Springhills Water Management District's

Management Plan

Renamed:
Bandera County River Authority and
Groundwater Dist.

As Adopted

20 August, 1998

TABLE OF CONTENTS

INTRODUCTION

Texas Water Code Background

In 1917, an amendment to the Texas Constitution was added, Article XVI, Section 59 allowing for the creation of CONSERVATION AND DEVELOPMENT OF NATURAL RESOURCES; CONSERVATION AND RECLAMATION DISTRICTS. Through this amendment, all of the various types of water districts were created. Underground water conservation districts, or groundwater conservation districts as they are currently called, have been authorized and created since 1949 in Texas by authority of Article III, Section 52, or Article XVI, Section 59, of the Texas Constitution. Each water district is created with specific authorities, listed in their enabling legislation, which address the needs and functions necessary for the district's region. The different authorities are stated in the different chapters of the Texas Water Code.

BANDERA COUNTY RIVER AUTHORITY

Background

The Bandera County River Authority was created by the 62nd Texas Legislature in 1971. As a conservation and reclamation district it was created under and pursuant to Article XVI, Section 59, of the Texas Constitution. As defined by Article 8280-526, Vernon's Texas Civil Statutes, the River Authority encompassed all of the territory contained in Bandera County except the territory included in the Bandera County Fresh Water Supply District No. 1 and the Bandera County Water Control and Improvement District No. 1.

The Bandera County River Authority, whose authority was incorporated into the Springhills Water Management District, was a springboard for the creation of the joint surface and groundwater district.

Beginning with the reorganization of the River Authority Board of Directors in 1985, the Directors began working with State and local officials, and concerned citizens to determine the most advantageous method to manage groundwater in Bandera County. After numerous public meetings the decision was made to pursue legislation creating a joint surface and groundwater district in Bandera County. The result was the creation and confirmation of the Springhills Water Management District.

Enabling Legislation

The Bandera County River Authority was created under House Bill 988 under and pursuant to the provisions of Article XVI, Section 59, of the Texas Constitution, as a conservation and reclamation district. According to those provisions, the River Authority shall have and exercise, and is hereby vested with, all of the rights, powers, privileges, authority and duties conferred and imposed by the general laws of this state now in force or hereafter enacted, applicable to water control and improvement districts created under authority of Article XVI, Section 59 of the Texas Constitution; but to the extent that the

provisions of any such general laws may be in conflict or inconsistent with the provisions of this Act, the provisions of this Act shall prevail. All such general laws are hereby adopted and incorporated by reference with the same effect as if incorporated in full in this Act.

Texas Water Code Chapters

At the time of the Bandera County River Authority's conception, water control and improvement districts originally fell under Chapters 50, and 51.

Ch. 50 - *Provisions Generally Applicable to Districts*, an administrative chapter.

Ch. 51 - *Water Control and Improvement Districts*, specific authority granted to water control and improvement districts.

Major portions of these Chapters were repealed and replaced by Chapters 49 and 59, which were enacted in 1995 by the 74th Legislature. Chapter 49 is the chapter applicable to Springhills Water Management District, when the District utilizes its water control and improvement authority.

Ch. 49 - *Provisions Applicable to All Districts*, an administrative chapter applicable to any conservation and reclamation district unless superseded by another chapter of the Texas Water Code. (This chapter is applicable to Springhills Water Management District only when the water control and improvement district powers are used.)

SPRINGHILLS WATER MANAGEMENT DISTRICT

Background

The Springhills Water Management District's enabling legislation, appearing as Act of June 17, 1989, Ch. 654, 1989, Tex. Gen. Laws 2155 (Vernon), granted the District the rights, powers, privileges, authority, functions, and duties provided by Chapters 50 and 52, which are now provided by Chapter 36 of the Texas Water Code and the rights, powers, purposes, authority, and functions of the Bandera County River Authority. The legislation defines the District's boundaries as all of the territory contained within Bandera County. The legislation further stipulates that the Board of Directors will be composed of nine (9) directors. The directors will be elected from commissioner precincts and one director at large.

The Springhills Water Management District is continuing all of the programs and activities initiated by the River Authority, and implementing the programs required of a groundwater conservation district

Enabling Legislation

Springhills Water Management District was created under Senate Bill 1636. The District has all of the rights, powers, privileges, authority, functions, and duties provided by the general law of this state, Chapter 36, Texas Water Code, applicable to underground water conservation districts created under Article XVI, Section 59, of the Texas Constitution. This Act prevails over any provision of general law that is in conflict or inconsistent with

this Act. As additional authority, the District may exercise the rights, powers, purposes, authority, and functions provided by Chapter 629, Acts of the 62nd Texas Legislature, Regular Session, 1971 (Article 8280-526, Vernon's Texas Civil Statutes).

Texas Water Code Chapters

At the time of Springhills conception, groundwater conservation districts originally fell under Chapters 50 and 52.

Ch. 50 - *Provisions Generally Applicable to Districts*, an administrative chapter.

Ch. 52 - *Underground Water Conservation Districts*, specific authority granted to underground water conservation districts.

Major portions of these Chapters were repealed and replaced by Chapters 36 and 49 which were enacted in 1995 by the 74th Legislature.

