

HEADWATERS GROUNDWATER CONSERVATION DISTRICT

Gordon Morgan
President

Joseph D. Cavazos
Vice-President

Mike Allen
Secretary-Treasurer

James F. Hayes
Director

Paul M. Siemers, III
Director

Lon Langley
General Manager

September 23, 2003

Mr. Kevin Ward
Executive Administrator
Texas Water Development Board
P.O. Box 13231
Austin, Texas 78711

RE: Headwaters Groundwater Conservation District Management Plan

Dear: Mr. Ward:

The Headwaters Groundwater Conservation District is pleased to submit to the Texas Water Development Board for administrative approval the District's Water Management Plan.

Enclosed are the Water Management Plan and the following supporting documents.

- 1) District Water Management Plan
- 2) Copy of Resolution by Board of Directors adopting plan
- 3) Copy of Public Notice and Agenda
- 4) Copy of letters to the Region J Regional Water Planning Group (RWPG), City of Kerrville, and Upper Guadalupe River Authority with copies of certified mail return receipts, as evidence of coordination with RWPGs, and surface water entities.

If you have any questions or need further assistance, please feel free to contact me at (830) 896-4110, or via email at llangley@hgcd.org.

Respectfully,



Lon Langley
General Manager

1418 Sidney Baker
Live Oak Plaza
Kerrville, Texas 78028

Bus (830) 896-4110
Fax (830) 257-3201

Llangley@hgcd.org
Gene@hgcd.org
Maria@hgcd.org

Headwaters Groundwater Conservation District

Groundwater Management Plan

Board of Directors

Gordon Morgan, President
Joseph D. Cavazos, Vice President
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Paul M. Siemers

General Manager

Lon Langley

Headwaters Groundwater Conservation District
1418 Sidney Baker North
Kerrville, Texas 78028

(830) 896-4110
(830) 868-0376 FAX

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District Mission

The Headwaters Groundwater Conservation District (HGCD) will develop, promote, and implement water conservation, augmentation and management strategies to protect the water resources of the District as a sustainable resource for the benefit of its citizens, economy and environment.

Time Period For This Plan

This plan as amended becomes effective upon certification by the Texas Water Development Board (TWDB) and incorporates a planning period of ten years in accordance with 31TAC §356.5(a). The plan may be revised at any time, or after five years in 2008 when the plan will be reviewed to insure it is consistent with the Regional Water Plan and the State Water Plan. This plan has been reviewed in 2003 and required changes have been made and adopted by the HGCD Board on September 19, 2003 and is being submitted to the TWDB for certification. 9

Statement of Guiding Principles

The District recognizes that the groundwater water resources of the region are of vital importance. The preservation of this valuable resource can be managed in a prudent and cost effective manner through regulation and permitting. The greatest threats to preventing the District from achieving the stated mission are inappropriate management, based in part on a lack of understanding of local conditions, and abuse of the resources in surrounding areas. A basic understanding of the aquifers and resources is the foundation from which to build prudent planning measures. This planning must also consider and apply sound principles of conjunctive management of both surface and groundwater to ensure correct management of the total water resources within the District. This management document is intended as a tool to focus the thoughts and actions of those given the responsibility for the execution of District activities. The District Board will review the status of all performance standards in this plan annually.

District Creation and History

The District was created by HB No. 1463, Chapter 693 of the Texas Legislature, dated January 16, 1991, signed by Governor Ann Richards and filed in the Office of the Secretary of State at 4:00 PM, January 16, 1991. The Board of Directors is composed of five members who serve four-year rotating terms, with two members and three members elected on the odd years. The current Board of Directors are Gordon Morgan, President, Joseph D. Cavazos, Vice President, Mike Allen, Secretary/Treasurer, James F. Hayes, Director, and Paul M. Siemers, Director.

Demographics

The District boundaries are contiguous with that of Kerr County, Texas. Kerr County encompasses 1,106 square miles and is located in the Hill Country of southwest Central Texas. The county is bounded on the north by Kimble and Gillespie counties, on the east by Kendall County, on the west by Edwards and Real Counties and on the south by Bandera and Real Counties. Kerrville, the largest city in the county, is also the county seat for Kerr County.

The Kerr County population was 43,822 in 2000 according to population estimates prepared by the TWDB from data developed and submitted by RWPG Region J. According to these estimates, population projections for the 50-year planning period are 52,124 (2010), 60,492 (2020), 68,494 (2030), 76,791 (2040), and 85,669 (2050). The growth is largely due to the influx of retirees and people moving from more urbanized locations.

Retirement living, private camps, resorts, hunting, and medical services dominate the economy in Kerr County. Agriculture, light industry and manufacturing contribute to the economy to a lesser extent.

Topography and Climatic Conditions

The predominantly rough and rolling topography of Kerr County is characteristic of the Edwards Plateau or Hill Country region. In the western part of Kerr County the land surface is gently rolling, interrupted by steep slopes and narrow valleys caused by the erosion of resistant limestone beds. Extensive dissection of the plateau in the eastern part of the county has formed wide valleys separated by high hills of generally uniform altitude. The altitude of the land surface ranges from about 1,400 MSL ft. at the southeastern edge of the county to about 2,400 feet in the western part (Reeves, 1969). Historically, the vegetative cover was considered to be an oak and juniper savannah. Presently, second and third growth juniper is increasing in density to the point of being dominant.

