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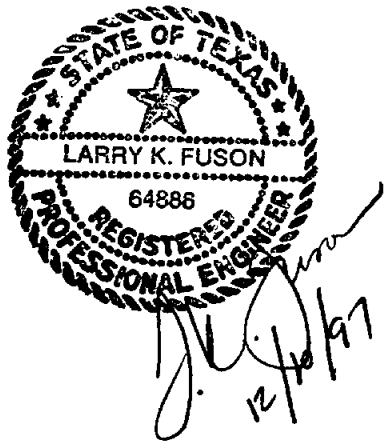
CANYON LAKE WATER SUPPLY CORPORATION

REGIONAL WATER PLAN

CLWSC

December 1997



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CANYON LAKE WATER SUPPLY CORPORATION

REGIONAL WATER PLAN

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1.0 Introduction

1.0 INTRODUCTION

On August 30, 1995, Canyon Lake Water Supply Corporation (CLWSC) applied to the Texas Water Development Board (TWDB) for a planning grant under the TWDB Research and Planning Fund program. The planning grant was approved by the Board in their regular meeting of October 19, 1995. CLWSC and TWDB subsequently executed a formal agreement dated January 10, 1996 for use of the planning grant funds to perform a regional water supply planning study.

To perform the engineering and planning services required for the study, CLWSC contracted with The Hogan Corporation by work order agreement dated February 27, 1996. The scope of work to be performed generally consists of four parts, which are summarized below:

Part I - Develop Baseline Data

- Conduct Preliminary Meetings
- Review Existing Reports and Other Information
- Assemble Existing Plats and Plans
- Develop an Overall Digital Base Map of the Planning Area
- Prepare a Summary of Existing Population in the Study Area
- Prepare a Projection of Existing Water Usage in the Study Area
- Evaluate Existing Water Production and Distribution Facilities
- Evaluate the Capacity and Quality of Existing Water Wells

Part II - Future Water Supply Requirements

- Prepare Population Projections for Each Planning Milestone
- Develop Water Use Projections for Each Planning Milestone
- Assess Supply Options and Develop Alternate Supply Scenarios
- Analyze and Prioritize Alternatives
- Develop an Overall Phasing Approach and Implementation Plan

Part III - Canyon Lake WSC System Master Plan

- Prepare a Layout of the Existing and Future Distribution Network
- Perform a Hydraulic Analysis of Major Distribution Lines
- Locate and Size Future Storage and Pumping Facilities
- Develop Capital Cost Projections
- Develop a Phasing Plan for Distribution Lines

Part IV - Environmental Assessment

- Prepare a Description of the Existing Environment
- Identify and Discuss Environmental Impacts Resulting from Alternative Solutions
- Identify and Discuss Primary Short-Term and Long-Term Impacts, Secondary Impacts, and Adverse Impacts
- Provide a Description of Tradeoffs Between Short-Term Environmental Gains at the Expense of Long-Term Gains
- Provide a Description of Those Resources Irretrievably Committed or Irreversibly Constrained

The findings of this planning study presented herein are generally organized in the same manner as listed in the scope of work.

The formation of CLWSC in 1991 was for the purpose of consolidating the needs of independent water utility companies in the Canyon Lake Area and to provide legal authority to prepare and implement a regional plan for development of surface water supply and distribution facilities and wastewater collection and treatment for the northwestern portion of Comal County. In March 1994 CLWSC acquired and began operating numerous independent water supply systems in the area surrounding Canyon Lake. Given the abundant water supply in Canyon Lake and the reliability concerns with wells, CLWSC has implemented a 0.50 mgd surface water treatment plant to serve existing subdivisions on the south side of Canyon Lake. CLWSC intends to continue to develop surface water supply facilities to serve development within its service area.

2.0 Baseline Conditions

2.0 BASELINE CONDITIONS

2.1 General

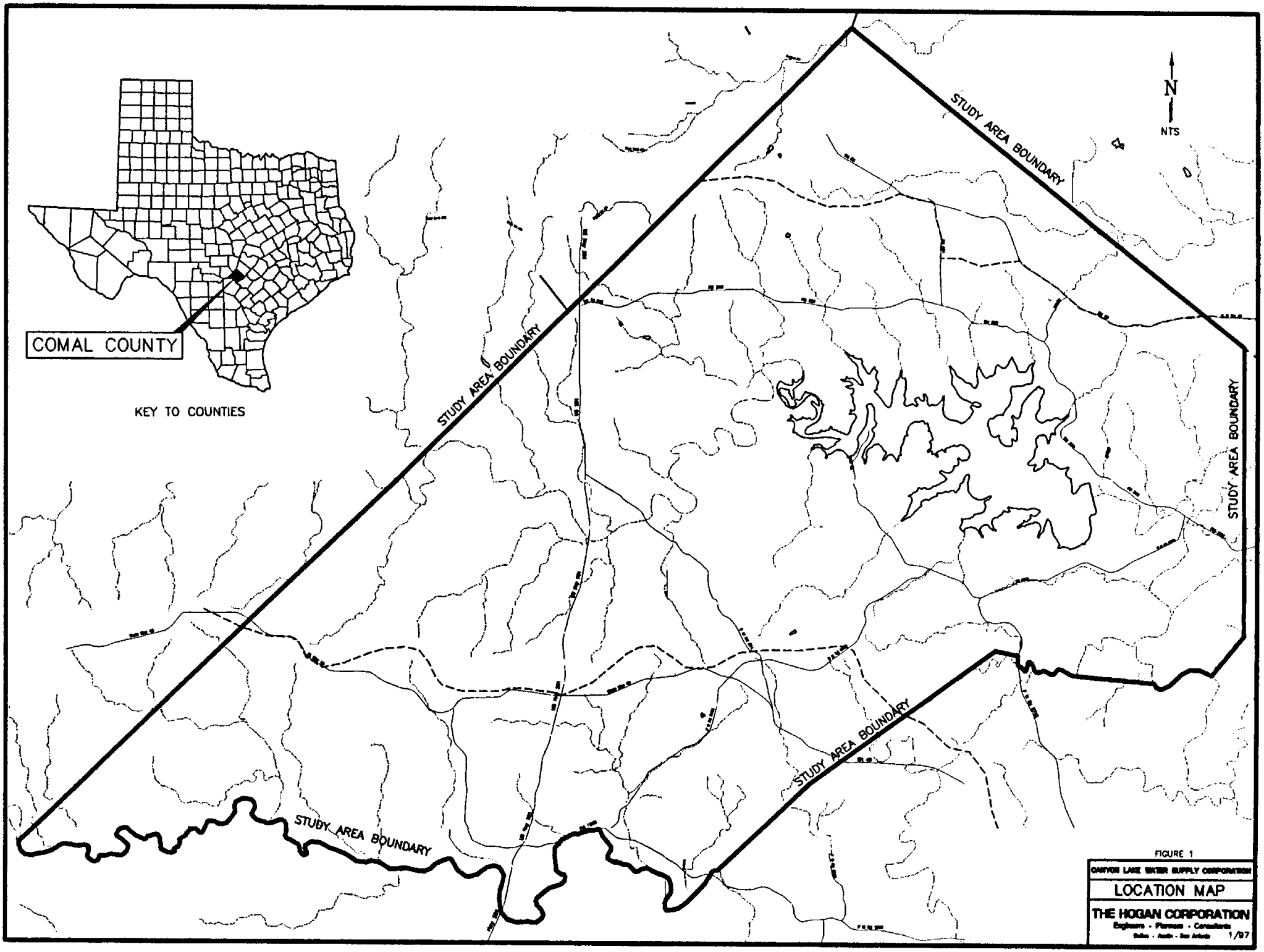
The project planning area is located wholly within Comal County, Texas and is defined as all of the northwesterly portion of the County outside of the Edwards Aquifer recharge zone. The area is bounded by Kendall County to the west, Blanco County to the northwest and Hays County to the northeast. Cibolo Creek forms the southern boundary of the planning area between Comal County and Bexar County to the south. Figure 1 presents the location and limits of the planning area in greater detail. Except for a small portion of the City of Fair Oaks in the extreme southwesterly tip of Comal County, there are no incorporated municipalities in the planning area. Canyon Lake is the dominating land feature in the area, comprising a surface area of about 8,000 acres and fed by the Guadalupe River. Most of the planning area lies within the Guadalupe River Basin. The southerly Basin divide bisects the planning area generally along the State Highway SH 46 corridor. Land areas to the south drain to Cibolo Creek and the San Antonio River. A detailed description of the physical characteristics and natural resources of the study area are provided in Section 4 - Environmental Assessment.