Ch. 36 - *Groundwater Conservation Districts*, contains specific administrative and other authorities granted to groundwater conservation districts and supersedes any conflict in administration or other authorities granted in Chapter 49.

Ch. 49 - *Provisions Applicable to All Districts*, an administrative chapter applicable to any conservation and reclamation district unless superseded by another chapter of the Texas Water Code. (This chapter is applicable to Springhills Water Management District only when the water control and improvement district powers are used.)

PURPOSE OF A DISTRICT

Water Control and Improvement District

51.121. Purposes of District -

(b) A water control and improvement district organized under the provisions of Article XVI, Section 59, of the Texas Constitution, may provide for:

(1) the control, storage, preservation, and distribution of its water and floodwater and the water of its rivers and streams for irrigation, power, and all other useful purposes;

(2) the reclamation and irrigation of its arid, semiarid, and other land which needs irrigation;

(3) the reclamation, drainage, conservation, and development of its forests, water, and hydroelectric power;

(4) the navigation of its coastal and inland water;

(5) the control, abatement, and change of any shortage or harmful excess of water;

(6) the protection, preservation, and restoration of the purity and sanitary condition of water within the state; and

(7) the preservation and conservation of all natural resources of the state.

(c) The purposes stated in Subsection (b) of this section may be accomplished by any practical means.

Chapter 36. Groundwater Conservation Districts
36.0015. Purpose -
In order to provide for the conservation, preservation, protection, recharging, and prevention of waste of groundwater, and of groundwater reservoirs or their subdivisions, and to control subsidence caused by withdrawal of water from those groundwater reservoirs or their subdivisions, consistent with the objective of Section 59, Article XVI, Texas Constitution, groundwater conservation districts may be created as provided by this chapter. Groundwater conservation districts created as provided by this chapter are the state's preferred method of groundwater management.

POWERS AND DUTIES

Specific authority is granted to Springhills Water Management District as applies through the different Chapters of the Texas Water Code. Under these sections of the Water Code, Springhills is given the following powers to manage Bandera County's water resources.

36.101. Rulemaking Power -

A district may make and enforce rules to provide for conserving, preserving, protecting, and recharging of the groundwater reservoir or its subdivisions in order to control subsidence or prevent waste of groundwater and to carry out the powers and duties provided by this chapter.

49.211. Powers -

(a) A district shall have the functions, powers, authority, rights, and duties that will permit accomplishment of the purposes for which it was created or the purposes authorized by the constitution, this code, or any other law.

(b) A district is authorized to purchase, construct, acquire, own, operate, maintain, repair, improve, or extend inside and outside its boundaries any and all land, works, improvements, facilities, plants, equipment, and appliances necessary to accomplish the purposes of its creation or the purposes authorized by this code or any other law. (This chapter of the Texas Water Code is applicable to Springhills Water Management District only when the water control and improvement district authority is used.)

TIME PERIOD FOR THIS PLAN

This plan becomes effective upon certification by the Texas Water Development Board (TWDB) and adoption by the Springhills Water Management District Board of Directors, and remains in effect until a revised plan is certified or September 1, 2008, whichever is earlier. The plan may be revised at anytime, or after five years when the plan will be reviewed to insure that it is consistent with the applicable Regional Water Plans and the State Water Plan.

LOCATION AND EXTENT

Bandera County lies in the south central part of Texas, in the hill country region of the Edwards Plateau. The County has an areal extent of 768 square miles, or 491,520 acres[1]. The County seat, the city of Bandera, is centrally located at the intersection of State Highways 16 and 173. Kerr, Kendall, Bexar, Medina, Uvalde, and Real Counties bound the County, in a clockwise pattern. Springhills Water Management District encompasses all of Bandera County.

MANAGEMENT OF GROUNDWATER SUPPLIES

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. 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. An observation network shall be established and maintained in order to monitor changing storage conditions of groundwater supplies within the District. The District will make a regular assessment of water supply and groundwater storage conditions and will report those conditions to the Board and to the public. The District will undertake, as necessary and cooperate with investigations of the groundwater resource within the District and will make the results of investigations available to the public upon adoption by the Board.

The District will adopt rules to regulate and protect the groundwater resource within the District. 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 limit groundwater withdrawals, the District will consider the public benefit against individual hardship after considering all appropriate testimony.

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

1) the purpose of the rules of the District;
2) the equitable distribution of the resource; and
3) 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 amounts which will not cause harm to the aquifer. 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 or revocation of a permit by the District will be based on aquifer conditions observed by the District. The District will 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, 36.102.

A contingency plan to cope with the effects of water supply deficits due to climatic or other conditions will be developed by the District and will be adopted by the Board after notice and hearing. In developing the contingency plan, the District will consider the economic effect of conservation measures upon all water resource user groups, the local implications of the degree and effect of changes in water storage conditions, the unique hydrologic conditions of the aquifers within the District and the appropriate conditions under which to implement the contingency plan.

The District will employ all technical resources at its disposal to evaluate the resources available within the District and to determine the effectiveness of regulatory or conservation measures. A public or private user may appeal to the Board for discretion in enforcement of the provisions of the water supply deficit contingency plan 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 FOR PLAN IMPLEMENTATION

The District will implement the provisions of this plan and will utilize the provisions of this plan as a guidepost for determining the direction or priority for all District activities. All operations of the District, all agreements entered into by the District and any additional planning efforts in which the District may participate will be consistent with the provisions of this plan.