Most of Kerr County is drained by the upper Guadalupe River (approximately 75%), which rises in the western part of the county and flows eastward for approximately 40 miles before exiting the county. The Llano and Pedernales Rivers to the north and the Medina River to the south drain small peripheral areas of the county amounting to less than 25 percent of the total area (Reeves, 1969).

Kerr County has a subhumid to semiarid climate coupled with mild winters and hot summers. Annual rainfall from 1961-1990 ranges from about 32 inches on the eastern edge to about 26 inches on the northwestern edge of the county (Plateau Regional Water Plan, Fig. 1-4). Net Lake surface evaporation ranges from approximately 45 inches per year in the eastern part of the county to about 55 inches per year in the western part (Plateau Regional Water Plan, Fig. 1-5).

Water Resources of Kerr County

Groundwater Resources of Kerr County

The Trinity Aquifer is the principal source of groundwater in Kerr County. The Trinity Aquifer in the Hill Country is an extension of the lower part of the Edwards-Trinity Aquifer of the Edwards Plateau, with the Edwards group and its equivalents mostly removed. The Trinity Aquifer yields water from Cretaceous limestone and sand of the Trinity Group. The Trinity Aquifer is composed of three permeable zones separated by two relatively impermeable horizontal barriers. The Upper Trinity is made up of the upper member of the Glen Rose Limestone formation. The Middle Trinity is composed of the Lower Glen Rose Limestone, the Hensell Sand, and the Cow Creek Limestone formations. The Lower Trinity consists of the

Hosston and Sligo Formations. Relatively impermeable tight sediments within the Glen Rose Limestone separate the Upper and Middle Trinity. The Hammett Shale separates the Middle and Lower Trinity. Recharge of the Trinity Aquifer occurs through lateral flow of water from the Edwards Plateau, infiltration of precipitation on the outcrop area, and surface water leakage from shallow tributary streams in upland areas. Relatively impermeable inner beds in the Upper and Middle Glen Rose Limestone generally impede the downward percolation of precipitation.

A second, less reliable, aquifer in Kerr County is the Fort Terrett Formation of the Edwards Group. Erosion caused by stream flow off the edge of the Edwards Plateau trending eastward across Kerr County has removed most of the Fredericksburg and Washita strata. Unconfined conditions prevail over parts of the county, varying greatly in response to diverse geologic conditions and topographic effects. The production of wells in the Fort Terrett Formation is usually confined to domestic and stock use, but is essential in maintaining streamflow of the Guadalupe River.

Projected Total Water Supplies

The estimated maximum amount of groundwater for the 50-year planning period that can be obtained from each aquifer in Kerr County is listed in Table 1, below. Groundwater availability for the district is based on information derived from Table 3-1 of the January 2001 Plateau (Region J) Regional Water Plan. The availability of groundwater, according to the Plateau Regional Water Plan, is defined as the total amount of water retrievable from the entire extent of the aquifer during a 1-year drought, assuming that wells are spread evenly over the extent of the aquifer. The Plan states that this assumption is not practical as a well has a finite radius from which it intercepts and pulls water. The Plan concludes by stating that availability based on limited radius around a given well is very useful for actual groundwater evaluation because groundwater is shared between wells and not from the entire aquifer.

The Plateau Regional Water Plan shows water levels are about 50 feet lower than during normal months. To represent reduced availability, during a drought, 50 feet is subtracted from the thickness of normal static water levels. Since the aquifers within the Plateau Region are predominantly fractured limestones, sandstones and shales, a conservative storage coefficient of one percent (0.01) was first applied to the total aquifer volumes of the Trinity age rocks and 2 percent (0.02) to the Edwards limestone. This was done because of the relative differences in transmissivities of the two units. Since it was determined not to be economically or physically realistic to spread wells evenly throughout the extent of the aquifer, a conservative 30 percent recoverable yield was applied to the calculated total storage volumes (Plateau Regional Water Plan, 2001).

The volume of groundwater in an aquifer is referred to as "storage". Storage is determined by the thickness of the saturated section and the porosity of the aquifer. Not all of the water in storage is recoverable because it is bound by capillary forces within the pore spaces. The amount assumed to be recoverable is determined by the "specific yield", which is the volume of water that will drain, under force of gravity, from the pore spaces of an aquifer. Specific yield is related to the permeability of an aquifer. Yields are higher for coarse-grained materials than fine-grained materials although both may hold large volumes of water. Aquifers that are composed of

coarse-grained materials may be more productive than aquifers consisting of fine-grained materials. "Specific retention" refers to the volume of water that does not drain. Specific yield and specific retention are equal to the effective porosity or storage coefficient of an aquifer (Plateau Regional Water Plan, 2001).