2.2 Existing Population

A projection of the existing population within the study area was extrapolated from US Census data and other information. Table 1 presents Census data for 1980 and 1990 for the entire County and for selected census tracts. Census Tract and Block Group boundaries were superimposed on the project area, as shown in Figure 2, to facilitate an accurate accounting and distribution of existing population. The planning area contains all of Census Tracts #3106.02 and #3107, the majority of tract #3106.01, and a portion of tract #3109. The 1990 Census data was evaluated on a Block Group level to identify portions of the aforementioned Census tracts which are not part of the planning area. The results of this analysis are also presented in Table 1, and indicate the net, adjusted 1990 Census population for the planning area was 16,428.

Table 1
Comal County Census Data

AREA	TOTAL POPULATION	NUMBER OF HOUSEHOLDS	PERSONS PER HOUSEHOLD	HOUSING UNITS
		1980 Data		
COUNTY	36,446	12,958	2.8	14,797
Census Tracts:				
C.T.# 3106				3,776
C.T.# 3107				1,194
C.T.# 3109	2,133	690		992
		1990 Data		
COUNTY	51,832	19,315	2.64	22,987
Census Tracts:				
C.T.# 3106.01	4,082		1.69	2,413
C.T.# 3106.02	6,290		1.57	4,013
Subtotal	10,372			6,426
C.T.# 3107	6,156		2.56	2,404
C.T.# 3109	3,792		2.43	1,558
Subtotal	9,948			3,962
Total	*20,320*			*10,388*


COMAL COUNTY
KEY TO COUNTIES
STUDY AREA BOUNDARY
STUDY AREA BOUNDARY
STUDY AREA BOUNDARY
STUDY AREA BOUNDARY
STUDY AREA BOUNDARY
N
NTS
FIGURE 1
CANYON LAKE WATER SUPPLY CORPORATION
LOCATION MAP
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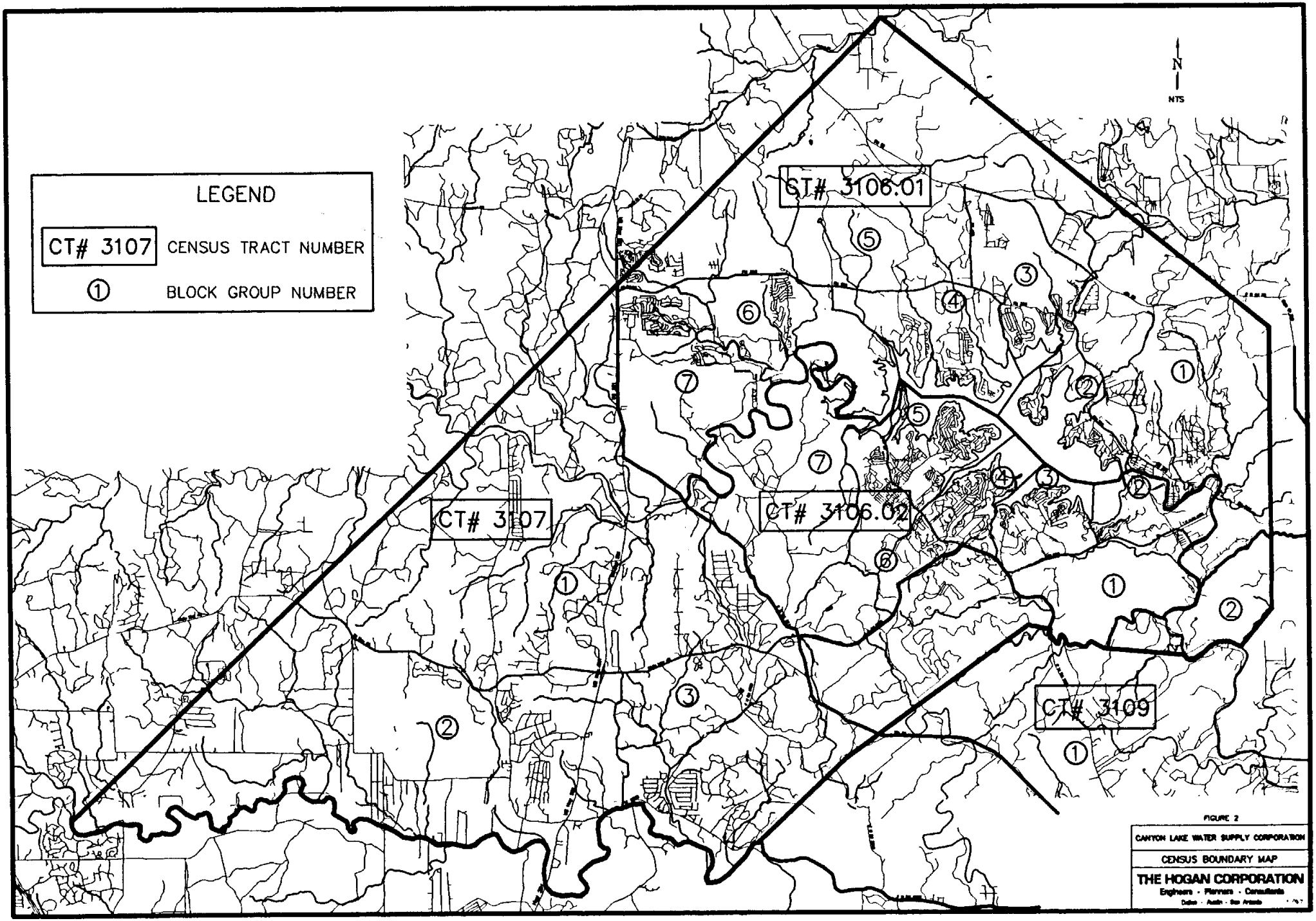
Dallas - Austin - San Antonio
1/97


LEGEND
CT# 3107
CENSUS TRACT NUMBER
BLOCK GROUP NUMBER
N
NTS
CT# 3106.01
CT# 3107
CT# 3106.02
CT# 3109
FIGURE 2
CANYON LAKE WATER SUPPLY CORPORATION
CENSUS BOUNDARY MAP
THE HOGAN CORPORATION
Engineers - Planners - Consultants

Adjusted1990 Data

CENSUS TRACT	BLOCK GROUP	Net 1990 Population
3106.01	1	873
	2	329
	3	594
	4	467
	5	522
	6	322
	7	975
Subtotal:		***4,082***
3106.02	1	406
	2	492
	3	1,146
	4	781
	5	1,665
	6	1,670
	7	130
Subtotal:		***6,290***
3107	1	1,548
	2	2,394
	3	1,854
Subtotal:		***5,796***
3109	1	33
	2	227
Subtotal:		***260***
Grand Total:		***16,428***

The net 1990 Census population for the planning area was then correlated with the TWDB "1996 Consensus Texas Water Plan, Projections of Population and Municipal Water Use for Comal County." Table 2 summarizes the TWDB data, which presents population projections at each decade for the four incorporated areas in Comal County, as well as for the unincorporated portions of the County. Average annual growth rates were extracted for each decade for the unincorporated County projections as shown in Table 2. These growth rates were used to update the net 1990 Census population to current (1996) conditions, as well as for future population projections. Applying an average annual growth rate of 5.28% to the projected, net 1990 Census population yields a theoretical current (1996) population for the planning area of approximately 22,000.

