

# ***00000000LOST PINES GROUNDWATER CONSERVATION DISTRICT***

## **MANAGEMENT PLAN**

*September 15, 2004*

### **INTRODUCTION**

#### **DISTRICT MISSION**

The mission of the Lost Pines Groundwater Conservation District (LPGCD) is to preserve and to protect interests in groundwater within Bastrop and Lee counties. Since surface water use and permitting is governed under different statutes and regulations, this mission statement applies only to groundwater. This mission statement has five overarching management goals:

- Providing the most efficient use of groundwater
- Controlling and preventing waste of groundwater
- Addressing natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater
- Addressing drought conditions
- Addressing conservation.

Two other overarching management goals, relevant in some groundwater conservation Districts -- controlling and preventing subsidence and addressing conjunctive surface water use issues -- are not applicable to the LPGCD.

In fulfilling its mission, the LPGCD will endeavor to maintain the aquifers in the District on a sustainable basis. The LPGCD considers "sustainability" as development and use of groundwater in a manner that can be maintained in perpetuity.

#### **TIME PERIOD COVERED BY THIS MANAGEMENT PLAN**

This Management Plan becomes effective upon adoption by the Board of Directors for the LPGCD and remains in effect for ten calendar years from the date of adoption. The

LPGCD may review the Management Plan annually; however, once every five years, at a minimum, the District must review and re-adopt this groundwater management plan, with or without change. The adopted Management Plan must then be submitted to the Texas Water Development Board (TWDB) for certification of administrative completeness.

## **STATEMENT OF GUIDING PRINCIPALS**

### **Basis**

The guiding principals for the LPGCD derive from its mission statement. The LPGCD recognizes that groundwater resources within the District are of vital importance to the residents and businesses in Bastrop and Lee counties and effectively constitute the only source of water available for all or most all of the District. The LPGCD was created to conserve, to preserve, and to protect the groundwater resources within the two counties and to prevent waste. The LPGCD may also support artificial recharge or enhanced recharge within the District. The District believes the valuable groundwater resources in Bastrop and Lee counties can be managed in a prudent manner through education and conservation coupled with reasonable regulation. A basic understanding of the nature and occurrence of the aquifers in the LPGCD, their hydrologic properties, the locations and capacities of existing wells, the permitting of new wells, and tracking aquifer conditions through a network of monitoring wells provides the foundation for development of a management plan.

### **Policy**

It is the policy of the LPGCD to plan for the present and future groundwater needs of Bastrop and Lee counties. Groundwater is to be conserved, preserved, and protected and waste prevented to maintain the viability of the groundwater supply for future generations in the two counties.

The LPGCD will do three principal things to protect the water supply in Bastrop and Lee counties:

1. Regulate spacing between wells to ensure fairness and sufficient water for everyone.
2. Regulate the amount of water that large users can pump; when water levels begin to drop, it may be necessary to reduce the amount that large users pump to avoid or to minimize depletion of the water supply District-wide or in specified areas within the District.
3. Measure water levels and monitor changes in those water levels to detect declines before the declines become serious, leaving users without water.

To the extent practical, the LPGCD will attempt to manage the aquifers within its jurisdiction on a sustainable basis. The concept of sustainability, while seemingly simple, is actually quite difficult to implement. Under natural conditions, aquifers are in a state of approximate dynamic equilibrium. Over one or more centuries, or even millennia, recharge is approximately balanced by discharge or a change in storage of water within the aquifer. Absent major climatic or geologic events, discharge tends to come into balance with recharge and there is very little change in storage. Thus, the concept of sustainability is commonly taken as meaning that discharge must be limited to the amount of recharge; i.e., pumpage of groundwater should not exceed recharge to prevent a decrease in groundwater storage in the aquifer. This approach is sometimes termed achieving a “safe yield” from the aquifer. A correlative argument, also commonly advanced, is that pumping an aquifer will increase recharge and that equilibrium will be preserved through inducing greater amounts of recharge to match the greater amounts of pumping. For example, the aquifers in the LPGCD have been thought to be full to the top, as evidenced by springs and historically flowing wells, and recharge has been thought to be rejected because there is no more room for water in the aquifers. Based on investigations to date of the hydrogeology within the District, the Board of Directors of the LPGCD does not believe the aquifers are full and rejecting recharge that could otherwise be captured. Recharge is limited not by the fullness of the aquifers, but by the nature of the soils through which infiltrating water must pass to recharge the aquifers. Under these circumstances, sustainability has little to do with changing the amount of recharge and everything to do with how much natural discharge can be captured, including natural discharge to surface-water courses, the use of which is governed by a totally different set of regulations.

Compounding implementation of the concept of sustainability is that it is impossible to withdraw water from an aquifer without reducing storage, at least immediately surrounding the well while the well is being pumped. Otherwise there would be no way to induce groundwater to move to the well. In fact, to develop the groundwater resources in the District, water must be removed from storage to achieve a new state of dynamic equilibrium, if such is possible. Other compounding factors affecting sustainability are the distance between recharge and discharge, the slowness with which groundwater, and even just pressure changes, move through an aquifer, the corresponding time it takes to reach a new state of approximate dynamic equilibrium, the nature and location of natural discharge, and the geometry and parameters of the aquifer. Thus, some withdrawal of groundwater from storage is essential to the production of groundwater, but the delayed reaction of groundwater in the aquifer to changes in discharge from new wells may make achieving a new approximate dynamic equilibrium within a human lifetime, let alone the limited term of office of a director on the LPGCD Board, a practical impossibility. Allowing too much pumpage from the aquifers means that the aquifers are being mined, depleting the available resource for future generations. Allowing too little pumpage means that use of the resource is not optimized for the maximum benefit of the citizens within the LPGCD.

The Board of Directors of the LPGCD will implement this management plan and any necessary changes or modifications to adhere to the policy stated herein. In

implementing this management plan, the Board also will attempt to adhere as closely as possible to the concept of sustainability to preserve, to conserve, and to protect the natural groundwater resources of the District for the citizens of Bastrop and Lee counties and for future generations. By doing so, the LPGCD Board of Directors believes that it is bringing a long-term perspective to the management of groundwater resources within the District.