Table 1

**Estimated Total Water Supply Available Under Drought of Record Conditions
(acre-feet)**

| Ground-Water Source | River Basin | S2000 | S2010 | S2020 | S2030 | S2040 | S2050 |
|---------------------------|-------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Trinity | Guadalupe | 178,100 | 173,700 | 168,900 | 163,700 | 158,000 | 151,600 |
| Trinity | San Antonio | 26,100 | 26,100 | 26,100 | 26,100 | 26,100 | 26,100 |
| Edwards-Trinity (Plateau) | Colorado | 192,200 | 192,200 | 192,200 | 192,200 | 192,200 | 192,200 |
| Edwards-Trinity (Plateau) | Guadalupe | 505,300 | 505,300 | 505,300 | 505,300 | 505,300 | 505,300 |
| Edwards-Trinity (Plateau) | San Antonio | 26,600 | 26,600 | 26,600 | 26,600 | 26,600 | 26,600 |
| Edwards-Trinity (Plateau) | Nueces | 17,800 | 17,800 | 17,800 | 17,800 | 17,800 | 17,800 |
| Total | | 946,100 | 941,700 | 936,900 | 931,700 | 926,000 | 919,600 |

Table 2, below defines estimated groundwater availability by aquifer subunits and is based on information from Table 3-2 of the January 2001 Plateau (Region J) Regional Water Plan. The total water available was determined by adding the total recoverable water and the drought recharge. Included in Table 2 is drought recharge for each aquifer subunit. Drought recharge is defined as 2% of the average rainfall, except for the Trinity aquifer in the San Antonio and Guadalupe River basins in Kerr County where recharge is 1% of the average rainfall (Plateau Regional Water Plan, 2001). The total recharge under drought conditions is estimated to be 34,919 ac/ft. The average annual effective recharge rates expressed as percent of rainfall are about 4% (Mace, et al.). These recharge numbers will be used until the model is more refined and better data is available.

Table 2

Estimated Total Water Supply Available Under Drought of Record Conditions By Aquifer Subunits

| River Basin | Aquifer | Aquifer Subunit | Area (acres) | Total Recoverable Water (ac-ft) | Drought Recharge** (ac-ft/year) | Yield Per Acre*** (gal/day) | Recoverable Water Per Acre (ac-ft) | Recoverable Water Per Square Mile (ac-ft) | Total Available Water (ac-ft) |
|-------------|-------------------------|-----------------|--------------|---------------------------------|---------------------------------|-----------------------------|------------------------------------|---|-------------------------------|
| Colorado | Edwards-Trinity Plateau | Middle Trinity | 14,655 | 16,750 | 733 | 89 | 1.19 | 764 | 192,212 |
| | | Edwards | 139,783 | 167,739 | 6,989 | 89 | 1.25 | 800 | |
| | | Total | | 184,490 | | | | | |
| Guadalupe | Edwards-Trinity Plateau | Lower Trinity | 344,162 | 81,311 | - | | 0.24 | 151 | 505,320 |
| | | Middle Trinity | 344,162 | 406,801 | 17,208 | 89 | 1.23 | 788 | |
| | | Total | | 488,111 | | | | | |
| Guadalupe | Trinity | Middle | 154,883 | 121,586 | 7,746 | 89 | 0.84 | 534 | 183,875 |
| | | Lower | 154,883 | 54,542 | - | | 0.35 | 225 | |
| | | Total | | 176,129 | | | | | |
| Nueces | Edwards-Trinity Plateau | Lower Trinity | 9,622 | 4,330 | - | | 0.45 | 288 | 17,802 |
| | | Middle Trinity | 9,622 | 12,990 | 481 | 89 | 1.40 | 896 | |
| | | Total | | 17,320 | | | | | |
| San Antonio | Edwards-Trinity Plateau | Lower Trinity | 18,327 | 7,608 | - | | 0.42 | 266 | 26,622 |
| | | Middle Trinity | 18,327 | 18,098 | 916 | 89 | 1.04 | 664 | |
| | | Total | | 25,706 | | | | | |
| San Antonio | Trinity | Middle | 17,651 | 13,238 | 846 | 86 | 0.80 | 511 | 26,233 |
| | | Lower | 17,651 | 12,681 | - | | 0.72 | 460 | |
| | | Total | | 25,919 | | | | | |

****note:** drought recharge = 2% of average rainfall; except for Trinity in San Antonio and Guadalupe River basin in Kerr County, where recharge = 1% of average rainfall.

*****note:** safe yield = normal recharge = 4% of average rainfall.

Mace, et al provided a flow budget for Kerr County based on the Hill Country Trinity Aquifer Model, presented in Table 3, below:

Table 3

County Flow Budget from the Hill Country Aquifer Model (ac/ft/yr)

| County | Lyr | Recharge | Rivers | GHB | Lakes | Storage | Wells | X-Flow | | upper Z-flow | | lower Z-flow | | Total in | Total out |
|--------|-----|----------|---------|-----|-------|---------|-------|--------|---------|--------------|------|--------------|---------|----------|-----------|
| | | | | | | | | in | out | in | out | in | out | | |
| Kerr | 1 | 28,900 | -24,200 | 0 | 0 | 1,300 | -400 | 1,400 | -3,300 | 0 | 0 | 0 | -3,600 | 31,600 | -31,600 |
| | 2 | 17,400 | -15,100 | 0 | 0 | 400 | -100 | 2,900 | -1,800 | 3,600 | 0 | 100 | -7,500 | 24,500 | -24,500 |
| | 3 | 0 | 0 | 0 | 0 | -100 | -500 | 3,700 | -10,700 | 7,500 | -100 | 0 | 0 | 11,300 | -11,400 |
| | all | 46,400 | -39,300 | 0 | 0 | 1,600 | -900 | 8,000 | -15,800 | 11,100 | -100 | 100 | -11,100 | 67,300 | -67,400 |