Table 2

COMAL COUNTY POPULATION PROJECTIONS

AREA	1980	1990	2000	2010	2020	2030	2040	2050
New Braunfels	22,375	27,091	38,126	49,873	65,003	82,894	95,424	109,848
Garden Ridge		1,450	2,301	3,157	4,352	5,686	6,903	8,380
Schertz	26	129	210	325	484	627	891	1,187
Fairoaks Ranch		51	88	127	180	241	294	359
County - Other	14,045	23,111	38,653	53,076	74,850	98,016	122,621	148,069
Unincorporated County Areas Effective Growth Rate		*5.11%*	*5.28%*	*3.22%*	*3.50%*	*2.73%*	*2.26%*	*1.90%*

Source: TWDB 1996 Consensus Texas Water Plan, Projections of Population and Municipal Water Use for Comal County.

The location and extent of existing land development was assessed throughout the planning area to aid in the geographic distribution of the existing population and to serve as an initial basis for locating future population growth in the area. Existing platted subdivisions were identified from the Comal Appraised Districts' (CAD) property map, and the boundaries of these subdivisions were plotted on the planning map (Figure 2). Other data on these subdivisions was also obtained from the CAD, including the total number of accounts (taken as lots) in each, as well as the breakdown of parcels by type of improvement (i.e. single-family residential, multi-family, commercial, etc.). The latter was used to indicate the current level of development within each subdivision. To facilitate the organization of the subdivision data and its correlation with the existing population projection, the overall project study limits was broken down into planning areas. Planning area boundaries were drawn to coincide with Census tract and block group boundaries, major thoroughfares, topographical features, and other logical divisors. These boundaries are shown on the Planning Area Map (Figure 4).

Occupancy rates were then applied to existing improved land parcels within each subdivision to arrive at the existing population in each planning area. Residential occupancy rates were based on the actual, average household occupancy values determined for each census tract in the 1990 census. To correlate this existing population distribution with the overall existing population projection, additional population was allocated to the various planning areas to account for unplatted properties and newer subdivisions not yet reflected in the CAD data. A detailed listing of all identified subdivisions within each planning area along with acreage and the projection of existing population is presented in Table A1 in the appendices, and is summarized by planning area group in Table 3.

Table 3 - Existing Development/Population Summary

Area	Platted Lots	Total Acreage	Projected 1996 Population
AREA A TOTAL	6,316	87,238	8,924
AREA B TOTAL	14,794	77,000	5,107
AREA C TOTAL	12,034	34,862	7,614
AREA D TOTAL	147	9,129	391
PROJECT AREA TOTAL	***33,291***	***208,229***	***22,036***

2.3 Existing Water Demands

A projection of existing water usage in the study area was developed by applying established consumption rates to the population assigned to each planning area. Unit water use rates were derived from the projections for unincorporated county areas in the TWDB "1996 Consensus Texas Water Plan, Projections of Population and Municipal Water Use for Comal County." Table 4 presents the TWDB projections for "Normal" and "Below Normal" precipitation with "Expected Conservation" scenarios. The per capita values were derived by dividing the total projected usage values at each milestone by the corresponding projected population. Based on the per capita consumption rate of 147 gallons per day (gpd) associated with the TWDB "Below Normal Precipitation" scenario, the total and existing water usage for the entire planning areas is projected to be 3.26 million gallons per day (mgd), or 3,650 acre feet/year.

5.0 Environmental Assessment

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1.0 INTRODUCTION

The Canyon Lake Water Supply Corporation (CLWSC) has applied to the Texas Water Development Board (TWDB) for matching funds to finance a study of possible water-supply alternatives using surface water from Canyon Lake. The study is part of a 50-year plan being developed to ensure that an adequate, reliable supply of water will be available to meet the projected demands as the Canyon Lake area undergoes significant growth. The Hogan Corporation (THC) of Dallas, Texas has prepared a Regional Water Plan for a system to collect, treat, and distribute water from Canyon Lake to over 300 subdivisions served by CLWSC. CLWSC's service area and the subidivisions it serves are depicted in Figures 1 and 3, respectively, in section 2.0 of the Regional Water Plan. TRC Mariah Associates Inc. (TRC Mariah) of Austin, Texas was contracted by THC to prepare an Environmental Assessment of the project, as required by the TWDB for all water supply projects.

This report presents the Environmental Assessment of the proposed water line installation and possible alternative routes. Included are descriptions of the natural and social settings of the area, alternatives considered during the project, potential impacts of the project, and input from the public and various regulatory agencies. The name, address, telephone number, and point of contact of the consultant by whom this EA was prepared are as follows:

TRC Mariah Associates
3939 Bee Caves Rd., Suite C-100
Austin, TX 78746
(512) 329-6080
Contact: Mr. Bradley R. Hamer

Statement of Problem

The CLWSC supplies water for domestic use to 312 subdivisions with an estimated 1996 population of 22,367 persons. At present the Trinity Aquifer is the sole source for the water supply on which these persons depend. However, water quality sampling of supply wells in the study area resulted in exceedances of Texas Natural Resource Conservation Commission (TNRCC) drinking water criteria for one or more of seven parameters (sulfate, chloride, fluorine, nitrate, pH, iron, and manganese) in 30 of the 121 wells (25%) during the most recent sampling. Because sampling data was not available from the TWDB for all of the wells, the percentage of wells out of compliance with state standards may be even higher. Some subdivisions served by CLWSC have also experienced low water pressure during high-demand periods. The use of surface water from Canyon Lake would alleviate these problems.

2.0 ENVIRONMENTAL SETTING

In accordance with TWDB guidelines for environmental assessments, this section of the report presents information on the geology, hydrology, floodplains and wetlands, climate, biology, cultural resources, economic conditions, land use, and effects of other programs on the proposed project locations.

2.1 GEOLOGY

Virtually the entire Canyon Lake study area is situated upon the Glen Rose Formation. This 900-ft thick formation dates from the early Cretaceous period and is comprised of limestone, dolomite, and marl in alternating beds that form stairstep topography. The limestone is typically aphanitic (individual grains small enough to be indistinguishable) to fine-grained. The dolomite is typically fine-grained and porous. The Glen Rose is divided into two layers, with the upper (approximately 400 ft thick) layer exhibiting thinner beds, a higher proportion of dolomite, and fewer fossils.

The beds of the Guadalupe River and a few other tributary streams exhibit both the oldest and youngest geological formations within the study area in approximately equal proportions. The Guadalupe River bed upstream of Highway 281 and the bed of Rebecca Creek, which flows into the Guadalupe just above Canyon Lake, are underlain by the Hensell Sand and the Cow Creek Limestone, which date from the beginning of the Cretaceous. The Hensell Sand, which forms the banks of these waterways, is approximately 45 ft thick and is comprised of an upper layer of limestone and a lower layer of sandstone. The Cow Creek Limestone is approximately 75 ft thick and occurs in the flow channels of the river and stream beds. Between Highway 281 and Canyon Lake and downstream of Canyon Lake, the Guadalupe is underlain by fluviatile terrace deposits consisting of gravel, sand, silt, and clay.

The Rumple soils are also undulating; however, they typically have a surface layer that is dark reddish brown, very cherty, clay loam approximately 10 inches thick. The Eckrant soils are strongly sloping to steep. The typical surface layer for the Eckrant soils is a very dark gray, extremely stony clay about 10 inches thick.