### **Technical Research and Studies**

The LPGCD, in cooperation with the TWDB, the Texas Commission on Environmental Quality (TCEQ), the Lower Colorado River Regional Planning Group (LCRRPG or Region K), the Brazos River Regional Water Planning Group (Brazos G or Region G), and other entities, will conduct studies to better understand the nature and occurrence of groundwater resources within the District. In support of its mission statement and guiding principals, the LPGCD will undertake, from time to time, technical research and studies that are believed to lead toward better, more efficient and fair management of the water resources within the District. The LPGCD Board of Directors recognize that the foundation of good groundwater management is built upon the availability of high-quality data, ever more sophisticated analyses of groundwater flow systems, and increasingly better understanding of the interaction between groundwater and surface water.

## **ABOUT THE DISTRICT**

### **GENERAL DESCRIPTION**

#### **Creation and Powers**

In 1949, the Texas legislature authorized the creation of Underground Water Conservation Districts to perform certain duties and functions and to hold specific powers set forth in Article 7880-3c, Texas Civil Statutes, currently in Chapter 36 of the Texas Water Code. Section 36.0015 of the Texas Water Code, passed as Senate Bill 1 by the 75<sup>th</sup> legislature in 1997, specifies that local groundwater conservation Districts are the State's preferred mechanism by which to manage groundwater resources. The LPGCD was created in 1999 by Senate Bill 1911 of the 76<sup>th</sup> Texas legislature, pursuant to Section 59, Article 16 of the Texas Constitution. State Senator Ken Armbrister and State Representative Robbie Cook sponsored the original legislation that created the District. Creation of the LPGCD was ratified by the 77<sup>th</sup> Texas Legislature in 2001. The LPGCD was confirmed by the voters in Bastrop and Lee counties in November 2002.

The LPGCD has all the powers and duties set forth in Chapter 36 of the Texas Water Code, as reinforced by Article XVI, §59 of the Texas Constitution.

## **Governing Board**

The LPGCD is governed by a ten-member Board of Directors, one-half of whom are appointed by the Bastrop County Judge and one-half of whom are appointed by the Lee County Judge, qualified and sworn as required by law. After the initial appointment of directors and the setting of staggered terms, each Director is appointed to a four-year term beginning in January. Thus, every second year, following the initial appointment of directors, two directors are appointed by the Bastrop County Judge and two Directors are appointed by the Lee County Judge. The succeeding second year, three Directors are appointed by the Lee County Judge and three Directors are appointed by the Bastrop County Judge.

Each year, in January, the Board selects one of its members to serve as president, a second member to serve as vice-president, and a third to serve as secretary-treasurer. The president presides over board meetings and proceedings. The vice-president presides in the absence of the president or when the president recuses himself from any matter brought before the board. The secretary-treasurer is charged with keeping a true and correct account of all board meetings and other proceedings. The board may also appoint an assistant secretary to assist the secretary treasurer. The president may appoint committees to draft policy recommendations for the board and appoint the chair and members of each committee. A committee may comprise members of the board and/or non-board members. Each committee serves at the pleasure of the president.

Members of the Board of Directors and officers serve until their successors are appointed, qualified to hold office, and sworn in. In the event of a vacancy in any office, the board shall select one of its remaining members to fill out the term of office. In the absence of a General Manager, under the LPGCD rules, the president of the board is to exercise the duties delegated to the General Manager. Business of the LPGCD may be conducted when a quorum is present and notice of the board meeting has been properly posted in accordance with the Open Meetings Act.

The LPGCD Board of Directors will hold its meetings on the days and at the places established by resolution of the board. At the request of the president, or by written request of at least three board members, the board may hold special meetings. All board meetings must be held in accordance with the Open Meetings Act.

Members of the LPGCD may not communicate, directly or indirectly with any agency, person, party or representatives of a party or agency, concerning any issue of fact or law in any contested case before the board except on notice and opportunity for all parties to participate. A board member may communicate *ex parte* with other members of the Board of Directors and with staff if a quorum is not present.

## **Daily Operations**

The LPGCD board may appoint a General Manager as the chief administrative officer of the District. The General Manager shall have full authority to manage and to operate the affairs of the District subject only to direction provided by the Board of Directors through policies and orders the board adopts. The General Manager of the LPGCD may, with the approval of the board, employ other persons necessary to carry out the daily operations of the District. The General Manager may delegate duties as may be necessary to effectively and expeditiously accomplish daily operations; however, delegation of those duties does not relieve the General Manager from overall responsibilities under the Texas Water Code, the act creating the District, or policies, orders and permits promulgated by the board.

The LPGCD board, by resolution shall establish an official office of the District, and the office will maintain regular business hours.

All documents, records, reports, and minutes of the LPGCD are available for public inspection and copying, in accordance with the Open Records Act. Upon written request by any person, the District will furnish copies of its public records. A copying charge may be imposed, pursuant to policies established by the Board of Directors. A list of copying charges will be maintained by the District.

Requests for certified copies must be made in writing. Copies may be certified by the secretary-treasurer of the board, the assistant secretary, or the General Manager. A charge for certification may be imposed by the board, in addition to the copying charge, pursuant to policies established by the board.

## **Rules and Regulations**

The rules and regulations of the LPGCD are contained in a separate document entitled “Lost Pines Groundwater Conservation District Rules and Regulations.”

## **LOCATION AND EXTENT**

The boundaries of the LPGCD are coincident with the boundaries of Bastrop and Lee counties with surrounding counties.

## **Topography**

Bastrop and Lee counties lie along the inner edge of the Texas Gulf Coastal Plain. The topography is flat to gently rolling. The Colorado River bisects Bastrop County. Middle

Yegua Creek crosses Lee County. Relief is somewhat in excess of 250 feet and ranges from slightly less than 400 feet where the Colorado River exits Bastrop County to slightly greater than 650 feet along the Bastrop-Lee county line just north of the upper reaches of West Yegua Creek.

## **GROUNDWATER AND SURFACE WATER RESOURCES**

### **GEOLOGY**

The geologic units in Bastrop and Lee counties are entirely Tertiary and Quaternary in age. All the tertiary age geologic units dip or tilt to the southeast. From oldest (westernmost) to youngest (easternmost), the Tertiary age geologic units exposed in Bastrop and Lee counties include: the Midway Group, the Wilcox Group, the Carrizo Formation, the Recklaw Formation, the Queen City Sand, the Weches Formation, the Sparta Sand, the Cook Mountain Formation, the Yegua Formation, the Caddell Formation, the Welborne Formation, and the Manning Formation. In Bastrop and Lee counties, three formations are recognized in the Wilcox Group. From oldest to youngest, these formations are the Hooper, Simsboro, and Calvert Bluff formations. All these Tertiary age geologic units are composed of varying portions of sand, silt, and clay, with clay and silt dominating in some formations and sand in others.