Notes:

1. Layer 1: Edwards Plateau aquifer.
2. Layer 2: Upper Trinity aquifer.
3. Layer 3: Middle Trinity aquifer.
4. All: sum of layers 1, 2, and 3.
5. Rivers include rivers, streams, and springs.
6. GHB refers to flow out of the Hill Country area to the south and east.
7. X-Flow in refers to lateral flow into the county.
8. X-Flow out refers to lateral flow out of the county.
9. upper – Z-Flow in refers to flow into the layer from the layer above.
10. upper – Z Flow out refers to flow out of the layer into the layer above.
11. lower – Z flow in refers to flow into the layer from the layer below.
12. lower – Z flow out refers to flow out of the layer into the layer below.
13. Wells is for 1975 pumping.
14. A negative sign refers to flow out of the layer in the county.
15. A positive sign refers to flow into the layer in the county.
16. Values are rounded to the nearest 100 acre-ft.

Historical Water Use

Historical groundwater withdrawals (ac-ft/yr) are taken from the water usage data for Figure 1-11, Plateau Regional Water Plan and are included in Table 4, below:

Table 4

Historical Groundwater Usage within Kerr County (ac-ft/yr).

| Year | Groundwater Usage |
|-------------|--------------------------|
| 1980 | 5,716 |
| 1984 | 3,802 |
| 1985 | 3,524 |
| 1986 | 2,955 |
| 1987 | 2,607 |
| 1988 | 2,999 |
| 1989 | 3,500 |
| 1990 | 3,176 |
| 1991 | 3,237 |
| 1992 | 3,812 |
| 1993 | 4,258 |
| 1994 | 4,146 |
| 1995 | 4,352 |
| 1996 | 4,821 |
| 1997 | 4,295 |

Comparison Of Water Demand and Supply

A comparison of water supply and demand for the planning years 2000-2050 is included in Table 5, below and was taken from information provided in Table 4-5, Plateau Regional Water Plan.

According to the Plateau Regional Water Plan, water demand is expected to grow for the City of Kerrville and County-Other. Kerrville is expected to see an increase in water demand from 4,747 acre-ft. in the year 2000 to 8,650 acre-ft. by the year 2050. Due to a lack of available surface water supplies during a Drought-of-Record, Kerrville shows an increasing deficit over the 50-year planning period. Irrigation is also projected to have a deficit for the same period.

Total estimated water demands, in acre-feet, for the 50-year planning period for Kerr County are as follows: 5

| 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
|--------|--------|--------|--------|--------|--------|
| 10,156 | 11,128 | 12,034 | 13,191 | 14,333 | 15,710 |

Total estimated water supply, in acre-feet, for the 50-year planning period for Kerr County are as follows: 4

| 2000 | 2010 | 2020 | 2030 | 2040 | 2050 |
|--------|--------|--------|--------|--------|--------|
| 38,901 | 38,901 | 38,901 | 38,901 | 38,901 | 38,901 |

It is a state requirement that groundwater conservation districts, upon review of their management plan, incorporate any new revisions to water availability numbers that are available from Regional Water Plans and Groundwater Availability Models (GAM). Headwaters Groundwater Conservation District will use the numbers from the Plateau Regional Water Plan and the Groundwater Availability Models until more accurate data approved by the TWDB is available to the district.

Surface Water Resources of Kerr County

The Guadalupe River predominately (70%) originates as spring flow from the Edwards Plateau Aquifer within Kerr County. The larger springs range in flow from 5-15 CFS and chemically reflect the limestone geology of Kerr County. Originally, streams in Kerr County were characterized by shallow, swift flow over bedrock, but construction of surface water impoundments has restricted this flow.

The primary surface water source available in Kerr County is the Upper Guadalupe River Basin. Considering the complexity of the diversion rights system and variations in the flows of the river, the river alone is not a sustainable long-term source for municipal, industrial and irrigation use when drought conditions or conservation plans are considered. However, prudent use of available supplies in the Guadalupe River should be made in order to protect and extend the capabilities of the groundwater system.

Artificial or Enhanced Recharge

Treated surface water has been successfully stored in and recovered from the Trinity Aquifers in Kerr County. Surface Water Diversion Rights in the amount of 1,408 acre-feet/year have been acquired for the purposes of storage in the Lower Trinity Aquifer in the Kerrville area. The District anticipates further research evaluating the feasibility of expanding recharge projects throughout the District. 6

An additional 2,000 acre-feet/year of recharge could be realized through brush control (Duguoos, et al, 1997) and construction of water and sediment control catchment basins (Water and Sediment Control Basin Evaluation Annual Report, 1996).