The Comfort-Rumple-Eckrant soils are typically used as rangeland. The shallow to very shallow rooting zone, the very low available water capacity, stoniness, and slope are limitations on use for crop or pasture land. These soils do provide habitat for wildlife, including deer, turkey and quail. Shallowness to rock, slope, and stoniness are limitations on urban and recreational uses of these soils.

The Lewisville-Gruene-Krum map unit is made up of dominantly well-drained soils that have slopes of 0% to 5%. These soils are found on low terraces along rivers and large creeks. The Lewisville soils are nearly level to gently sloping, are moderately permeable, and have a typical surface layer that is dark grayish brown silty clay approximately seven inches thick. The Gruene soils are gently sloping and exhibit a surface layer that is very dark grayish brown clay about 13 inches thick. The Krum soils are nearly level to gently sloping and are found in old stream channels that have been filled in. The Krum soils are moderately slowly permeable and exhibit a surface layer that is typically 16 inches thick, with dark gray clay. Soils in the Lewisville-Gruene-Krum map unit are used mainly for crops and pasture, although the Gruene soils are poorly suited for this use because they are shallow to caliche. These soils provide habitat for openland wildlife, including rabbit and small birds. Limitations for urban development of these soils include clayey texture, shrink-swell potential, and low soil strength. These soils are moderately well suited for recreational uses (USDA 1984).

2.2.2 Hydric Soils

Hydric soils are defined as those which are saturated or inundated for a sufficient duration to develop reducing soils conditions. Hydric soils are frequently associated with wetlands and are

an important distinction in determining presence or absence of U.S. Army Corps of Engineers (ACE) jurisdictional wetlands as defined in Section 404 of the Clean Water Act. Discussions with personnel at the Natural Resources Conservation Service (NRCS) office in New Braunfels, Texas indicated that no hydric soils exist in Comal County. However, three soils have been identified by the NRCS as associated with hydric soils. These soils include the Tinn clay, the Oakalla soils, and the Orif soils. All of these soils are frequently flooded; however, none of these soils meet the hydric criteria of saturation. The Tinn clay is the most hydric-like, because it is a clay and water tends to pond on it. The other two soils are loams with high permeabilities, and thus do not tend to remain saturated. (Personal communication with Carl Englerth, NRCS, 7/22/96). The locations of these soils in relation to the study areas is presented in Appendix A.

2.2.3 Prime Farmlands

Prime farmlands are soils that can be used to produce crops for food, feed, forage, fiber, and oilseeds. Their land uses include croplands, pasturelands, and woodlands, but not urbanized or water areas. Soil types that comprise prime farmlands feature slopes from 0% to 5%, good permeability to water and air, few or no rocks, and a reliable, adequate source of moisture (precipitation or irrigation). Otherwise acceptable soils that exhibit flooding, high water tables, or other limitations may be classified as prime farmlands if these limitations are overcome by drainage, flood control, etc.

The only areas in which proposed water lines would be installed in prime farmland soils occur in existing ROWs. Prime farmland soil types in such areas include the Anhalt clay, the Bolar clay loam, the Denton silty clay, the Krum clay, the Lewisville silty clay, the Oakalla silty clay loam, and the Sunev clay loam.

2.3 HYDROLOGICAL ELEMENTS

2.3.1 Surface Water

The Canyon Lake study area occurs within the Guadalupe River Basin, which drains 6,070 square miles in central Texas. The Basin has been divided into 17 segments for water quality monitoring purposes. Three of these segments occur within the Canyon Lake study area: Segment 1805, Canyon Lake itself; Segment 1806, the Guadalupe River above Canyon Lake; and Segment 1812, the Guadalupe River below Canyon Lake.

Segment 1805, Canyon Lake, extends for 25 miles from Canyon Dam to a point 1.7 miles downstream of Rebecca Creek Road, entirely within Comal County, and covers 8,230 acres. This segment has been designated for use as contact recreation, exceptional quality aquatic habitat, public water supply, and aquifer protection. Two permitted domestic outfalls totalling 0.11 million gallons per day (MGD) discharge into Canyon Lake. There are no known water quality problems associated with this segment.

Segment 1806, the Guadalupe River above Canyon Lake, extends for 103 miles from a point 1.7 miles downstream of Rebecca Creek Road in Comal County to the confluence of the North and South Forks of the Guadalupe in Kerr County. This segment has been designated for use as contact recreation, exceptional quality aquatic habitat, and public water supply. Five permitted domestic outfalls totalling 3.77 MGD discharge into this segment. Two industrial facilities are also permitted to discharge into this segment but, as of 1994, do not. Dissolved oxygen levels below the segment criterion of 6.0 mg/l have been measured in Kerr County, upstream of the study area, resulting in only partial support of the designated use of exceptional quality aquatic habitat. Concentrations of nitrogen as nitrate plus nitrite in the portion of the segment from Comfort in Kendall County to Kerrville in Kerr County, also upstream of the study area, have also occurred in excess of the segment screening level of 1.0 mg/l.

Segment 1812, the Guadalupe River below Canyon Lake, extends for 23 miles from the confluence of the Comal River to Canyon Dam, entirely within Comal County. This segment has been designated for use as contact recreation, exceptional quality aquatic habitat, public water supply, and aquifer protection. One permitted domestic outfall of 1.1 MGD discharges into this segment. Dissolved oxygen levels below the segment criterion of 6.0 mg/l have been measured at Horseshoe Falls, within the study area; as such, this segment does not support its designated use of exceptional quality aquatic habitat. Fecal coliform levels near New Braunfels, downstream of the study area, have been measured in excess of the segment criterion of 400 colonies per 100 ml, resulting in only partial support of the designated use of contact recreation. A 1992 assessment by the Guadalupe-Blanco River Authority (GBRA) also noted large concentrations of floating litter.

2.3.2 Groundwater

The Canyon Lake Study area is underlain by the Trinity Aquifer, which consists of a lower, a middle, and an upper unit in central Texas. In the Canyon Lake area, this aquifer occurs in the upper unit of the Glen Rose Formation, which also comprises the upper unit of the aquifer. The Trinity is considered a major aquifer of Texas. The lower and middle Trinity exhibit average coefficients of transmissivity of approximately 10,000 and 1,700 gal/day/ft, respectively; transmissivity in the upper Trinity was not available, but is presumably significantly lower, according to the Texas Department of Water Resources (TDWR). Water from the Trinity is of variable quality and ranges from fresh to slightly saline. Water samples from the aquifer typically exhibit calcium carbonate concentrations of 250 to 500 mg/l and sometimes significantly higher, classifying the water as very hard (TDWR 1983).

Users of the Trinity Aquifer, including residents of the subdivisions served by CLWSC, have encountered problems with both the quality and availability of their water supply. According to the TWDB Ground Water Data System, water from 30 of 121 supply wells (25%) exceeded at least one of seven TNRCC criteria for water quality parameters (sulfate, chloride, fluorine,

nitrate, pH, iron, and manganese) (THC 1996). Limited availability of groundwater in some portions of the study area has resulted in low water pressure at some residences during periods of peak demand.

Immediately east of the Canyon Lake study area is the outcrop of the Edwards Aquifer, which is considered to be one of the most important aquifers in Texas. The Edwards Aquifer is the sole source of drinking water for the city of San Antonio and discharges in several large springs, which are inhabited by several endangered species. The aquifer has dissolved large sections of several of the limestone formations in which it occurs, resulting in numerous subterranean caverns and honeycombs. These features, as well as fractures along the Balcones Fault, enable the Edwards aquifer to store and transmit large volumes of water. Well yields exceeding 16,000 gal/min have been reported. Water is generally fresh, exhibiting dissolved-solids concentrations of less than 500 mg/l.