Quaternary age geologic units within the LPGCD include river or stream alluvium, such as along the Colorado River and Middle Yegua Creek, and higher terrace deposits. Some of the higher terrace deposits, for example at Giddings, have no apparent relationship to modern stream courses.

### **GROUNDWATER RESOURCES**

#### **Aquifers**

The two major aquifers within the LPGCD are the Simsboro Formation of the Wilcox Group and the Carrizo Formation. Both are predominantly sand. Lesser amounts of water can be extracted from the Hooper Formation and the Calvert Bluff Formation of the Wilcox Group. Historically, though, the Wilcox Group and the Carrizo Formation have been considered a single aquifer; one of the nine Major Aquifers of the State. The Queen City Sand and the Sparta Sand also are important aquifers, but are not used as much as the Simsboro and the Carrizo. The Queen City and the Sparta are designated Minor Aquifers in the State. Alluvium along the Colorado River also yields water for municipal supply for the City of Bastrop and for irrigation. The other geologic units in the District are not known to yield significant quantities of groundwater.

## **Recharge**

The term “recharge” is defined in 31 Texas Administrative Code §356.2.14 as “The addition of water from precipitation or runoff by seepage or infiltration to an aquifer from the land surface, streams, or lakes directly into a formation or indirectly by way of leakage from another.” Recharge to the aquifers in the LPGCD occurs from direct precipitation on the outcrop, from losses from surface water bodies, and from interformational leakage. The amount of recharge from direct precipitation appears to be more a function of the nature of the soils than the amount of precipitation. Nevertheless, recharge of direct precipitation where the sandy aquifer units crop out, that is intersect the ground surface, is higher than where the soils and formations at the ground surface are dominated by clay. Effective recharge from precipitation, that is recharge that moves down dip into the deeper portions of the aquifer and is not discharged to surface streams, is typically only a few percent of average annual rainfall.

Leakage between formations accounts for a large component of total recharge. Under natural, pre-developed conditions, most interformational leakage was upward into the geologically younger formations. Locally, pumping stresses may have reversed the direction of interformational leakage.

Estimates of recharge are discussed under the Groundwater Availability Modeling below.

## **Storage**

Groundwater storage in the aquifers within the LPGCD occurs in two different forms. The dominant form of storage is within the pore spaces between the sedimentary grains that compose the aquifer. Removal of water from that form of storage involves physically draining the pore spaces. The drainable pore space is commonly called effective porosity (it is commonly somewhat less than the actual amount of pore space) and is expressed as a percentage of a unit volume of the deposit (volume of the sedimentary grains plus the drainage volume of the pore spaces). The upper surface of groundwater within an aquifer in which the only water produced is from physically draining the pore spaces is at atmospheric pressure and is called a water table. An aquifer in which the water table is at or beneath the top of the aquifer is said to be unconfined. Examples of unconfined aquifers in the LPGCD are the Colorado River Alluvium and the outcrop areas of the Simsboro and Carrizo aquifers.

In contrast, when the water level rises to the top of an aquifer, pressure begins to build up within the aquifer and a different kind of groundwater storage occurs (in addition to the storage in the pore spaces between the grains of aquifer). The pressure derives from the weight of the water and its confinement within the aquifer. For this reason, such aquifers are known as confined aquifers. As the weight and pressure build, the water becomes slightly compressed and the aquifer expands slightly. If a well were drilled into a confined aquifer, the water level in the well would rise within the well until the pressure

at the top of the water column equilibrated with atmospheric pressure. Examples of confined aquifers are the deeper portions of the Simsboro and the Carrizo aquifers.

Because water rises above the top of the aquifer in a well drilled into a confined aquifer, the aquifer also is known as an artesian aquifer and the pressure called artesian pressure. In some situations, artesian pressure is sufficient to cause groundwater to flow at the Earth's surface. Water produced from a confined or artesian aquifer is from artesian storage -- the slight expansion of the water and the slight compression of the aquifer -- resulting in a decline in artesian or confining pressure. The aquifer remains full of water from bottom to top, however. Where aquifers extend to great depths, say several thousand feet below the Earth's surface, the buildup of pressure is considerable, and a significant, but still a relatively small portion of the total amount of water contained within such an aquifer can be in artesian storage. Only if the artesian pressure were sufficiently reduced to cause the water level in a well to drop below the top of the aquifer would the pore spaces between the grains actually drain.

Estimates of the amounts of water in storage are discussed under the Groundwater Availability Modeling, below.

### **Groundwater Quality**

Within the LPGCD, the quality of groundwater that can be produced from the various aquifers is generally suitable for all purposes. Locally, however, the concentration of total dissolved solids (TDS), iron, and hydrogen sulfide, are elevated, limiting usefulness for potable purposes. In some places in the District, methane is produced along with groundwater. Based on current information, the occurrence of elevated concentrations of TDS, hydrogen sulfide, iron, and/or methane, cannot be accurately predicted.

### **Groundwater Availability Modeling**

In 1999, the 76<sup>th</sup> Texas legislature approved funding, through the TWDB, of a Groundwater Availability Model (GAM) program. The stated purpose of the GAMs is to provide reliable and timely information on groundwater availability to the citizens of the state to assure adequate groundwater supplies or to recognize the inadequacy of supplies over a fifty-year planning period. Two major expectations of the GAM program are: 1) to develop standardized, thoroughly-documented, publicly available numerical groundwater flow models and supporting data; and 2) to provide predictions of groundwater availability over a fifty-year planning period, based on current projections of groundwater use and anticipated demands during normal and drought of record climatic conditions. The currently applicable GAM for the LPGCD is the one developed for the central part of the Carrizo-Wilcox Aquifer (Dutton and others, 2003, Groundwater Availability Model for the Central Part of the Carrizo-Wilcox Aquifer in Texas). This GAM is a quasi-three dimensional, numerical model based on interpretations of geologic structure and depositional settings of the Carrizo-Wilcox Aquifer, hydrologic properties,

estimates of historic water use derived from surveys, and estimated base-flow discharge into the Colorado River and other large streams in the area. The Central Carrizo-Wilcox GAM encompasses the Carrizo-Wilcox Aquifer from the surface water divide between the San Antonio and the Guadalupe rivers to the southwest and the surface water divide between the Trinity and the Neches rivers to the northeast. Similar GAMs were developed for the parts of the Carrizo-Wilcox to the southwest and to the northeast, with considerable overlap between these GAMs and the GAM for the central part of the Carrizo-Wilcox Aquifer.