The District will adopt rules to regulate and protect the groundwater resource within the District. The rules adopted by the District shall be pursuant to Texas Water Code, 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 conditions. In granting of 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. All activities of the District will be undertaken in cooperation and coordinated with the appropriate state, regional or local water management entity.

TOPOGRAPHY AND DRAINAGE

Ashworth (1983)$_2$ describes the topography as:

> "The land surface in Bandera County is characterized by rough and rolling terrain. The nearly flat-lying, erosion-resistive limestone rocks forming the surface of the Edwards Plateau have been deeply incised into the less resistive, marly limestone rocks on the Glen Rose Formation."

The altitude of the land surface ranges from approximately 2,330 to 1,080 feet above mean sea level.

Wermund (1974)$_3$ describes three different terrains in Bandera County as:

> Along the "....., Sabinal Rivers, the terrain comprises both highly dissected divides and incised stream valleys. About the Medina and Guadalupe Rivers, most terrain lies in broad valleys and less occupies narrow divides."

Bandera County contains parts of three major drainage basins. The Nueces River basin occupies approximately 25 percent of the County to the west and southwest, with drainage to the south. The San Antonio River basin occupies approximately 73 percent of the County; located from the north central, to the southeastern portion of the County, where the river has been dammed to form Medina Lake. Drainage from the San Antonio River basin is to the southeast. The Guadalupe River basin occupies approximately 2 percent of the County as a small portion of the central northern section. The two major rivers in the County are the Sabinal River located in the Nueces River basin, and the Medina River located in the San Antonio River Basin. The larger rivers are dominantly effluent and form wide valleys. Two dominant types characterize the smaller creeks and streams: the perennial spring-fed streams and the intermittent creeks that only transport precipitation runoff.

GROUNDWATER RESOURCES OF BANDERA COUNTY

The Trinity Group aquifer underlies all of Bandera County, underlying the Edwards Plateau aquifer in the northwest portion of the County and extending south into Medina and Uvalde counties and east into Kendall and Bexar counties. The Trinity Group aquifer is the primary source of groundwater in Bandera County. This aquifer is divided into three groups: the Upper Trinity, Middle Trinity, and Lower Trinity. The Upper Trinity aquifer contains the Upper Glen Rose Limestone. The Middle Trinity aquifer contains the Lower Glen Rose Limestone, the Hensell Sand, and the Cow Creek Limestone. The Lower Trinity aquifer is composed of the Sligo Limestone and Hosston Sands. The Trinity Group aquifer yields groundwater from the Upper and Lower units of the Glen Rose Formation; and the Hensell, Cow Creek, Sligo, and Hosston members of the Travis Peak Formation of the Trinity Group of Cretaceous age. Downdip from the outcrop area,

in the artesian pressure portion of the aquifer, groundwater production is used to meet the needs of public water supply, domestic, and livestock. Primary sources of recharge to the Trinity Group aquifer include the infiltration of precipitation on the outcrops to the north and northwest of Bandera County and infiltration of surface water from lakes and streams through vertical leakage from overlying formations. The Trinity Group aquifer primarily exists under water-table conditions along the outcrop and under artesian conditions downdip, where confining beds of limestone and shale bound the water-bearing units. Movement of shallow groundwater is primarily down gradient, from high to low elevations, and at right angles to the potentiometric surface contours, which denote the configuration of the water table. The overall groundwater movement is to the southeast with local movement away from groundwater highs and towards, the surface drainage system, with groundwater lows that have developed as a result of production in large well fields.

Alluvial deposits are found in the flood plain of the major tributaries of streams, which make up the surface drainage system in the county. The alluvial deposits are highly permeable with a maximum thickness of approximately 50 feet, small areal extent, and yield only small amounts of good quality water. Due to the naturally occurring anhydrate and gypsum beds, the overall quality of groundwater obtained from the Upper Trinity aquifer, which contains the Upper Glen Rose formation is of poor quality, with small yield. The Middle Trinity aquifer, which contains the Lower Glen Rose Limestone, Hensell Sand, and Cow Creek Limestone formations yield small to moderate amounts of water with a good to excellent water quality. The lower Trinity aquifer that contains the Sligo Limestone and Hosston Sand yields moderate to large quantities of water of good to excellent quality.

RECHARGE AND AVAILABILITY

Recharge

Currently, the District is using the Texas Water Development Board's estimation process, to generate descriptions of the aquifers as well as estimates of recharge and availability. It is estimated that annual recharge of 1.5%[4] occurs locally in Bandera County from the approximately 29 inches of annual rainfall[1] to the Trinity Group aquifer which equates to approximately 17,817.6 acre-feet per year.

Additional recharge through feasible methods could be obtained if the District where to implement a brush management program, such as juniper reduction in Bandera County. There are other benefits which would also be realized such as a reduction in precipitation interception, and increased infiltration. The following table illustrates the water balance differences experienced at the Texas Agricultural Experiment Station in Sonora, Texas[7].