2.4 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) has mapped floodplains for the entire study area. The floodplains are delineated on Flood Insurance Rate Maps (FIRMs) generated by FEMA. On newer FIRMs or in areas where a detailed survey floodplain elevations has been undertaken, floodplains are subdivided into various zones of differing potential flood depths or elevations. Portions of the FIRMs for the Canyon Lake area have been subdivided in this manner; however, almost all of the floodplain areas in which construction would occur as part of this project are simply labeled as Zone A, which represents 100-year floodplains for which base flood elevations have not been determined. These floodplains occur at locations where proposed linework would cross any of numerous small creeks throughout the study area.

2.5 WETLANDS

Wetlands are areas that exist between terrestrial and aquatic systems. The ACE maintains authority, with the U.S. Environmental Protection Agency (EPA), to regulate the placement of fill material within wetlands that meet the definition of jurisdictional wetlands. Jurisdictional wetlands are identified by three criteria: 1) the presence of hydrophytic vegetation, 2) soil possessing hydric characteristics, and 3) wetland hydrology.

For this report, wetlands have been identified by utilizing the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory maps which have been assembled using topographical, remote sensing, and other types of information. These maps can be used for preliminary identification of potential wetland areas. The maps use a system, subsystem, class and subclass approach to describe the wetlands. Additional modifiers include water regime, water chemistry, soil type and special modifiers. Definitions of wetland types and terminology used to describe wetlands encountered in the study areas are provided below:

Palustrine: Palustrine systems are defined as all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where the salinity is below 0.5 parts per thousand. The Palustrine System was developed to group the vegetated wetlands traditionally called by such names as marsh, swamp, bog, fen and prairie. It also includes the small, shallow, permanent or intermittent water bodies often called ponds.

Riverine: Riverine systems include all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 parts per thousand. A channel is defined as "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water."

Unconsolidated bottoms: Unconsolidated bottoms refers to wetlands and deepwater habitats with at least 25% cover of particles smaller than stones and vegetative cover less than 30%. Water regimes are restricted to subtidal, permanently flooded, intermittently exposed and semipermanently flooded. These wetlands are characterized by the lack of large stable surfaces for plant and animal attachment.

Water Regimes: Permanently flooded wetlands are those for which water covers the land surface throughout the year. Vegetation is composed of obligate hydrophytes. Semipermanently flooded wetlands are those for which surface water persists throughout the growing season in most years. When surface water is absent, the water table is usually at or very near the land surface. Seasonally flooded systems are those for which surface water is present for extended periods especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface. Temporarily flooded systems are those for which surface water is present for brief periods during the growing season, but the water table usually lies well below the soil surface for most of the season.

Diked or Impounded Wetlands: Diked or impounded wetlands are defined as those which have been created or modified by a barrier or dam which purposefully or unintentionally obstructs the outflow of water.

The proposed linework and water pumping and treatment facilities are located in wetland areas only at creek and river crossings. Creeks that may be crossed include Rebecca, Potter, Sorrel, Jacobs, Mountain, Tom, Jentsch, Hanz, Miller, Cypress, and Kelly creeks and Devil's Hollow. Wetlands associated with these creeks are all classified as riverine intermittent streambed temporarily flooded. The Guadalupe River is classified as riverine lower perennial unconsolidated bottom permanently flooded. Other wetland areas near potential construction areas include a few isolated farm ponds, classified as palustrine unconsolidated bottom

permanently flooded diked/impounded, and Canyon Lake itself, classified as lacustrine limnetic unconsolidated bottom permanently flooded diked/impounded.

2.6 CLIMATIC ELEMENTS

2.6.1 Local Climate

The average daily minimum and maximum temperatures at New Braunfels are 56.6° and 80.7° F, respectively. Precipitation averages 33.5 inches per year. Table 2.1 summarizes temperature and precipitation data for Comal County. The data in the table were gathered by the NRCS at its station at New Braunfels (USDA 1984). Winds are typically from the south and southeast during the spring and summer and from the north during the fall and spring. Prevailing winds are generally from the south and southeast during the spring and summer months and are of generally even distribution during the rest of the year. Wind speeds rarely attain or exceed the 14 to 18 knot range (Larkin and Bomar 1983).

2.6.2 Air Quality

The EPA has established primary and secondary National Ambient Air Quality Standards (NAAQS) for six air pollutants: ozone, carbon monoxide, sulfur dioxide, nitrogen dioxide, respirable particulate matter, and lead. Primary NAAQS are concentrations required to protect public health with an adequate safety margin. Secondary NAAQS are concentrations required to protect public welfare from any known or anticipated adverse effects. Primary and secondary NAAQS are presented in Table 2.2.

2.7 BIOLOGICAL ELEMENTS

Comal County occurs within the Balconian biotic province of Texas (Blair 1950). This province is located in the center portion of the state. It is generally bounded by Interstate 35 to the east,

Table 2.1 Summary of Temperature and Precipitation from New Braunfels, Texas.

Month	Avg. Daily Min. (deg. F)	Avg. Daily Max. (deg. F)	Precipitation (inches)
January	37.8	61.9	1.77
February	41.7	66.9	2.36
March	48.3	74.8	1.56
April	57.6	81.4	3.17
May	64.2	86.7	4.59
June	70.8	93.3	3.07
July	72.8	96.6	1.44
August	72.2	96.7	2.85
September	68.1	90.8	4.22
October	57.7	82.5	3.64
November	47.3	71.8	2.81
December	40.1	64.9	1.98
Annual Average	56.6	80.7	33.46

San Angelo to the north, the Pecos River to the west and US 90 to the south. The wildlife of the area is generally characterized by the intermixture of species of other, major provinces, specifically the Austroriparian, Tamuaulipan, Chihuahuan and Kansan. However, the vegetation of this province is quite different from that of adjoining provinces. Natural regions of this province include the Edwards Plateau and the Llano Uplift (LBJ School of Public Affairs 1978).

Comal County is found in the Edwards Plateau portion of the Balconian biotic province. The Edwards Plateau region comprises an area of West Central Texas commonly referred to as the "hill country." Elevations range from slightly less than 100 ft to over 3,000 ft. There are several river systems within this region that create a rough and well-drained landscape.

Table 2.2 National Ambient Air Quality Standards.

Pollutant	Primary NAAQS	Secondary NAAQS
Ozone	125 ppb 1-hour average (not to be exceeded on more than three days in three years)	same as primary
Carbon monoxide	35.5 ppm 1-hour average; 9.5 ppm 8-hour average (neither to be exceeded more than once per calendar year)	same as primary
Sulfur dioxide	145 ppb 24-hour average (not to be exceeded more than once per calendar year); 35 ppb annual average	550 ppb (not to be exceeded more than once per calendar year)
Nitrogen dioxide	54 ppb annual average	same as primary
Respirable particulate matter	155 $\mu g/m^3$ 24-hour average (not to be exceeded on more than three days in three years); 51 $\mu g/m^3$ annual average	same as primary
Lead	1.55 $\mu g/m^3$ quarterly average	same as primary

Due to the geology and geography of the subregion, the Edwards Plateau is further subdivided into subregions. Comal County contains elements of the Live Oak - Mesquite Savannah and the Balcones Canyonlands subregions. The Balcones Canyonlands subregion is closely correlated to ecological areas surrounding the rivers of the region, specifically the Guadalupe River in Comal County.

2.7.1 Vegetative Communities

The scrub forest is the most characteristic plant association of the area. Ash (*Fraxinus* sp.), juniper (*Juniperus* sp.), Texas oak (*Quercus texana*), and stunted live oak (*Q. Virginiana*) are dominant in the more dissected southern and eastern canyonlands of the region. Mesquite (*Prosopsis* sp.) and live oak are the dominant species in the woody vegetation in the west. The floodplains of the streams are occupied by a mesic forest of large live oaks, elms (*Ulmus* sp.), hackberries (*Celtis laevigata*), and pecans (*Carya illinoinensis*). Large cypress trees (*Taxodium distichum*) fringe the stream banks of many of the rivers of this area, including the Guadalupe.