The LPGCD is using the GAM for the central portion of the Carrizo-Wilcox Aquifer as a tool for evaluating the availability of groundwater within the District to assess the anticipated long-term consequences of in-District consumption and out-of-District transfer from permitted non-exempt wells within the District, and, if necessary, as a basis for developing different management zones within the District. The TWDB also has contracted for the development of a GAM for the Queen City and Sparta Aquifers and integration of the GAM for these aquifers with the existing Carrizo-Wilcox GAMs. A draft of the report for the new GAMs has already been released for review, and the new GAM for the central portion of the Carrizo-Wilcox Aquifer System is expected to become available after November 2004. Upon completion of the newer GAM, it is likely that the LPGCD will use it rather than the current GAM, which is for the Carrizo-Wilcox Aquifer only. Until the new GAMs encompassing the Wilcox, Carrizo, Queen City, and Sparta aquifers is formally released, however, it is unavailable for use.

There are no direct methods by which to estimate recharge from direct precipitation, a necessary input to the GAMs. Typically, it is on the order of just a few percent of average annual rainfall. Based on the currently applicable GAM for the Central Carrizo-Wilcox Aquifer, exclusive of interformational leakage and losses from surface water bodies, the total amount of recharge from direct precipitation in Bastrop County is 27,615.7 acre-feet per year, and the total amount of recharge from direct precipitation in Lee County is 7,438.2 acre-feet per year. Recharge to the Carrizo Aquifer from direct precipitation is estimated to be 10,841.1 acre-feet per year in Bastrop County and 3,187.8 acre-feet per year in Lee County. Recharge to the Wilcox Aquifer from direct precipitation is estimated to be 10,442.4 acre-feet per year in Bastrop County and 3,986.6 acre-feet in Lee County. Within the Wilcox, recharge to the Simsboro Aquifer from direct precipitation is estimated to be 4,793.7 acre-feet per year in Bastrop County and 1,896.2 acre-feet per year in Lee County, or approximately half of the total amount of recharge from direct precipitation received by the Wilcox in each county. Estimated recharge to the Reclaw Formation from direct precipitation in Bastrop County is only 991.4 acre-feet per year in Bastrop County and only 263.7 acre-feet per year in Lee County. Currently there are no reliable estimates of recharge from direct precipitation in the Tertiary age formations above the Reclaw Formation. The GAM for the Queen City and the Sparta aquifers should provide reasonably reliable estimates of recharge from direct precipitation for those aquifers and the bounding formations. The Midway Group, beneath the Wilcox, is predominantly clay and assumed to receive little effective recharge from direct precipitation. Colorado River Alluvium, in Bastrop County, is estimated to receive 5,340.7 acre-feet per year of recharge from direct precipitation.

There are no estimates of recharge from direct precipitation for alluvium in Lee County, or for the higher terrace deposits.

Based on the currently available GAM for the Central Carrizo-Wilcox Aquifer (i.e., excluding the Queen City, Weches, and Sparta formations and any older or younger Tertiary-age strata, the total amount of water in storage in Bastrop and Lee counties is 236,442,954.6 acre-feet. Of this total amount, 235,286,423.2 acre-feet represents the amount in storage equivalent to the effective porosity of the aquifer and 1,156,531.5 acre-feet represents the amount in artesian storage. The further down dip in the aquifer; i.e., the further toward the southeast, the greater the amount of artesian storage relative to the storage provided by the effective porosity; however, typically, the amount of water in artesian storage is less than one percent of the total amount of water in storage. The total amount of water in storage within the Simsboro Formation in Bastrop and Lee counties is 46,585,903.9 acre-feet, of which 46,387,754.6 acre-feet is the storage equivalent to the effective porosity in the Simsboro and 198,149.3 acre-feet is artesian storage. The total amount of water in storage within the Carrizo Formation in Bastrop and Lee counties is 33,482,702.4 acre-feet, of which 33,220,845.7 acre-feet is the storage equivalent to the effective porosity in the Carrizo and 261,856.6 acre-feet is artesian storage. Although there is more groundwater in storage in the Hooper, Calvert Bluff, and Reclaw formations than in the Simsboro and Carrizo Aquifers, the distribution and availability of that storage varies from place to place, is largely unobtainable, and, thus, irrelevant for planning purposes. Few high volume users or suppliers rely on groundwater stored within these formations.

There are no known estimates for the amounts of water in storage within the Queen City and the Sparta aquifers in Bastrop and Lee counties. These estimates will be best derived from the GAM that is being developed for the two aquifers, which will not be available until November 2004. Nor are there estimates for the water in storage in the Midway Group, the Weches Formation, the Cook Mountain Formation, the Yegua Formation, the Caddell Formation, the Welborne Formation, or the Manning Formation. Within the LPGCD, none of these latter formations are identified as a source of groundwater by high-volume water suppliers or users.

### **Groundwater Availability**

Like the concept of sustainability, groundwater availability would seem to be rather simple to define and to quantify, but it is actually quite difficult to do either. The availability of groundwater is a function of many interrelated factors, the same factors that compound an effort to manage an aquifer on a sustainable basis, that no one single figure or quantity is sufficient to accurately describe the amount of groundwater that can be withdrawn on an average annual basis. One thing is clear, no groundwater can be withdrawn without depleting storage, particularly artesian storage, to some extent. It is that amount of depletion that is in accordance with the management policies and goals of the District that defines how much groundwater is available. In the end, the amount of groundwater that can be withdrawn from an aquifer over any finite period of time can be

determined only by monitoring water levels. It is for this reason that the LPGCD, in cooperation with the local municipalities and water supply companies has established a monitoring well network and a system of reporting water levels to the District.