Management of Groundwater Supplies

The District has:

- A. Implemented a program to License/Register and Monitor the construction of all new water wells in the District (1994).
 - B. Implemented a program to acquire and archive well drilling and completion records, including driller logs for wells drilled in the District (1994).
 - C. Implemented a program to monitor ground water levels (1994), quality (1998) and water usages (1998) in the District and began a dedicated monitor well program in 2001.
 - D. Initiated a program to identify and properly cap/plug abandoned wells (1994).
 - E. Implemented a program that provides information to the public to create awareness of water issues on the topics of water conservation, drought contingencies, and waste of groundwater (1994).
 - F. Developed a program to study the feasibility of recharging the Edwards formations in West Kerr County (1996).
 - G. Adopted District Rules in 1994 with subsequent revision in 1996, and amended in 1997, 1998 and 2002.
 - H. Adopted district water well construction and completion requirements on June 12, 1996 with subsequent revisions dated April 9, 1997, July 9, 1997, and December 11, 2002. The District will continue to manage the supply of groundwater within the District as a sustainable resource in order to conserve this 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 resources within the District, and will make the results of such investigations available to the public through a website upon adoption by the District's Board.
- The District has adopted rules to regulate groundwater withdrawals by means of well-spacing and production limits. The District may deny a well construction permit or limit groundwater withdrawals in accordance with the guidelines stated in the District rules. 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.

A drought and conservation plan to cope with the effects of water supply deficits due to climatic or other conditions has been developed and adopted by the adopted by the Board.

The relevant factors to be considered in making a determination to deny a construction 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 that will prevent harm to the aquifer. To achieve this purpose, the District may, at the Board's 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 Chapter 36.102.

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 drought 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.

Action, Procedures, Performance and Avoidance for Plan Implementation

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The District has adopted rules dated June 12, 1996 relating to the permitting of wells and the production of groundwater. The rules adopted by the District are 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 strive to 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 purposes of this plan.

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 and in compliance with State and Regional Water Plans.

Potential Solutions for Projected Water Supply Shortfalls

The projected shortfalls in available water supplies can potentially be addressed with the following options:

1. The City of Kerrville has developed a conjunctive-use policy for both surface water and groundwater. The policy specifies that (1) surface water will be used to the maximum extent that it is available and (2) groundwater will be a supplemental source of supply. Through the conjunctive use policy, groundwater is reserved for meeting peak demand in a normal year and base demand in a drought year.
2. The City of Kerrville has developed an Aquifer Storage and Recovery (ASR) system that allows treated surface water to be injected into the Lower Trinity aquifer for use when demand exceeds surface water supply. The City of Kerrville's water treatment capacity also limits its utilization of its ASR facility. The City needs a combined ASR/treatment system with a capacity to treat and store 2 million gallons per day during periods of high streamflow, while the current system is limited to 1 million gallons per day. For planning purposes, the City does not consider stored water as an addition to the firm yield from either surface water or groundwater (Plateau Regional Water Plan, 2001).
3. The City of Kerrville will develop additional surface water rights, storage options or modifications to existing permits, if it can be shown that the City will not be able to use the permitted water.
4. Development of wells in remote locations (availability of ground water in such areas would need to be determined).
5. Water conservation practices can extend the use of existing supplies.
6. Encourage practices to reduce runoff and increase recharge of the aquifer.

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Tracking Methodology

The Headwaters Underground Water Conservation District's manager will provide a report of staff activities to the District Board of Directors on an annual basis to insure management objectives and goals are being achieved.

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Groundwater Management Goals

1.0 Implement management strategies that will provide for the most efficient use of groundwater.

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Management Objective

1.1 Implement a program to improve the understanding of usable groundwater supplies in the District by 12/1/99.

Performance Standards

1.1a Implement a program to conduct periodic sampling and water analysis in monitor wells to detect changes in water quality by 10/1/98.

Status

Ongoing. 5 Lower Trinity wells monitored monthly. 12 Middle Trinity Wells monitored monthly. Will begin semi-annual water quality sampling on all 17 wells in 2004.

Management Objective

1.2 Implement a program to regulate groundwater withdrawals by 9/1/04.

Performance Standard

1.2a. Begin work on developing and implementing a production limitation and well spacing plan by 9/1/03.

Status

Completed

Management Objective

1.3 Provide for a regular review of the District Rules by 6/12/00.

Performance Standards

1.3a. Review and revise, as needed, the District Rules of 6/12/96 by 6/12/00 and review annually thereafter to provide for the most efficient use of groundwater.

Status

Reviewed December 2002. Will be reviewed again by December 2003.

2.0 Implement strategies that will control and prevent waste of groundwater.

Management Objective

2.1 Upon request, provide speakers to schools and civic groups to raise public awareness about the most efficient use of groundwater and the prevention of waste.

Performance Standards

2.1a. Number of speaking appearances to provide public awareness of efficient groundwater use.

Status

Ongoing through WET Program. Will have at least one speaking engagement per year.

Management Objective

2.2 Provide to the public, upon request, water efficient literature handouts.

Performance Standard

2.2a. Provide water efficient literature handouts.

Status

Handouts have been developed and handed out, posters constructed to illustrate conservation practices through WET Program beginning in 2003. Will provide at least one water efficient literature handout to the public per year.

3.0 Implement strategies that will control and prevent subsidence.

The rigid geologic framework of the region precludes significant subsidence from occurring. Therefore, this goal is not applicable to the operation of the District.

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4.0 Implement strategies that will address conjunctive surface water management issues.

Management Objective

4.1 Have the District Board meet each year with representatives of the City of Kerrville and Upper Guadalupe River Authority to discuss the most efficient conjunctive use of the water resources within the District beginning in the year 1998.