2.7.2 Wildlife Communities

The vertebrate fauna of the Balconian of Texas includes at least 57 species of mammals, but no species is restricted to this province. The mammalian fauna found in this area contains a strong element of Chihuahuan species that range into the province from the west and strong elements of the Austroriparian species that range into the province from the Texan to the east. Elements from the other two provinces, the Tamaulipan and Kansan, occur sparingly in the Balconian province. A minimum of 36 species of snakes, 16 lizards, 15 anurans (frogs and toads), seven urodeles (salamanders and newts), and one land turtle are known from this biotic province.

Mammals with Chihuahuan affinities found in this area include the pallid bat (*Antrozous pallidus*), the ringtail (*Bassariscus astutus*), the hog-nosed skunk (*Conepatus mesoleuens*), the brush mouse (*Peromyscus boylii*), and the Encinal mouse (*Peromyscus pectoralis*). Most of these species inhabit the rugged, desiccated parts of the Balconian terrain. Mammals associated with the Austroriparian province that range widely in the Balconian province include the Virginia opossum (*Didelphis virginiana*), the Eastern pipistrelle [bat] (*Pipistrellus subflavus*), the fox squirrel (*Sciurus niger*), and the Eastern cottontail (*Sylvilagus floridanus*). Other species that occur in the eastern portion of this province include the evening bat (*Nycticeius humeralis*), the pocket gopher (*Geomys breviceps*), and the Eastern woodrat (*Neotoma floridana*). The stream valleys likely act as important avenues of dispersal from the Austroriparian across the Texan and to the Balconian provinces. However, some of these species have moved away from the stream valleys and into the cedar/oak scrub forests.

Species from the Tamaulipan province include the javelina (*Tayassu angulatum*) and the nine-banded armadillo (*Dasypus novemcinctus*). Two Tamaulipan species, the ocelot *(Felis pardalis)* and the jaguar (*Panthera onca*), have been extirpated in the Balconian. The few characteristically Kansan species found in the Balconian include the badger (*Taxidea taxus*) and the plains harvest mouse (*Reithrodontomys montanus*). Texan species ranging into the Balconian

province include the fulvous harvest mouse (*Reithrodontomys fulvescens*) and the Northern pygmy mouse (*Baiomyns taylori*).

Other mammalian species widely distributed in the Balconian, but not distinctly characteristic of a single other province, include the white-footed mouse (*Peromyscus leucopus*), the hispid cotton rat (*Sigmodon hispidus*), the hispid pocket mouse (*Perognathus hispidus*), Merriam's pocket mouse (*Perognathus merriami*), the Northern grasshopper mouse (*Onychomys leucogaster*), the Southern Plains woodrat (*Neotoma micropus*), and the black-tailed jackrabbit (*Lepus californicus*).

Population densities of the mammals usually remain low in the Balconian by contrast with the high densities of the same species found in the Tamaulipan province. Part of this phenomenon may be due to the transitional nature of the Balconian region in which many of the various species approach the limits of their ecological tolerance. Additional factors in the low densities may include the destruction of native vegetation over most of the region by overgrazing.

Recent surveys of fur-bearing animals resulted in recorded sightings of raccoon *(Procyon lotor)*, ringtail, opossum, skunk (*Spilogale gracilis* [Western spotted skunk] and *Mephitis mephitis* [striped skunk]), gray fox (*Urocyon cinercoargenteus*), coyote (*Canis latrans*), bobcat (*Felis rufus*), and badger (one sighting) within the Edwards Plateau ecological region (Delmonte 1995). Recent surveys suggest that the Edwards Plateau ecological region contains approximately 1,726,333 white-tailed deer (*Odocoileus virginianus*), which represents almost one-half of the population in the State of Texas. In 1994, the estimated deer population of Comal County was 48,063 (Young and Richards 1995).

The Western box turtle (*Terrapene ornata*) is the only land turtle common to this area. The lizard fauna is comprised principally of Chihuahuan and widely distributed western species. These species include the Texas banded gecko (*Coleonyx brevis*), the crevice spiny lizard

(*Sceloporus poinsetti poinsetti*), the Texas alligator lizard (*Gerrbonotus liocephalus*), and the common tree lizard (*Ursosaurus ornatus*). Other species found in the Balconian with western affinities include the Northern earless lizard (*Holbrookia maculata*), the collared lizard (*Crotophytus collaris*), the Texas horned lizard (*Phrynosoma cornutum*), the four-lined skink (short-lined subspecies; *Eumeces tetragrammus brevilineatus*), the Great Plains skink (*Eumeces obsoletus*), and the Texas spotted whiptail (*Cnemidophorus gularis*). Two species of lizards typical of the Austroriparian province extend their range to include the Comal County area of the Balconian. These species are the racerunner (*Cnemidophorus sexlineatus*) and the Eastern glass lizard (*Ophisaurus ventralis*).

Thirty-six species of snakes are known to inhabit the Balconian province; however, they are not restricted in Texas to this province. The majority of these snakes are widely distributed western species that range over many of the Texas provinces and North America. Snake species that are known only in the Balconian and Chihuahuan provinces are the Mexican garter snake (*Thamnophis eques*) and the Northern black-tailed rattlesnake (*Crotalus molossus molossus*). Other snake species common to this area include the rough green snake (*Opheodrys aestivus*), the buttermilk racer (*Coluber constrictor anthicus*), the Texas rat snake (*Elaphe obsoleta lindheimeri*), the Texas brown snake (*Storeria dekayi victa*), the plain-bellied water snake (*Nerodia erythrogaster*), the diamondback water snake (*Nerodia rhombifera*), and the Western diamondback rattlesnake (*Crotalus atrox*).

Representative urodele fauna species include the barred tiger salamander (*Ambystoma tigrinum mavortium*) and the white-throated slimy salamander (*Plethodon glutinosus albagula*). Five urodele species are endemic neotenic forms that have developed in subterranean drainage and springs of the Edwards Plateau. These species include the Texas blind salamander (*Eurycea rathbuni*), the San Marcos salamander (*Eurycea nana*), the Texas salamander (*Eurycea neotenes*), the Cascade Cavern salamander (*Eurycea latitans*), and the Comal blind salamander (*Eurycea tridentifera*).

Common anurans include Couch's spadefoot (*Scaphiopus couchii*), Woodhouse's toad (*Bufo woodhousii*), the Northern leopard frog (*Rana pipiens*), the Eastern green toad (*Bufo debilis debilis*), the red-spotted toad (*Bufo punctatus*), and the Great Plains narrow-mouthed frog (*Gastrophryne olivacea*) (Blair 1950).

Project Area Description

As previously noted, the majority of the project area is dedicated to highway and street ROWs, with some disturbed and undisturbed areas dedicated to the placement of pumping stations and water treatment plants. Species occurring in the roadside areas are generally limited to small rodents and various bird species.

The eastern and western portions of the Canyon Lake study area occur within the Central Prairie and Edwards Plateau Ornithological Regions of Texas, respectively, as indicated in Figure 2.1 (Oberholser 1974). No regional breakdown of bird species numbers is provided in this reference. Due to the large number of bird species occurring in each of these regions, a list is not included in this report.

2.7.3 Threatened and Endangered Species

This section includes a complete list (Table 2.3) of the threatened and endangered species, as well as species of concern, that could potentially occur within the project area. This list also includes natural communities that have been identified as a concern. There are two governmental agencies that have jurisdiction over threatened and endangered species. These agencies are the USFWS, that operates under the United States Department of the Interior. The USFWS is responsible for listing and protecting species that are federally listed as threatened and endangered. The second agency is the Texas Parks and Wildlife Department (TPWD). TPWD is responsible for listing and protecting species that are state listed as threatened and endangered.