Despite these facts, in accordance with §36.1071(e)(3)(D) of the Texas Water Code and TWDB rule §356.5(a)(5)(D), the LPGCD must specify some value or figure for the projected water supply or amount of groundwater ostensibly available within the District on an average annual basis for the purpose of achieving a determination of administrative completeness in accordance with §36.1072 of the Texas Water Code and §356.6 and 7 of the TWDB rules. Using information, the best information available, provided by the currently available GAM for the central part of the Carrizo-Wilcox Aquifer (Dutton and others, 2003) as required in §36.1071(h) of the Texas Water Code and §356.5(b) of the TWDB rules, the LPGCD believes, at least on an interim basis, that the amount of groundwater available on an average annual basis is best represented by and approximately equal to the amount of recharge from direct precipitation in Bastrop and Lee counties. The amount of recharge from direct precipitation specified in the currently approved GAM for the Carrizo and Wilcox Aquifers is 28,000 acre-feet per year in Bastrop County and 7,500 acre-feet per year in Lee County, for a total of 35,500 acre-feet per year within the District. The LPGCD believes that this estimate of groundwater availability within Bastrop and Lee counties is reasonably conservative and defensible.

Nevertheless, §36.1071(e)(4) of the Texas Water Code and §356.5(c) of the TWDB rules also require that the management plan address water supply needs in a manner that does not conflict with an approved regional water plan for each region in which the district is located. The approved regional plans would be those developed by Region K for Bastrop County and Region G for Lee County in 2001. Based on a determination by Region K and in accordance with calculations performed by the staff of the TWDB, there is no conflict with the groundwater availability figure selected by the LPGCD for Bastrop County; thus the LPGCD adheres to the 28,000 acre-feet per year figure for groundwater availability on an average annual basis for Bastrop County. Calculations performed by TWDB staff for Lee County, however, would indicate a conflict. Therefore, solely for the purpose of obtaining a determination of administrative completeness from the TWDB for the LPGCD Management Plan, the District specifies a figure of 55,000 acre-feet per year for average annual groundwater availability or total usable groundwater in Lee County. Based on the best available information, though, adherence to such an amount of average annual groundwater availability for any other purpose besides obtaining a determination of administrative completeness from the TWDB for the LPGCD Management Plan would not allow management of groundwater resources in the LPGCD on a sustainable basis, a central tenant of this management plan.

Within the Texas Water Code [§36.1071(e)(3)(C)] and the Rules of the TWDB [§356.5(a)(5)(C)], the question is asked concerning how natural or artificial recharge may be increased. The discussion contained in the subsection, Policy, of the Section on Statement of Guiding Principals of the LPGCD Groundwater Management Plan makes it clear that the LPGCD does not believe that there is any means by which natural recharge to the aquifers within the District can be increased if the groundwater supply is managed

on a sustainable basis. Based on the currently available GAM, there is little difference in aquifer response under normal precipitation conditions and under drought conditions. Thus, increasing precipitation, for example, is not likely to increase actual recharge to the aquifers. Rather, only along surface water courses that currently receive discharge from the aquifers could recharge be increased if water levels in the aquifers were drawn down sufficiently that groundwater flow is reversed, or at least in part reversed, such that discharges to the surface water courses are reduced or eliminated and the surface water courses commence to lose water to the aquifers rather than receive water from the aquifers.

In the Subsection, Basis, of the Section on Statement of Guiding Principles of the LPGCD Management Plan, the LPGCD indicates willingness to support artificial or enhanced recharge. It is uncertain how this would be accomplished and there are no known proposals for either artificial or enhanced recharge. Given the District's current understanding of the hydrogeology of the district, it is unlikely that such means as spreading basins would be effective. Under the right circumstances, though, aquifer/storage recharge is a possibility, but the source of water for such an endeavor or any other mechanism to increase recharge to the aquifer systems within the District is not known.

It is anticipated that with the finalization of the new GAM for the Queen City and Sparta aquifers, which incorporates revisions to the Carrizo/Wilcox Aquifer GAM, the figure for the amount of groundwater that is available on an average annual basis can be revised. It is further anticipated that as the LPGCD builds a history of water levels in the aquifers within the District and the basis for estimating demands for groundwater from the aquifers within the District improves that determination of the amount of groundwater available on an average annual basis can be refined.

## **SURFACE WATER RESOURCES**

Currently surface water resources are little used in Bastrop and Lee counties because of their general lack of availability and because what is available has already been appropriated to the exclusion of new water rights permits. Surface water withdrawn from the Colorado River is used as make-up water for Lake Bastrop, which functions as a cooling pond for the Lower Colorado River Authority's Sim Gideon power plant. Another, privately owned power plant in Bastrop County also draws its cooling water from the Colorado River. Some water withdrawn from the Colorado River also is used for irrigation and a small amount of surface water also is used for irrigation in Lee County. No other uses of surface water within the LPGCD are known.

## **REGIONAL DEVELOPMENT**

### **EXISTING DEVELOPMENT**

Based on the most recent demand projections, developed by the Lower Colorado River Regional Planning Group (Region K) for Bastrop County and by the Brazos River Regional Planning Group (Region G) for the next iteration of the State Water Plan (2007), groundwater currently is used in the LPGCD for municipal, manufacturing, mining, livestock, and irrigation purposes (Table 1; year 2000). All water used for steam-electric (cooling water) purposes in the LPGCD is from surface water supplies.

The other demand categories represent groundwater use almost entirely; surface water use in these categories is negligible for planning purposes.

Currently, the two largest demand categories are for municipal purposes, including rural-domestic demands, and for mining purposes. Demands for municipal purposes include all water used for ordinary municipal purposes; e.g., drinking, cooking, washing, bathing, sanitary purposes, lawn watering, fire fighting, and the like. Demands for mining purposes normally include dewatering requirements, to keep the mine dry, and depressurization of underlying aquifers, to prevent blowout of the mine floor. Estimated groundwater demands within the LPGCD for municipal purposes in the year 2000 were 9,315 acre-feet in Bastrop County and 2,604 acre-feet in Lee County. Estimated mining demands in 2000 were nominal in Bastrop County, but estimated to be 20,000 acre-feet in Lee County.

Almost all the mining water demands are from the Simsboro Aquifer. Most of the municipal water demands also are from the Simsboro Aquifer, although the City of Giddings and Lee County Water Supply Corporation have some wells in the Queen City Sand and a few of Aqua Water Supply's wells may be in the Calvert Bluff Formation.