Performance Standard

4.1a. The number of meetings conducted by the District Board and representatives from the City of Kerrville and Upper Guadalupe River Authority in the year 1998, and each year thereafter.

Status

The district will have one meeting per year with the Upper Guadalupe River Authority and the City of Kerrville

Management Objective

4.2 Submit a grant request by 12/31/99 for the preparation of a ground/surface water-modeling program for the District.

Performance Standard

4.2a. The number of grant requests submitted by 12/31/99.

Status

Two grant requests submitted. One grant proposal submitted to Community Foundations of the Texas Hill Country, April 7, 2000. One grant application submitted to Lower Colorado River Authority December 17, 1999.

5.0 Implement strategies that will address natural resources issues which impact the use and availability of groundwater, or which are impacted by the use of groundwater.

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Management Objective

5.1 Implement a program to monitor 2 major springs for common water quality indicators and spring flow in order to assess impacts to the groundwater from the Edwards-Trinity Aquifer each year after 1/01/04.

Performance Standard

5.1a. The number of major springs monitored for common water quality indicators and spring flow in the year 2004, and each year thereafter.

Status

Currently obtaining water quality from one spring by UGRA Stream Monitoring Program. Currently monitoring one major spring flow in cooperation with the Texas Parks and Wildlife Department.

5.1b. Submit an analysis of the monitoring program in a report to the District each year beginning in the year 2004.

Status

Will commence in 2004

Management Objective

5.2 Identify an applicable management practice and strategy that would enhance/ protect water quality and quantity from springs (and groundwater) of the Edwards-Trinity Aquifer by 12/31/04.

Performance Standard

5.2a. Submit a report to the District Board by 12/31/04 with the number of applicable management practices and strategies identified.

Status

Ongoing

6.0 Implement strategies that will address drought conditions.

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Management Objective

6.1 Develop a drought and a conservation plan for the District by 9/1/01.

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Performance Standards

6.1a. Request, by 6/1/01, from the Texas Natural Resources Conservation Commission ("TNRCC") all conditions that may require suspension of withdrawal rights from the Guadalupe River and the mechanism for implementation of these orders.

Status

Completed March 1999

6.1b. By 8/1/01, establish the conditions (triggers) pursuant to which the District's drought and conservation plan will be implemented.

Status

Completed December 2001

6.1c. Adopt a drought and a conservation plan by 9/1/01.

Status

Completed December 2002

6.1d. Prepare and provide minimum standards for the preparation of the drought and the conservation plans for all major water users and providers within the District by 10/1/01. These standards shall be reviewed and updated as necessary, but not less than once every three years thereafter.

Status

Completed December 2001. Will be reviewed every three years beginning in 2004.

References

- Bluntzer, Robert L., Evaluation of the Groundwater Resources of the Paleozoic and Cretaceous Aquifers in the Hill Country of Central Texas, 1992. Texas Water Development Board Report 339, Figure 4.
- Duguos, W.A., Hick, R.A., and Wright, P., 1997, Affect of removal of juniperus and ashei on evapotranspiration and runoff in the Seco Creek Watershed, USDA-NCRS Fiscal Year Report Dec. 1, 1997.
- LBG-Guyton Associates and Freese-Nichols. Plateau Regional Water Plan, 2001.
- Mace, R. E., Chowdhury, A. H., Anaya, R., and Way, S-C., 2000, Groundwater Availability of the Hill Country Area, Texas: Numerical Simulations through 2050. Texas Water Development Board, Report 353, 117 p.
- Reeves, Richard D. Groundwater Resources of Kerr County, Texas, 1969. Texas Water Development Board, Report 102, p.4.
- Water and Sediment Control Basin Evaluation, Annual Report 1996, Seco Creek Water Quality Demonstration Project.

RESOLUTION NO. 2003-04

RESOLUTION ADOPTING A WATER MANAGEMENT PLAN
FOR THE HEADWATERS GROUNDWATER
CONSERVATION DISTRICT

10

WHEREAS, Senate Bill No. 1 enacted by the 75th Texas Legislature mandated that all underground water conservation districts adopt a comprehensive water management plan for their respective district; and

WHEREAS, the Headwaters Groundwater Conservation District (the "District") conducted, after proper notice, and a public meeting on September 19, 2003 concerning the proposed plan for the District; and

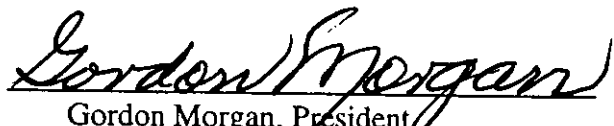
WHEREAS, the Board of Directors of the District desires to formally adopt the attached water management plan for the District:

NOW, THEREFORE, BE IT RESOLVED that the Board of Directors of the Headwaters Underground Water Conservation District does hereby:

1. Adopt the attached water management plan as the water management plan for the District as mandated by Senate Bill No. 1;
2. Direct the Administrator of the District to forward a copy of the adopted water management plan to the Texas Water Development Board for its review and approval, along with such other documents or certificates as may be required by the Texas Water Development Board.

NOW, THEREFORE, BE IT FURTHER RESOLVED that this Resolution shall take effect and be in full force and effect immediately upon its passage.

PASSED AND APPROVED this 19 day of September, 2003.