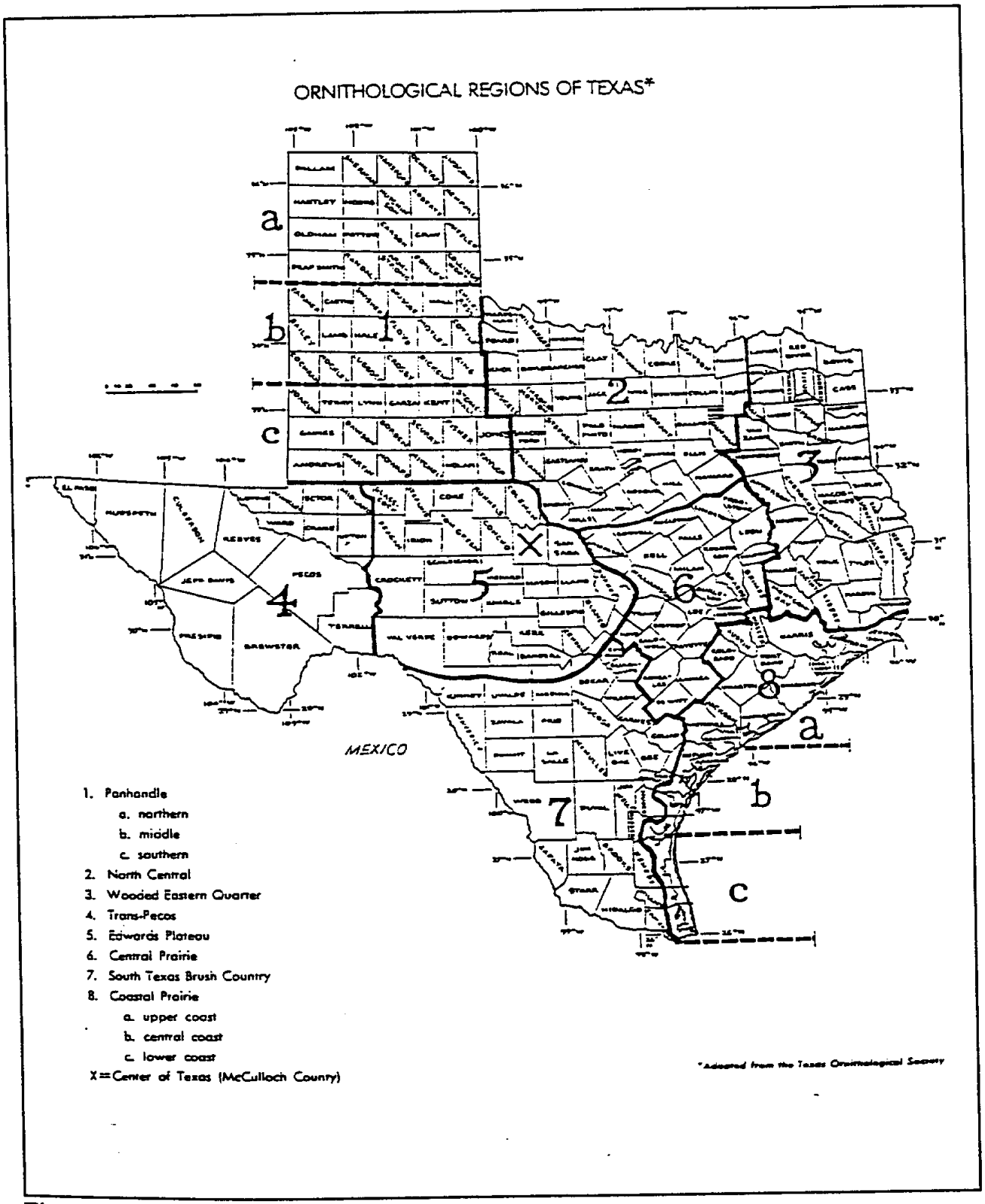

Figure 2.1 Ornithological Regions of Texas.

Table 2.3 Rare, Threatened, and Endangered Species of Potential Occurrence and Known Natural Occurrence in Comal County, Texas.

Common Name	Scientific Name	USFWS Status	TPWD Status	State Rank	Global Rank	TOES
Amphibians						
Cascade Caverns Salamander	*Eurycea latitans*	3B	T	S3	G3	
Comal Blind Salamander	*Eurycea tridentifera*	C2	T	S1	G1	T
Edwards Plateau Spring Salamanders	*Eurycea sp. 7*	C2		S1S3	G1G3Q	
San Marcos Salamander	*Eurycea nana*		T			
Reptiles						
Cagles' Map Turtle	*Graptemys caglei*	C1		S3	G3	
Spot-Tailed Earless Lizard	*Holbrookia lacerata*			S3?	G3G4	
Timber Rattlesnake	*Crotalus horridus*		T	S5	G5	
Texas Horned Lizard	*Phrynosoma cornutum*	C2	T	S4	G5	T
Mammals						
Cave Myotis	*Myotis velifer*	C2		S4	G5	
Birds						
American Peregrine Falcon	*Falco peregrinus anatum*	LE	E	S2B	G3T2	E
American Swallow-tailed Kite	*Elanoides forficatus*		T	S2	G5	T
Arctic Peregrine Falcon	*Falco peregrinus tundrius*	E/SA	T	S2	G3T2	T
Bald Eagle	*Haliaeetus leucocephalus*		E	S3B/S3N	G4	E
Black-Capped Vireo	*Verio atricapillus*	E	E			T
Brown Pelican	*Pelecanus occidentalis*	LE	E	S3B	G4	E
Golden-Cheeked Warbler	*Dendroica chrysoparia*	LE	E	S2	G2	T
Interior Least Tern	*Sterna antillarum athalassos*	LE	E	S1B	G4T2Q	E
Peregrine Falcon	*Falco peregrinus*	LELT		S3	G3	
White-Faced Ibis	*Plegadis chihi*	C2	T	S4B	G5	T
White-Tailed Hawk	*Buteo albicaudatus*		T	S4B	G4	T
Whooping Crane	*Grus americana*	LE	E	S1	G1	E
Wood Stork	*Mycteria americana*		T	SHB, S3N	G4	T
Zone-tailed Hawk	*Buteo albonotatus*		T			T
Fish						
Fountain Darter	*Etheostoma fonticola*	LE	E	S1	G1	E
Guadalupe Bass	*Micropterus treculi*	C2		S3	G3	
Invertebrates						
Coman Dryopid Beetle	**Stygoparnus comalensis**	**PE**		**S1**	**G1**	
Comal Springs Riffle Beetle	*Heterelmis comalensis*	C1		S1	G1	
Reddell's Cave Amphipod	**Stygobromus reddelli**	**PE**		**S1**	**G1**	

Table 2.3 Concluded.

Common Name	Scientific Name	USFWS Status	TPWD Status	State Rank	Global Rank	TOES
Plants						
Bracted Twistflower*	*Streptathos bracteatus*		E			E
Canyon Mock-Orange	*Philadelphus ernestii*	C2		S2	G2	WL
Dark Noseburn*	*Tragia Nigricans*					WL
Glass Mountains Coral-Root	*Hexalectris Nitida*	C2		S3	G3	
Heller's Marbleseed*	*Onusmodium helleri*					WL
Hill Country Wild Mercury	*Argythamnia aphoroides*	C2		S2	G2	WL
Texas Gourd*	*Cucurbita texana*					WL
Texas Mock-Orange	*Philadelphus texensis*	3C		S2	G2	WL
Natural Communities						
Ceder Elm-Sugarberry Series	*Ulmus crassifolia-Celtis laevigata series*			S4	G4	
Plateau Live Oak-Little Bluestem Series	*Quercus fusiformis -Schizachyrium scoparium series*			S3	G3	
Ashe Juniper-Oak Series	*Juniperus ashei-Quercus Spp. series*			S4	G4	
Bald Cypress-Sycamore Series	*Taxodium distichum-Platanus occidentalis series*			S3	G3	WL
Curlymesquite-Side Oats Gramma Series	*Hilaria belangeri-Bouteloua curtipendula series*			S3	G3	WL

* These plant species are listed as occurring in Comal County by TOES, not TPWD.