### **DEVELOPMENT TRENDS**

As indicated above, both Region G (Lee County) and Region K (Bastrop County) have recently revised projections of water supply demands in preparation for the next revision of the State Water Plan in 2007. These revised projections have been approved by the TWDB and now constitute the best available demand projections for the LPGCD. Although of and by themselves, the projections do not distinguish whether the origin of the water is surface water or groundwater, for Bastrop and Lee counties, the distinction is fairly clear-cut. Other than some minor, insignificant use of surface water for irrigation purposes, all the demands are anticipated to be met by groundwater except the for steam-electric (cooling water) demands in Bastrop County, which will be supplied entirely by surface water. These revised demand figures, then, are the groundwater demand estimates that are incorporated into this Management Plan.

Table 1

Using the newly revised demand projections has another advantage, too. The demand projections incorporated into the currently available GAM for the Central Carrizo-Wilcox Aquifer System were a hybrid of in-county demands and out-of-District transfers. Not only is it difficult to impossible to distinguish in-groundwater conservation District (in-GCD) demands from out-of-groundwater conservation District (out-of-GCD) demands, but the out of District demands reflected by various supply strategies proposed by the planning regions to meet anticipated water shortages in the regions had been reduced by proportional, but unstated, amounts so that water demands in each planning region and possible supplies for the region matched more closely.

The latest demand projections for the LPGCD through 2060 are provided in Table 1. Municipal demands in both Bastrop and Lee counties are expected to increase, more so in Bastrop County than Lee County because Bastrop County is where the major population growth is expected to occur. The demand for municipal water in Lee County over the next sixty years is projected to grow by less than a factor of two, but the demand for municipal water in Bastrop County is expected to nearly quadruple.

Mining demands for water are expected to drop over the next sixty years. The Sandow lignite mine is expected to close within the next few years, eliminating 20,000 acre-feet of dewatering/depressurization requirements for that mine. The Three Oaks lignite mine is expected to open about the same time as the Sandow Mine closes, but the projected demands for dewatering/depressurization requirements are only about 5,000 acre-feet in each county. The only discrepancy between the Region G and Region K projections is that Region G shows mining extending to or near the year 2040, whereas, Region K shows mining only until the year 2030. Region G's time estimate more closely matches ALCOA's announced life of the mine; thus in exercising the GAM, it has been assumed that the Three Oaks Mine is active until the year 2040.

Projected changes in the other demand categories -- manufacturing, livestock, and irrigation -- are relatively insignificant. Manufacturing demands are expected to increase some, especially in Bastrop County. Livestock demands are expected to hold steady, and irrigation demands are expected to decrease, again, especially in Bastrop County. Overall, the net change in these three use categories is very small.

The demand estimates prepared by the planning regions and approved by the TWDB, are for in-GCD demands only. Groundwater pumpage within Bastrop and Lee counties that is exported to neighboring counties is not accounted for. The areas encompassed by each of several retail rural water purveyor's "Certificate of Convenience and Necessity" (CCN) or other special utility Districts commonly extend outside the LPGCD. The pumpage is within the LPGCD, but recognition of demand is in the county and river basin of use. Thus, the estimates of water demand used for the purposes of preparing this Management Plan do not fully encompass all the demands on groundwater resources that currently occur and will continue to occur within the LPGCD. At present, though, there is no mechanism to account for these demands or to even assess their relative significance. According to the largest municipal water supplier operating in the District, the amount of water pumped out of the two counties is minor.

In addition, potential large transfers of groundwater out of the District are not encompassed by the water demand projections developed by the planning regions. For example, though an interlocking set of contracts among ALCOA, the San Antonio Water System (SAWS), and Central Public Service (CPS), the municipal power purveyor in San Antonio, up to 40,000 acre-feet of water potentially could be extracted from the Sandow Mine area in Milam and Lee counties and up to 15,000 acre-feet of water potentially could be extracted from the Three Oaks Mine area in Bastrop and Lee counties for transfer to San Antonio. Other water marketing entities are looking for available groundwater for transfer to Williamson County, and the Brazos River Authority has announced that it also is seeking groundwater from the Carrizo-Wilcox Aquifer for Williamson County to augment surface water supplies. These groundwater demands would be over and above those shown by planning regions G and K for Lee and Bastrop counties. Such potential demands must be separately evaluated.

## **GROUNDWATER SUPPLY ISSUES AND POTENTIAL SOLUTIONS**

Groundwater supply issues for the LPGCD are relatively simple and straightforward; unfortunately, potential solutions are not readily apparent. Looking solely at the total amount of water within the pore spaces between the sedimentary particles, based on the currently available GAM for the Carrizo-Wilcox Aquifer, there are approximately 235 million acre-feet of water in storage. In addition, there are slightly more than one million acre-feet of water in artesian storage, but this amount is equivalent to only about one-half percent of the amount of water in intergranular storage and, thus, is comparatively a much smaller amount of water. Unfortunately the existence of artesian storage is critical because it is the pressure associated with this artesian storage that drives the natural behavior of the aquifers, most particularly the discharge of groundwater to surface water courses. Artesian pressure also likely influences the overall quality of water in the aquifers. While recognizing that some temporary decline in artesian pressure must occur for groundwater to be produced, the LPGCD believes that a long-term, continued reduction in artesian pressure is not in the best interests of the citizens and businesses in Bastrop and Lee counties, which depend on groundwater for a potable water supply.

It is this fact coupled with the limited amount of potentially usable natural recharge on an average annual basis, only about 28,000 acre-feet per year based on the currently available GAM for the Carrizo-Wilcox Aquifer, that restricts, to a first approximation, the amount of groundwater that can be withdrawn from aquifers within the District without potentially adversely affecting artesian pressure, water levels in the aquifers, and the amount of groundwater contributing to the base flow of the surface water courses. Thus, the LPGCD's ability to manage groundwater resources within the District on a sustainable basis in accordance with its mission statement is severely restricted because there is so little of the total amount of water in storage to work with.

The LPGCD's ability to achieve its mission statement -- to manage the groundwater resources within the District on a sustainable basis in perpetuity -- is, thus, tenuous, at

best, given that even the current estimated in-District demands for ground water exceed the apparent amount of water being recharged within the District by approximately 10,000 acre-feet per year. This is primarily due to the necessity to depressurize the Simsboro Aquifer at the Sandow Mine in Milam and Lee counties. Although the Sandow Mine is projected to close within a few years and the depressurization requirements of the newly permitted Three Oaks Mine in Lee and Bastrop counties are projected to be only about half of those of the Sandow Mine, the demand for groundwater within Bastrop and Lee counties is projected to increase to a total of approximately 44,000 acre-feet per year by 2060. Even though mining water demands will decrease and then virtually cease by about 2040, municipal demands are anticipated to nearly quadruple in Bastrop County and nearly double in Lee County over the next fifty-five or so years. Using a simple water balance approach, the excess in-District demand over in-District recharge would consume the equivalent of approximately one-half of all the water in artesian storage in the two counties by 2060. This simple water-balance approach does not consider the potential negative affects of major out-of-District demands, such as those in the Bryan College Station area, that affect artesian pressure in the District, but are outside of the District's control.