	100% Grass	70% Grass 12% Oak 18% Juniper	40% Grass 24% Oak 36% Juniper
Rainfall	22.6	22.6	22.6
Interception Loss	3.0	6.3	9.6
Water Reaching the Soil	19.6	16.3	13.0
Runoff	0.2	0.2	0.2
Water Going in the Soil	19.4	16.1	12.8
Evapotranspiration	15.7	15.8	12.8
Deep Drainage	3.7	0.3	0.0

3.7 inches of Deep Drainage/year = 100,500 gallons/acre/year

Using the numbers obtained from the brush management experiment in Sonora, and assuming Bandera County contains a composition of 40% grass, 24% oak, and 36% juniper the following additional recharge is possible if the District where to implement a brush management plan to change the composition to 100% grass.

Rainfall:

- Bandera = 29 inches/year
- Sonora = 22.6 inches/year

Percent increase in rainfall from Sonora to Bandera: 29 - 22.6 = 6.4
(22.6/6.4) = 3.53, (100/3.53) = 28.3% increase in rainfall

Deep Drainage: Sonora = 3.7 inches/acre/year

- 3.7 inches/acre/year = 100,500 gallons/acre/year
- 28.3% increase from 3.7 inches = 1.04 ≅ 1.0 inch/acre/year increase in deep drainage
- 3.7 + 1.0 = 4.7 inches/acre/year deep drainage in Bandera

If: 3.7 inches = 100,500 gallons,
Then: (100,500/3.7) = 27,162 gallons/inch of deep drainage

- 4.7 inches deep drainage = 100,500 = 3.7
  27,162 = 1.0
  127,662 gal 4.7 inches

1 acre-foot = 325,080 gallons, gallons/acre/year of deep drainage from 29 inches of rainfall in Bandera = 127,662 gallons/acre/year
(127,662 gallons/acre/year)/(325,080 gallons/acre/year) = 0.39 ac-ft/(acre/year)

This is the amount of additional recharge per acre of land cleared that would be realized from clearing land with 40% grass, 24% oak, and 36% juniper to 100% grass. Thus each year, 0.39 acre-feet of additional recharge would be accrued for every acre cleared. The key is to establish an estimate for the number of acres that could feasibly be cleared in Bandera County.

To derive the final value for additional recharge if the District were to implement a brush management program the followings calculations could be used.

X = number of acres to be cleared
N = number of acre-feet of additional recharge, which could possibly be gained
0.39 x (X) = N

If the District were to implement a brush management program in which 100 acres of land were converted to 100% grass, then 39 acre-feet of additional recharge could possibly be gained.

Availability

Due to the absence of thorough data and studies performed for the Trinity Group aquifer in Bandera County a crude estimation of the water in storage shall be used. The Trinity Group aquifer storage within Bandera County shall be estimated by the simplification of considering the entire Trinity Group to be an unconfined aquifer. The average thickness of each unit, with the exception of the Hammett Shale that yields no water, will be used in conjunction, and assumed as the saturated thickness. With the assumption of an unconfined aquifer the storage coefficient shall be used as the specific yield.

Trinity Group Formation Thicknesses[5]:

Formation	Maximum Thickness (feet)	Minimum Thickness (feet)	Average Thickness (feet)
Upper Glen Rose	440	385	413
Lower Glen Rose	380	190	285
Hensell Sand	150	20	85
Cow Creek	60	50	55
Hosston/Sligo	335	260	298
	Average Total Formation Thickness (feet)		1136

The storage coefficient which shall be used as the specific yield is 0.00015[6].

Using these as generalized assumptions for the entire County. The following simplified equation may be used.

(491,520 acres in Bandera County) x (1,136 ft. avg. total formation thickness)
x (0.00015) = **83,755 acre-feet of storage in Bandera County**

The District believes that the Trinity Group aquifer estimates for Bandera County need to be improved before realistic production limits can prudently be determined.

GROUNDWATER USE IN BANDERA COUNTY

The most recent estimates for annual groundwater usage in the County has varied from a high of 2,321 acre-feet to a low of 1,846 acre-feet. Annual usage from available TWDB estimates for 1990 through 1995 are as follows:

1990	***1,990 acre-feet per year***
1991	***1,906 acre-feet per year***
1992	***1,846 acre-feet per year***
1993	***2,172 acre-feet per year***
1994	***2,266 acre-feet per year***
1995	***2,321 acre-feet per year***

These data were obtained from the Texas Water Development Board's annual survey of municipal and manufacturing water use and estimated irrigation water use program and other sources available to the District.

AQUIFER SUPPLY CAPABILITY

The TWDB published projected groundwater needs in their planning document "Water for Texas Today and Tomorrow, 1997". This management planning document is based upon the estimates contained in that document and related files of the Texas Water Development Board and will be used until alternatives are generated. The TWDB has projected that the total water demands for Bandera County will be 3714 acre-feet per year by 2050. The estimated amount of groundwater available within the county as sustainable yield is placed at 3,829 acre-feet per year. As a result, it would appear that there will be a surplus of 115 acre-feet per year in the year 2050 and no shortfall should occur. This will probably be the case for some of the county's aquifers and areas. However, there will probably be areas of the county where demand will be such that some of the aquifers will be in too great of stress to be able to meet demand.