Gordon Morgan, President
Board of Directors

ATTEST:



Mike Allen, Secretary
Board of Directors

HEADWATERS GROUNDWATER CONSERVATION DISTRICT

BOARD OF DIRECTORS CALLED MEETING

DATE: FRIDAY SEPTEMBER 19, 2003

TIME: 4:00 pm

PLACE: UPPER GUADALUPE RIVER AUTHORITY - CLASSROOM
125 LEHMANN DRIVE, KERRVILLE, TX


Notice is hereby given that a Called Meeting of the Headwaters Groundwater Conservation District will be held on Friday, September 19, 2003 beginning at 4:00 p.m. at 125 Lehmann Drive, Kerrville, Kerr County, Texas, at which time the following items will be discussed and possible action taken to wit:


AGENDA

1. Call to Order and Roll Call. Certification of Quorum in Compliance with Texas Open Meetings Law.
2. Public Comments – At this time, any person with business relative to Item # 3 may be recognized for comment.
3. Discussion & Adoption of Revised Water Management Plan for Headwaters Groundwater Conservation District.
4. Adjournment.

This notice is published pursuant to the Texas Open Meeting Act, CHAPTER 551, TEXAS GOVERNMENT CODE. Dated this 16th day of September, 2003.

I hereby certify that the above Notice of Meeting of the Board of Directors for Headwaters Groundwater Conservation District is a true and correct copy of said Notice; that a true and correct copy of said Notice was posted on Tuesday September 16, 2003, at 12:00 p.m., in its administrative office in Kerrville, Kerr 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 Kerr County; and that a copy of said Notice was furnished to each director.


Lori Langley, General Manager

Filed 16th Day of Sept A.D. 20 03
JANNETT PIEPER, KERR CO. CLERK TIME 11:58
By  Deputy

HEADWATERS GROUNDWATER CONSERVATION DISTRICT

13 (a)

Gordon Morgan
President

September 22, 2003

Joseph D. Cavazos
Vice-President

Mr. Jonathan Letz
Chair, Region J RWPG
700 Main Street
Kerrville, Texas 78028

Mike Allen
Secretary-Treasurer

James F. Hayes
Director

RE: Headwaters Groundwater Conservation District Management Plan

Paul M. Siemers, III
Director

Dear: Mr. Letz:

Lon Langley
General Manager

The Headwaters Groundwater Conservation District is pleased to submit to the Region J Regional Water Planning Group a copy of the District's Water Management Plan.

The management plan will be submitted to the Texas Water Development Board for administrative approval on September 23, 2003.

If you have any questions or need further assistance, please feel free to contact me at (830) 896-4110, or via email at llangley@hgcd.org.

Respectfully,



Lon Langley
General Manager

1418 Sidney Baker
Live Oak Plaza
Kerrville, Texas 78028

Bus (830) 896-4110
Fax (830) 257-3201

Llangley@hgcd.org
Gene@hgcd.org
Maria@hgcd.org

HEADWATERS GROUNDWATER CONSERVATION DISTRICT

12

Gordon Morgan
President

September 22, 2003

Joseph D. Cavazos
Vice-President

Mr. Greg Etter
General Manager
Upper Guadalupe River Authority
125 Lehmann Dr., Suite 100
Kerrville, Texas 78028

Mike Allen
Secretary-Treasurer

James F. Hayes
Director

RE: Headwaters Groundwater Conservation District Management Plan

Paul M. Siemers, III
Director

Lon Langley
General Manager

Dear: Mr. Etter:

The Headwaters Groundwater Conservation District is pleased to submit to the Upper Guadalupe River Authority a copy of the District's Water Management Plan.

The management plan will be submitted to the Texas Water Development Board for administrative approval on September 23, 2003.

If you have any questions or need further assistance, please feel free to contact me at (830) 896-4110, or via email at llangley@hgcd.org.

Respectfully,



Lon Langley
General Manager

1418 Sidney Baker
Live Oak Plaza
Kerrville, Texas 78028

Bus (830) 896-4110
Fax (830) 257-3201

Llangley@hgcd.org
Gene@hgcd.org
Maria@hgcd.org

HEADWATERS GROUNDWATER CONSERVATION DISTRICT

Gordon Morgan
President

September 22, 2003

12

Joseph D. Cavazos
Vice-President

Mr. Ron Patterson
City Manager
City of Kerrville
800 Junction Hwy
Kerrville, Texas 78028

Mike Allen
Secretary-Treasurer

James F. Hayes
Director

RE: Headwaters Groundwater Conservation District Management Plan

Paul M. Siemers, III
Director

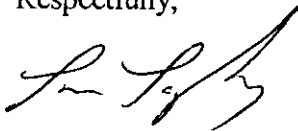
Dear: Mr. Patterson:

The Headwaters Groundwater Conservation District is pleased to submit to the City of Kerrville a copy of the District's Water Management Plan.

The management plan will be submitted to the Texas Water Development Board for administrative approval on September 23, 2003.

If you have any questions or need further assistance, please feel free to contact me at (830) 896-4110, or via email at llangley@hgcd.org.