Yet, the Carrizo-Wilcox Aquifer in the LPGCD is perceived by those outside of the District to have an over abundance of groundwater for transfer out of the District. As previously indicated, there is an existing set of contracts to which SAWS and ALCOA are parties to transfer as much as 55,000 acre-feet of water per year from Bastrop, Lee, and Milam counties to San Antonio. In addition, the Brazos River Authority is seeking to withdraw almost as much water to meet growing water needs in Williamson County. On top of these possible transfers, private water marketers also are seeking to transfer groundwater from within Bastrop and Lee counties and the counties surrounding the two counties to meet other water demands outside of the District. Using the demand projections that accompany the currently available GAM for the Carrizo-Wilcox Aquifer as indicator of the maximum anticipated pumpage from within the District, an amount of water equivalent to all the recharge and all the water in artesian storage in the District could be withdrawn in only about twenty years.

Thus, whether the LPGCD will be able to achieve its mission statement remains to be seen, even to meet only in-District demands. It is clear, though, that with major transfers of groundwater outside of the District, achieving the mission statement will be impossible. Perhaps, with the new GAMs being developed that include the Queen City and the Sparta aquifers with the Carrizo and the Wilcox aquifers and the ability to distinguish in-District demand projections from out-of-District transfers, the LPGCD will be able to better understand the groundwater resources within the District and to refine estimates of groundwater availability. There appears to be no other solution at this point, since the LPGCD is precluded by law from discriminating between in-District operating permits and out-of-District transfers.

## **CERTIFICATION CRITERIA**

### **REGIONAL COOPERATION AND COORDINATION**

#### **Lower Colorado River Regional Planning Group (Region K)**

The LPGCD regularly coordinates with Region K through participation at regional planning meetings and, when deemed necessary, by written communication.

#### **Brazos River Regional Planning Group (Region G)**

The LPGCD has regularly sought coordination and communication with Region G by verbal and written means. A representative of the LPGCD commonly attends the Region G planning meetings.

#### **Lower Colorado River Authority**

The LPGCD communicates with the Lower Colorado River Authority (LCRA) through the Region K planning group and by direct communication on an as needed basis. In that conjunctive use of surface and groundwater has not occurred to date in Bastrop and Lee counties and the statutes and regulations for surface water are so different from those for groundwater, regular communication for that purpose has not yet occurred, but is not precluded and would be welcomed in the future.

#### **Brazos River Authority**

The LPGCD communicates with the Brazos River Authority (BRA) through the Region G planning group and by direct communication on an as needed basis. Commonly representatives of the BRA attend LPGCD Board meetings. In that conjunctive use of surface and groundwater has not occurred to date in Bastrop and Lee counties and the statutes and regulations for surface water are so different from those for groundwater, regular communication for that purpose has not yet occurred, but is not precluded and would be welcomed in the future.

## **CERTIFIED COPY OF DISTRICTS RESOLUTION ADOPTING THE MANAGEMENT PLAN**

A certified copy of the LPGCD's resolution adopting this Management Plan is contained in Appendix A.

## **EVIDENCE OF PUBLIC NOTICE AND HEARING**

Evidence of public notice and hearing prior to the adoption of this management plan is provided in Appendix B.

## **MANGEMENT GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS**

### **REQUIRED GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS**

**Goal:** Provide the most efficient use of groundwater.

**Management Objective:** To inform the residents of Bastrop and Lee counties about the efficient use of groundwater. Such information may be related to irrigation efficiency, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD board. The information on efficient use of groundwater may be disseminated in conjunction with information on controlling and preventing waste of groundwater and/or water conservation.

**Performance Standard:** At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on efficient use of groundwater. The article on efficient use of groundwater may be published in conjunction with an article on controlling and preventing waste of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

**Goal:** Controlling and preventing waste of groundwater.

**Management Objective:** To inform the residents of Bastrop and Lee counties about the waste of groundwater. Such information may be related to leaky or poorly functioning plumbing, transmission losses, xeriscaping, or any other related subject deemed appropriate by the LPGCD Board. The information on waste of groundwater may be disseminated in conjunction with information on efficient use of groundwater and/or water conservation.

**Performance Standard:** At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on waste of groundwater. The article on waste of groundwater may be published in conjunction with an article on efficient use of groundwater and/or water conservation. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

**Goal:** Address natural resource issues that impact the use and availability of groundwater and which are impacted by the use of groundwater.

**Management Objective:** To provide information to the public about the status of groundwater use, availability, and water levels and a description of natural resource issues, e.g., mining, out of District transport of groundwater, protection of endangered species, or the spread of phreatophytic vegetation, that impact the use and availability of groundwater or which are affected by the use and availability of groundwater.

**Performance Standard:** At least annually, the General Manager shall prepare a report for the LPGCD board on the status of groundwater use, availability, and water levels within the District and a description of natural resource issues. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. To the extent practical, the LPGCD also will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

**Goal:** Address drought conditions.

**Management Objective:** Drought conditions are to be addressed on an ongoing basis by tracking rainfall records available from nearby weather stations as compared to hydrographs for LPGCD monitoring wells. At least once per month, the General Manager will update rainfall and water level records maintained by the LPGCD. Based on GAM modeling and an understanding of the outcrop areas of the principal aquifers – Simsboro, Carrizo, Queen City, and Sparta – in the LPGCD, recharge appears to be relatively constant under the current climatic regime and little affected by drought conditions. It is anticipated, though that drought conditions will result in increased pumpage and decreased natural discharge, thereby affecting water levels in the aquifers.

**Performance Standard:** At least annually, the General Manager shall prepare a report for the LPGCD board on precipitation amounts as compared to water levels within the District and a description of apparent trends. Once this report is reviewed and accepted by the LPGCD Board, it shall be made available to the public at the District's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

**Goal:** Address conservation of groundwater resources.

**Management Objective:** To educate the public within the District concerning water conservation. One or more articles related to advances in plumbing fixtures that conserve water and comparative cost savings of installing such fixtures, xeriscaping, or any other related subject deemed appropriate by the LPGCD board will be prepared for publication.