PROJECTED DEMANDS FOR WATER IN BANDERA COUNTY

The TWDB published projected groundwater needs in their planning document "Water for Texas Today and Tomorrow, 1997". This management planning document is based upon the estimates contained in that document and related files of the Texas Water Development Board and will be used until alternatives are generated. The TWDB has projected that the total water demands for Bandera County will be 3714 acre-feet per year by 2050. This estimate is based on projections of the following breakdown and population statistics. Bandera City will have a demand of 445 acre-feet per year by the year 2050. The projected population for Bandera City in 2050 is 2243. The projected demands and population for the rest of Bandera County are 2664 acre-feet per year and 28,502 respectively for 2050. Projected irrigation demands are 223 acre-feet per year, domestic

and stock demands are 333 acre-feet per year for 2050. Manufacturing and mining projected demands are 22 acre-feet and 27 acre-feet respectively. Total projected demands in 2050 will be 3714 acre-feet per year.

PURPOSE

The purpose of this management plan is to provide an understanding of the water resources in Bandera County and the concerns surrounding those resources. Additionally, this plan will stipulate those activities and programs currently in place to address water quantity and quality concerns, and most importantly, this plan will delineate additional steps necessary to protect and preserve the water resources in Bandera County.

It is important to remember that this plan, as with all plans, is a working document, providing structure to a dynamic process. As more data is collected and interpreted elements may change in the process necessitating changes in the plan. It is, therefore, imperative that this management plan be periodically reviewed and, if the situation warrants, amended in order to effectively preserve and protect water quantity and water quality.

GOALS

In accordance with the directive in Chapter 36, Texas Water Code, to formulate a management plan, the Springhills Water Management District has established four (4) long-range goals to direct the District's activities and programs. The goals established in Senate Bill 1 (SB 1) as required contents have been combined into the District's original management plan goals to allow for continuity between the original plan and its current revision. The goal of "providing the most efficient use of groundwater" has been combined into the District's goal one (1). The goal of "controlling and preventing waste of groundwater" has been combined into the District's goals two (2) and four (4). The goal of "addressing conjunctive surface water management issues" has been combined into the District's goal three (3). The goals are as follows:

1. To ensure that both surface and groundwater in the District are used in a manner most beneficial to the citizens of the District.

2. To ensure that both surface and groundwater quality and the historic uses of these waters in the District are not impaired for the generations to follow.

3. To address conjunctive surface water and ground water issues.

4. To develop and promote programs and rules that encourage wise water use and water conservation.

The goals established in the management plan for the Springhills Water Management District shall be attained through the implementation of the programs and activities listed below in outline form.

GOALS, MANAGEMENT OBJECTIVES AND PERFORMANCE STANDARDS

Goal 1.0 To ensure that both surface and groundwater in the District are used in a manner most beneficial to the citizens of the District.

Management Objective

1.1 Maintain and annually measure the static level of 60 percent of the wells in the District's current groundwater monitoring network of six wells to monitor and improve the basic understanding of groundwater conditions within the District.

Performance Standards

1.1a - Percentage of monitoring wells measured by the District, which are currently used for the water level monitoring network in the Trinity Group aquifer, annually.

Management Objective

1.2 Review the District's current monitoring well network for viability every two years, and revise as necessary. A monitoring well's viability will be evaluated based on the criteria set by the District. Maintaining each monitoring well as long as the well proves viable and phase new, more effective monitoring wells into the network if necessary. (Implement by January 1, 2000)

Performance Standards

1.2a - Establish criteria for the monitoring well network. (Implement by January 1, 2000.)

1.2b - Assessment, every two years, of each well in the network for viability. Document the reason for retention, addition and/or deletion of wells from the monitoring network.

Management Objective

1.3 Enter all monitoring data into the District's database, annually.

Performance Standards

1.3a - Number of static levels entered into the District's database, annually.

Management Objective

1.4 Disseminate upon request, or at least annually, educational information regarding issues such as either water conservation or the status of aquifers annually through either one article in a newspaper of general circulation, educational material, or through public speaking. (Implement by January 1, 1999.)

Performance Standards

1.4a - Number of newspaper articles generated on the results of data collection activities in District, annually.

1.4b - Number of public speaking engagements, annually.

Methodology for District tracking of progress towards achievement of management goals.

Management Objective

1.5 Provide the Board with an annual report describing the District's monitoring program and any modifications implemented or recommended for implementation by January 30, 1999 and every year thereafter.

Performance Standards

1.5a - Number of reports provided annually to Board on status of monitoring program.

1.5b - An annual report maintained on file at the District office.

Goal 2.0 To ensure that both surface and groundwater quality and the historic uses of these waters in the District are not impaired for the generations to follow.

Management Objective

2.1 Monitor the District's current surface water quality network of 30 sites to observe and improve the awareness of surface water quality within the District. Monitor and analyze the surface water quality annually of 60 percent of the District's current surface water monitoring network.

Performance Standards

2.1a - Monitor and analyze 60 percent of the surface water quality monitoring network, annually.

Management Objective

2.2 Review and revise the District's current surface water monitoring network for viability every two years or as necessary. A surface water monitoring site's viability will be evaluated based on criteria set by the District. Maintaining each surface water monitoring site as long as the site proves viable and phase new, more effective sites into the network if necessary. (Implement by January 1, 2000)

Performance Standards

2.2a - Establish criteria for the surface water monitoring network by January 1, 2000.