Respectfully,



Lon Langley
General Manager

1418 Sidney Baker
Live Oak Plaza
Kerrville, Texas 78028

Bus (830) 896-4110
Fax (830) 257-3201

Llangley@hgcd.org
Gene@hgcd.org
Maria@hgcd.org

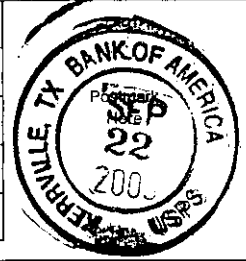
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13 (a)

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 Mr. Jonathan Delo
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 or PO Box No. 700 Main St
 City, State, ZIP+4
 Kerrville Tx 78021
 PS Form 3800, June 2002 See Reverse for Instructions

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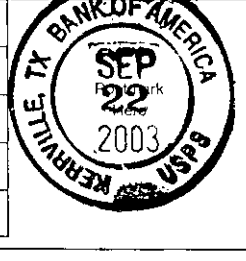
Sent To
 Mr. Craig Eiten UGRA
 Street, Apt. No.,
 or PO Box No. 125 Delman Dr. Suite 100
 City, State, ZIP+4
 Kerrville Tx 78021
 PS Form 3800, June 2002 See Reverse for Instructions

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Sent To
 Mr. Ron Patterson
 Street, Apt. No.,
 or PO Box No. 800 Junction Hwy
 City, State, ZIP+4
 Kerrville Tx 78021
 PS Form 3800, January 2001 See Reverse for Instructions



TEXAS WATER DEVELOPMENT BOARD




E. G. Rod Pittman, *Chairman*
Wales H. Madden, Jr., *Member*
Thomas Weir Labatt III, *Member*

J. Kevin Ward
Executive Administrator

Jack Hunt, *Vice Chairman*
William W. Meadows, *Member*
Dario Vidal Guerra, Jr., *Member*

TO: Rima Petrossian

FROM: Ernest C. Rebuck 

DATE: October 13, 2003

SUBJECT: Headwaters Groundwater Conservation District Management Plan

The following comments are offered as suggestions for improving the Headwaters Groundwater Conservation District management plan:

pg 3, line 4 under **District Creation and History**. A phrase may be missing after two members, such as elected on the even years.

pgs 4 & 5, under Groundwater Resources of Kerr County, the discussion of groundwater sources doesn't match the terminology used in Tables 1 and 2. The Trinity aquifer in the discussion is divided into the Trinity and Edwards-Trinity aquifers in Tables 1 and 2.

pg 5, paragraph 2 under Groundwater Resources of Kerr County. The last sentence infers that the production of wells is essential in maintaining streamflow of the Guadalupe River. Additional explanation should be provided, because as presently stated, the sentence is hydrologically unclear.

pg 5, paragraph 3 under Projected Total Water Supplies. Hydrogeologists do not universally accept the statement that 'Specific yield is related to the permeability of an aquifer', as specific yield and permeability are independent measures of different aquifer characteristics. The paragraph can stand without the statement, and therefore the statement can be deleted.

pg 10, the title for Table 5 is missing.

pg 10, water supply portion of Table 5. The management should clarify that the total estimated water supply is the total estimated groundwater supply and that the estimated supply reflects the amount of groundwater that can be pumped at present with no new infrastructure.

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**Regional Water Planning Area Project Manager Review of
Groundwater Conservation District Management Plan for
Conflicts With a TWDB Approved Regional Water Plan**

| Review of the Groundwater Conservation District Management Plan for Conflict With TWDB Approved Regional Water Plan(s) | Yes | No |
|--|-----|----|
| 13(a). Did the District provide a letter by certified mail, return receipt requested to all Regional Water Planning Groups formed under authority of TWC §16.053 (c)) in which any part of the District is located, asking the Regional Water Planning Group to review the groundwater management plan and specify any areas of conflict with the Texas Water Development Board approved regional water plan? 31TAC §356.6 (a)(5) | ✓ | |
| 13(b). Did any Regional Water Planning Group formed under authority of TWC §16.053 (c)) indicate any potential conflict between the groundwater conservation district management plan and a Texas Water Development Board approved regional water plan? 31TAC §356.6 (a)(5) | | ✓ |
| 13(c). Did reviewer identify any potential conflicts between the management plan and the Texas Water Development Board approved regional water plan? TWC §36.1071 (e)(4), 31TAC §356.6 (a)(5) [If answering Yes, please provide a written explanation] | ✓ | |
| Signify an affirmative response with YES Signify a negative response with NO Signify that a checklist item is not applicable with (N/A) | | |

13
(a)

**AFFIRMATION OF COMPLETION OF THE GROUNDWATER CONSERVATION DISTRICT
MANAGEMENT PLAN REVIEW PROCESS BY TEXAS WATER DEVELOPMENT BOARD**

The undersigned does affirm and attest that the management plan submitted by:

Headwaters Groundwater Conservation District

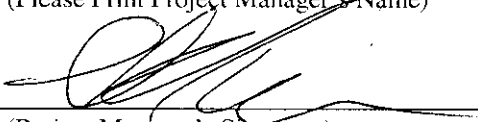
has been reviewed and the contents of which have been found to fulfill the requirements of TWC §36.1071 (e)(4) and 31TAC Ch. 356.6 (a)5, as defined by the TWDB groundwater management plan review checklist.

Ernest Rebuck

J

, Project Manager for Region _____

(Please Print Project Manager's Name)



(Project Manager's Signature)

Date 16/13/03