**Performance Standard:** At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on conservation of groundwater. The article on water conservation may be published in conjunction with an article on efficient use of groundwater and controlling and preventing waste of groundwater. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

#### **DISTRICT SPECIFIC GOALS, OBJECTIVES, AND PERFORMANCE STANDARDS**

**Goal:** Public education.

**Management Objective:** To inform the public about any and all matters related to the occurrence, distribution, behavior, and use of groundwater. To a degree, this management objective overlaps with all the required goals and management objectives described above; however, the focus of this management objective is on children.

**Performance Standard:** At least once each year in each county of the LPGCD, the General Manager, assisted by other staff and consultants, as necessary, will present a program dealing with the above matters at a public school. The particular timing and age-level of such a program will be coordinated with the local school systems.

**Goal:** Drilling permits.

**Management Objective:** To review and evaluate all applications for drilling permits for exempt and non-exempt wells, not otherwise excluded and not existing prior to the date the District rules became effective.

**Performance Standard:** At least once per year, notify all known water-well drillers operating in the District of the requirement for the prospective non-excluded well owner to obtain a drilling permit and the requirement that the driller insure that no new non-excluded well is drilled in the District without a permit. In addition, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article related to the requirement to obtain drilling permits for non-excluded wells. Such an article may be combined with articles on other subjects published by the District.

**Goal:** Register all wells within the LPGCD boundaries.

**Management Objective:** To register all exempt wells drilled since the LPGCD Rules became effective and attempt to register all pre-existing exempt wells.

**Performance Standard:** Registration of newly drilled exempt wells is accomplished by refunding the drilling permit fee upon submittal of completion reports, well logs, and well registration materials. The number of newly drilled wells will be documented in the annual report by the General Manager and in the LPGCD's database. Registration of pre-existing exempt wells is a more difficult issue, because registration of such wells is voluntary. Nevertheless, at least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article on registration of exempt wells. The article on registration of exempt wells may be published in conjunction with an article on controlling and preventing waste of groundwater, water use efficiency, and/or water conservation. In addition, the General Manager or his designated representative will note the existence of unregistered wells, spot the location of such wells on a map as best possible, and visit with the landowner, if possible, to encourage registration of the wells. Documentation of attempts to encourage registration of wells that were in existence prior to the effective date of the LPGCD Rules will be through notes made and kept on file at the District offices.

**Goal:** Operating permits

**Management Objective:** To review and evaluate all applications for operating permits for non-exempt wells, not otherwise excluded, within the LPGCD. In addition, the LPGCD will notify operating permit holders of the need to renew their operating permit at least sixty days prior to expiration.

**Performance Standard:** At least once per year, notify all known water-well drillers and pump installers operating in the District of the requirement for the owner of a non-exempt well, not otherwise excluded, to obtain an operating permit and the requirement that the driller and/or pump installer insure that no non-exempt well,

not otherwise excluded, is placed into service within the District without an operating permit. In addition, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article related to the requirement to obtain operating permits for non-exempt wells, not otherwise excluded. Such an article may be combined with articles on other subjects published by the District.

**Goal:** Transfer Permits.

**Management Objective:** To review and evaluate all applications for transfer permits. Notify holders of transfer permits of the need to renew their transfer permit prior to expiration.

**Performance Standard:** At least annually, the General Manager shall cause to be published in one or more newspapers of general circulation in Bastrop and Lee counties an article related to the requirement to obtain a transfer permit to transfer groundwater out of the District. Such an article may be combined with articles on other subjects published by the District.

**Goal:** Timely processing of all drilling permits, operating permits and transfer permits.

**Management Objective:** To complete administrative review of all permit applications and schedule for LPGCD consideration within sixty days of receipt.

**Performance Standard:** On an annual basis track the dates on which applications are received, the dates on which administrative review is completed, and the date on which the board considered applications. For any permit application taking longer than sixty days to process, record a brief comment in the files as to the reason for the delay. Provide an annual summary of the permit application tracking to the LPGCD board. Upon review and approval of the report, make it available for public review at the District office.

**Goal:** Maintain a Database.

**Management Objectives:** To maintain a database of each drilling permit and registration of an exempt well, each drilling and operating permit for a non-exempt well, and each transfer permit. The LPGCD's intent is to be able to generate plots of the locations of each registered and permitted well, available completion information for the well, and to compute distances between the wells based on the most detailed coordinates in the data base.

**Performance Standard:** The database will be constantly changing and evolving, as new data are acquired and entered into the database and as new or updated software

and hardware become available. The overall performance standard is; Does it do what the LPGCD needs done? The measurable standard is an annual report prepared by the General Manager to the Board describing changes made to the structure and the content of the database and containing recommendations for additional changes and improvements. Once reviewed and accepted by the Board it shall be made available to the public at the LPGCD's office. In addition, the General Manager will cause a summary of the annual report to be published in one or more newspapers of general circulation in Bastrop and Lee counties. The summary may be published in conjunction with the publication of the summary of natural resource issues and drought conditions. In addition, to the extent practical, the LPGCD will sponsor or co-sponsor workshops open to the public that address this issue and similar issues.

### **ACTION, PROCEDURES, AND AVOIDANCE NECESSARY TO EFFECTUATE THE MANAGEMENT PLAN**

The LPGCD will implement the provisions of this Management Plan through the development and application of rules consistent with the Management Plan, using it as a guide to its principles and polices. Operation of the LPGCD, additional planning efforts, and additional rulemaking will be consistent with this plan or subsequent management plans adopted by the LPGCD and approved by the TWDB. The LPGCD will adhere to and enforce the rules it develops. These rules, subsequent additions or revisions, and revisions to this Management Plan will be based on the best technical advice available to the LPGCD.

The LPGCD will treat all citizens equally. In the exercise of its powers under Chapter 36 of the Texas Water Code, the LPGCD may use the discretion permitted by the water code and its rules to consider unique situations or local conditions and the potential for adverse economic and environmental consequences. Exercise of its discretion should not be construed as limiting the power and authority of the LPGCD.

The LPGCD will seek cooperation from municipalities, water supply companies, irrigators, and all other users of groundwater pumped in Bastrop and Lee counties in the implementation of this Management Plan. The LPGCD also will seek to cooperate and coordinate with state and regional water planning authorities and agencies and adjacent groundwater conservation Districts.