2.2b - Assessment, every two years, of each site in the network for viability. Document the reason for retention, addition and/or deletion of site from the monitoring network.

Management Objective

2.3 Enter all surface water site monitoring data into the District's database, annually.

Performance Standards

2.3a - Number of sites entered into the database, annually.

Management Objective

2.4 Maintain and annually analyze the groundwater quality of 60 percent of the wells in the current groundwater monitoring network of six wells to observe and improve the basic understanding of groundwater quality conditions within the District.

Performance Standards

2.4a - Percentage of wells tested for groundwater quality annually by the District, which are currently used for the groundwater monitoring network in the Trinity Group aquifer.

Management Objective

2.5 Review the District's current monitoring well network for viability every two years, and revise as necessary. A monitoring well's viability will be evaluated based on the criteria set by the District. Maintaining each monitoring well as the well proves viable and phase new, more effective monitoring wells into the network if necessary. (Implement by January 1, 2000)

Performance Standards

2.5a - Establish criteria for the monitoring well network. (Implement by January 1, 2000)

2.5b - Assessment, every two years, of each well in the network for viability. Document the reason for retention, addition and/or deletion of wells from the monitoring network.

Management Objective

2.6 Enter all groundwater analysis data into the District's database, annually.

Performance Standards

2.6a - Number of groundwater analysis data entered into the database, annually.

Management Objective

2.7 Initiate a public water quality testing program, available upon request, for water wells in Bandera County to allow the District and residents of Bandera County to monitor individual water well's quality. (Implement by September 1, 1998)

Performance Standards

2.7a - Number of public water quality test performed, annually.

Management Objective

2.8 Enter all public groundwater analysis data into the District's database, annually.

Performance Standards

2.8a - Number of public groundwater analysis data entered into the District's database, annually.

Management Objective

2.9 Disseminate, upon request, educational information at least once a year regarding the current conservation practices for efficient use of water resources. (Implement by December 31, 1999)

Performance Standards

2.9a - Number of District demonstrations of conservation practices applicable to District made, annually.

2.9b - Number of water conservation literature handout packets made available to District patrons and educational institutions, annually.

Management Objective

2.10 Implement a program to create standards for more efficient groundwater management practices. (Implement by January 1, 2001)

Performance Standards

2.10a - Number of reports on effectiveness of standards and timeliness of goals to the Board of Directors. (Implement by January 1, 2001)

Management Objective

2.11 Determine all definitions of aquifer conditions to be used as trigger mechanisms to implement emergency drought management plans by December 30, 2005 and provide to Regional Planning Group. Review every 5 years.

Performance Standards

2.11a - Adopt all trigger mechanisms definitions. (Implement by 30 December 2005.)

Management Objective

2.12 Establish an alternative fund to provide for financial assistance to encourage the conservation and efficient use of the District's water resources. (Initiate January 1, 1999)

Performance Standards

2.12a - Establish an alternative fund account. (Implement by January 1, 1999.)

Management Objective

2.13 Implement and enforce a system of rules for the drilling, completing and equipping of 100 percent of all water wells by January 1, 1999.

Performance Standards

2.13a - Percentage of new wells annually constructed to standards as set forth in District rules.

Management Objective

2.14 Initiate a District wide program to identify the location of abandoned* wells by January 1, 2000. Report unplugged abandoned water wells to the well owners within sixty (60) days and to the Board annually, upon date of discovery.

Performance Standards

2.14a - Average number of days required to report abandoned water wells to owner, annually.

Management Objective

2.15 Develop and adopt a District well plugging program and adopt necessary District Rules to allow for enforced plugging of wells, to be initiated by January 1, 1999.

Performance Standards

2.15a - Number of wells which are plugged in the District, annually.

Management Objective

2.16 Disseminate upon request, or at least annually, educational information, regarding issues such as either water conservation, the hydrologic cycle, water issues, District activities, water quality, or the status of aquifers annually through either one article in a newspaper of general circulation, educational material, or through public speaking. (Initiate by January 1, 1999)

Performance Standards

2.16a - Number of newspaper articles generated on the results of data collection activities in District, annually.

2.16b - Number of public speaking engagements, annually.

Methodology for District tracking of progress towards achievement of management goals.

Management Objective

2.17 Provide the Board with an annual report describing the District's monitoring program and progress towards the District's goals, and any modifications implemented or recommended for implementation by January 30, 1999 and every year thereafter.

Performance Standards

2.17a - Number of reports provided annually to Board.

2.17b - An annual report maintained on file at the District office.

Goal 3.0 To address conjunctive surface water and ground water issues.

Management Objective

3.1 The District will make an evaluation of groundwater resources and surface water quality for Bandera County and report annually to Commissioner's Court on status of groundwater in Bandera County. (Implement by January 1, 2000)

Performance Standards

3.1a - Number of reports provided annually to Commissioner's Court.

3.1b - An annual report maintained on file at the District's office, each year.

Methodology for District tracking of progress towards achievement of management goals.

Management Objective

3.2 Provide the Board of Directors with an annual report describing the status of attaining the District's goals and any modifications implemented or recommended for implementation by January 30, 1999 and every year thereafter.

Performance Standards

3.2a - Number of reports provided annually to Board.

3.2b - An annual report maintained on file at the District's office, each year.

Goal 4.0 To develop and promote programs and rules that encourages wise water use and water conservation.

Management Objective

4.1 Coordinate an emergency response/drought contingency planning with all public water supply purveyors. (Implement by January 1, 2001)

Performance Standards

4.1a - Review all public water supply purveyors drought contingency plan. (Implement by January 1, 2001)

4.1b - Number of documented inputs provided for the development of the Regional Drought Management Response Plan, annually.

Management Objective

4.2 Disseminate, upon request educational information, at least annually, regarding issues such as either water conservation, the hydrologic cycle, water issues, District activities, water quality, or the status of aquifers annually through either one article in a newspaper of general circulation, educational material, or through public speaking. (Implement by January 1, 1999)

Performance Standards

4.2a - Number of newspaper articles generated on the results of data collection activities in District newsletter, annually.

4.2b - Number of public speaking engagements, annually.

Methodology for District tracking of progress towards achievement of management goals.

Management Objective

4.3 Provide the Board of Directors with an annual report describing the District's monitoring program and any modifications implemented or recommended for implementation by January 30, 1999 and every year thereafter.

Performance Standards

4.3a - Number of reports provided annually to Board on status of monitoring program.

4.3b - An annual report maintained on file at the District office.

SB-1 MANAGEMENT GOALS DETERMINED NOT-APPLICABLE

Goal **Control and prevention of subsidence.**

Goal **Natural resource management issues which impact the use and availability of groundwater and which are impacted by the use of groundwater in the District.**

SUMMARY DEFINITIONS

"Abandoned Well" - Shall mean a well or borehole the condition of which is causing, or is likely to cause, pollution of groundwater in the District and includes a well which is or is not in use or not in compliance with applicable law, including the Rules and Regulations of the District, the Texas Water Well Driller's Act, Texas Natural Resource Conservation Commission, Texas Department of Licensing and Regulation or any other state or federal agency or political subdivision having jurisdiction, if presumed to be an abandoned or deteriorated well.

"Waste" - As defined by Chapter 36 of Texas Water Code means any one or more of the following:

1. Withdrawal of groundwater from a groundwater reservoir at a rate and in an amount that causes or threatens to cause intrusion into the reservoir of water unsuitable for agricultural, gardening, domestic, or stock raising purposes;

2. The flowing or producing of wells from a groundwater reservoir if the water produced is not used for a beneficial purpose;

3. Escape of groundwater from a groundwater reservoir to any other reservoir or geologic strata that does not contain groundwater;

4. Pollution or harmful alteration of groundwater in a groundwater reservoir by salt water or by other deleterious matter admitted from another stratum or from the surface of the ground;

5. Willfully or negligently causing, suffering, or allowing groundwater to escape into any river, creek, natural watercourse, depression, lake, reservoir, drain, sewer, street, highway, road, or road ditch, or onto any land other than that of the owner of the well unless such discharge is authorized by permit, rule or order issued by the Commission under Chapter 26 of the Texas Water Code;

6. Groundwater pumped for irrigation that escapes as irrigation tailwater onto land other than that of the owner of the well unless permission has been granted by the occupant of the land receiving the discharge; or

7. For water produced from an artesian well "waste" has the meaning assigned by Section 11.205 of the Texas Water Code.

"District" - The Springhills Water Management District.

"Board" - The Board of Directors of the Springhills Water Management District.

SELECTED REFERENCES

1) 1971, Soil Survey of Bandera County, Texas: United States Department of Agriculture Soil Conservation Service *in cooperation with* Texas Agricultural Experiment Station, pg. 1
2) Ashworth, J. B., 1983, Ground-water availability of the Lower Cretaceous formations in the hill country of south-central Texas: Texas Department of Water Resources, Report 273, pg. 2
3) Wermund, E. G., editor, 1974, Environmental units in carbonate terraces as developed from a case study of the southern Edwards Plateau and adjacent interior coastal plain, *in* Approaches to environmental geology. A colloquium and workshop: University of Texas, Bureau of Economic Geology Rept. of Inv. No. 81, pg 52-78
4) Muller, D. A. and Price, R. D., 1979, Ground-water availability in Texas estimates and projections through 2030: Texas Department of Water Resources Report 238, pg.
5) Reeves, R. D. and Lee, F. C., 1962, Ground-water geology of Bandera county, Texas: Texas Water Commission, Bulletin 6210, pg. 9-14
6) Bradley, R. G., Coker, D. B., and Moore, S. W., 1997, Open-File Report, Data and results from an aquifer test performed at the Medina Water Supply Corporation well field, Medina, Texas: Texas Water Development Board, pg. 2
7) Thomas, T. L. and Hester, J. W., 1997, How an increase or reduction in juniper cover alters rangeland hydrology. Juniper 1997 Synposium: Texas Agricultural Experiment Station, Technical Report 97-1, pg. 4-19

This Management Plan was formally adopted following a Public Hearing and will be effective on the date of signature.

Signed this 20th day of August, 1998.

James Chastain, President

Attest: Jerry Sides

Jerry Sides, Secretary

SPRINGHILLS WATER MANAGEMENT DISTRICT

TEL: 830-796-7260 FAX: 830-796-8262

August 25, 1998

Mr. Craig D. Pedersen
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Mr. Pedersen:

Please find enclosed Springhills Water Management District's Management Plan, as approved and formally adopted by the SWMD Board of Directors following the public hearing held on Thursday, August 20, 1998. In addition, a copy of the posted Notice of Public Hearing filed with the Bandera County Clerk along with the general circulation newspaper article, which was published in the Bandera Review, are being provided.

Also enclosed, you will find a copy of the letter sent from this office following the public hearing to the BMA Water Control and Improvements District #1 requesting review and comment. No written response has been received to date from Mr. Johnny Ward, BMA General Manager.

Should you have any questions or need further assistance, please do not hesitate to contact me at (830) 796-7260 or Email me at swmd@hctc.net.

Respectfully Submitted,

Cameron E. Cornett
General Manager

4 Enclosures:
Certified SWMD Management Plan
Public Hearing Notice
Newspaper Publication
SWMD Ltr, August 21, 1998

cc: Randy Williams, TWDB Technical Coordinator

SPRINGHILLS WATER MANAGEMENT DISTRICT

TEL: 830-796-7260 FAX: 830-796-8262

NOTICE
SPRINGHILLS WATER MANAGEMENT DISTRICT
PUBLIC HEARING AND CALLED MEETING
August 20, 1998

Notice is hereby given that a Public Hearing of the Board of Directors for Springhills Water Management District (SWMD) will be held on Thursday, August 20, 1998, beginning at 7:00 p.m., at 202 Twelfth Street (Old County Jail), Bandera County, Texas, to receive public comment on the SWMD Management Plan. Copies of the Management Plan may be obtained from the SWMD Office at the address listed above. A Called Meeting of the Board of Directors for Springhills Water Management District (SWMD) will be held immediately following the Public Hearing at which time the following items will be discussed and possible action taken, to wit:

Public Hearing:

I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum and Compliance with Texas Open Meetings Law.
II. Receive Public Comment.
III. Adjournment.

SWMD Called Meeting:

I. Call to Order, Roll Call, Pledge of Allegiance, Certification of Quorum and Compliance with Texas Open Meetings Law.
II. Approval of Minutes.
III. General Manager's Report.
IV. Joe Cantu to Address the Board on the Alamo Resource Conservation and Development Area, Inc.
V. Adoption of SWMD Management Plan.
VI. EAA's Rain Enhancement Program.
VII. Adjournment.

This notice is published pursuant to the Texas Open Meeting Act, TEX. REV. COV. STAT. ANN., Article 6252-17.

Dated this 17th day of August, 1998.

Cameron E. Cornett, General Manager

I hereby certify that the above Notice of Meeting of the Board of Directors for Springhills Water Management District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on August 17, 1998, at 4:00 p.m., in its administrative office in Bandera, Bandera County, Texas at a place convenient and readily accessible to the general public at all times; that a true and correct copy of said Notice was furnished to the County Clerk of Bandera County; and that a copy of said Notice was furnished to each director.

Cameron E. Cornett, General Manager

FILED
This 17 Day of Aug A.D. 1998
At 3:55 O'Clock P M
County Clerk Bandera County, Texas
By ..... Deputy

SPRINGHILLS WATER MANAGEMENT DISTRICT

TEL: 830-796-7260 FAX: 830-796-8262

August 21, 1998

BMA Water Control & Improvements District #1
ATTN: Johnny Ward
P.O. Box 170
Natalia, TX 78059

Dear Mr. Ward:

Please find enclosed Springhills Water Management District's Management Plan, which was the subject of a public hearing held Thursday evening, August 20, 1998, in which the SWMD Board of Directors received public comments regarding the plan. The District requests that BMA Water Control and Improvements District #1 also review the enclosed and provide this office with any comments deemed pertinent to the plan as soon as possible so that we may submit the final plan, as adopted, to the Texas Water Development Board for approval.

Should you have any questions or need further assistance, please do not hesitate to contact me at (830) 796-7260 or Email me at swmd@hctc.net.

Respectfully Submitted,

Cameron E. Cornett
General Manager

1 Enclosure:
SWMD Management Plan

202 Twelfth Street P.O. Box 771 Bandera, Texas 78003-0771

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PUBLIC NOTICES

NOTICE TO LINDA MARKS & RICK JAMES

Two notices will be printed. Then paragraph II on your contract will be enforced.
Sids Self Storage

PUBLIC NOTICE

NOTICE TO BRIDGET SAB

Two notices will be printed. Then Paragraph II on your contract will be enforced.
Sids Self Storage

NOTICE OF PUBLIC HEARING

Springhills Water Management District (SWMD) will hold a Public Hearing of the Board of Directors this Thursday, Aug. 20, 1998 at 7:00 pm at the District office located at 202 Twelfth St. (Old County Jail), Bandera County, Bandera, Texas to receive public comments on the SWMD Managment Plan. Copies of the Management Plan may be obtained from the SWMD office at 202 Twelfth Street (Old County Jail) in Bandera, Texas. District hours are 8:00-12:00 and 1:00-5:00 p.m. Monday throught Friday.

NOTICE OF INTENTION TO INCORPORATE

Notice is hereby given that BARTON BACK-HAUL, whose principal business office is in Medina, Bandera County, Texas, intends, on or before July 20, 1998, to become incorporated without a change in firm name.