Federal Status
LE - Listed Endangered
LT - Listed Threatened
E/SA - Listed Endangered on basis of Similarity of Appearance
C1 - Candidate, Category 1. USFWS has substantial information on vulnerability to support proposing to list as endangered or threatened. Data is being gathered on this species.
C2 - Candidate, Category 2. Information indicates that proposing to list species is possibly appropriate, but data on vulnerability are unknown to support immediate preparation of rules.
3B - Former Candidate. Rejected because not a recognized taxon, i.e synonym or hybrid.
3C - Former Candidate. Rejected because more common, widespread, or adequately protected.
PE - Proposed to be listed as Federally Endangered.
State Status
E - Endangered
T - Threatened
Global Rank
G1 - Critically imperiled globally, extremely rare, 5 or fewer occurrences (critically threatened throughout range)
G2 - Imperiled globally, very rare, 6 to 20 occurrences (endangered throughout range)
G3 - Very rare and local throughout range or found locally in restricted range, 21 to 100 occurrences (threatened throughout range)
G4 - Apparently secure globally
G5 - Demonstrably secure globally
G#G# - Ranked within a range as status uncertain
G#T# - "G"= species rank; "T"= rank of variety or subspecies taxa
Q - Qualifier denoting questionable taxonomic assignment.
State Rank
S1 - Critically imperiled in state, extremely rare, very vulnerable to extirpation, 5 or fewer occurrences
S2 - Imperiled in state, very rare, vulnerable to extirpation, 6 to 20 occurrences
S3 - Rare or uncommon in state, 21 to 100 occurrences
S4 - Apparently secure in state
S5 - Demonstrably secure in state
SH - Of historical occurrence in state. May be rediscovered
? - Qualifier denoting uncertain rank.
B - Basic rank refers to breeding population in state
N - Basic rank refers to non-breeding population in state
Texas Organization for Endangered Species (TOES)
E - Endangered. In danger of extinction in all of most of the species' range in the United States, particularly in Texas.
T- Threatened. Depleted or impacted by man so as likely to become endangered in the near future.
WL - Watch List. Potentially endangered or threatened in the United States, especially in Texas, although not necessarily in its range as a whole.

TPWD also supports a program known as the Texas Biological and Conservation Data System, which is responsible for maintaining data on selected species and provides state and global ranks to species on its "Special Species" list. A private organization, known as the Texas Organization for Endangered Species (TOES), also publishes a list that includes federal and state listed species as well as "watch-list" species. Watch-list species are those that are not currently listed as threatened or endangered, but are believed to warrant further study to determine their current status.

Table 2.3 provides the complete list of species that may occur in the project area. They are categorized by order and include the USFWS and TPWD determination, the species' state and global rank, and their TOES determination.

As indicated in Table 2.3, there are a variety of rare, threatened and endangered species in Comal County and the Central Texas region. The following is a discussion of the USFWS and TPWD's threatened and endangered species listed above, including a presentation of natural histories, when available.

Amphibians

Four amphibian species of concern, all salamanders, are either known to exist or may exist within the study area. All of these species exist either in subterranean aquatic environments or are associated with spring flows and submerged vegetation. Three of these species- the Cascade Cavern salamander, the Comal blind salamander, and the San Marcos salamander- are listed as state threatened. The Edwards Plateau Spring salamander (*Eurycea* sp.) is not listed by the TPWD as being endangered or threatened, but is a Category 2 species with the USFWS.

Because this project will draw water from Canyon Lake that is in excess of current water needs for downstream users it is not likely to have an impact on these species. However, before

excavations are conducted to install facilities and water lines, efforts to identify potential habitat for these species in those areas will be conducted.

Reptiles

Four reptile species of concern are either known to exist or may exist in the study area. None of these species are listed by the USFWS as threatened or endangered. Two of the species, the Timber rattlesnake (*Crotalus horridus*) and the Texas horned lizard (*Phyrnosoma cornutum*), are listed as state threatened. The Cagle's map turtle (*Graptemys caglei*) is listed as a Category 1 species by the USFWS, while the spot-tailed earless lizard (*Holbrookia lacerata*) is not listed by TPWD or the USFWS; however, it is believed to be rare.

Mammals

The cave myotis (*Myotis velifer*), a relative of the bat, is the only mammal species of special concern that is listed as potentially occurring in the project area. This species is listed as a Category 2 candidate by the USFWS. Although current data suggest that listing of this species is possibly appropriate, substantial data on biological vulnerability is lacking at this time.

Birds

There are fourteen avian species of special concern that could potentially occur in Comal County. These species are described below.

American and Arctic Peregrine Falcon: The American and Arctic Peregrine Falcon are very similar in appearance and behavior, however, the American subspecies (*Falco peregrinus anatum*) and the arctic subspecies (*Falco peregrinus tundris*) differ in range and migrational patterns. The American subspecies nests from central Alaska to central Mexico. The arctic subspecies nests from northern Alaska to Greenland. These falcons are usually found in most

climate zones, in steppes, grasslands or scrubland to forested areas, however, they prefer areas with high cliffs and avoid climate extremes, such as humid rain forests. No species presence in Comal County has been documented by Oberholser (1974). No impacts to these species are anticipated from the proposed project.

American Swallow-Tailed Kite: The American swallow-tailed kite (*Elanoides forficatus*) is listed as threatened by the TPWD. This bird is a medium-sized hawk with long pointed wings that formerly bred throughout the Mississippi Valley, although now is mainly found in Florida. This bird mostly winters in South America. This bird is not a secluded species as nests and foraging birds have been documented in and around human development. River bottom forests with adjacent semi-prairie land, glades with cypress swamps, and freshwater marshes that skirt large lakes are the prime habitats of this species. This species was formerly a common to uncommon nesting species over much of the eastern half of the state, including west to the Balcones Escarpment area. Several authors have suggested that lumbering and drainage are the principal culprits for the birds rapid decline in population. A recent report indicates that while some sightings of these birds has occurred in Texas, these sightings are primarily limited to the East Texas region. No species have been reported in Comal County from 1990 to 1992, the time period covered in the report (Boone 1993). No evidence of the presence of this species was observed during the field investigations.

Bald Eagle: The bald eagle (*Haliaeetus leucocephalus*) is listed by the TPWD Heritage Conservation Program (HCP) as a potential species in Comal County. However, a recent report that includes state-wide data on bald eagle distribution does not include any reported sightings in Comal County (Mitchell 1995). Given the lack of evidence that this species is present in the county and the residential/commercial nature of the proposed project, it is unlikely that this project will negatively impact this species.

Black-capped Vireo: The black-capped vireo (*Vireo atricapillus*) is a small, insectivorous bird that is known to prefer habitat consisting of scattered trees and numerous dense clumps of bushes

growing to ground level, interspersed with open areas of base ground, rock, grasses, or forbs. This type of habitat consists of juniper (*Juniperus ashei*), evergreen and flameleaf sumacs (*Rhus spp.*), shin oak (*Q. sinuta* var. *breviloba*), elbowbush, Texas kidneywood (*Eysenfardita texana*), and yaupon (*Ilex vomitoria*). Canopy height for this habitat is typically between one to six meters. The breeding season starts about March 15 and ends August 15 in Texas. A recovery plan has been approved for the black-capped vireo (USFWS 1991).

Brown Pelican: The brown pelican (*Pelicanus occidentalis*) is a large dark water bird known to inhabit sea coasts and islands of the Pacific and Atlantic coasts. It is currently listed as endangered by the USFWS and the TPWD. This bird is mainly a resident bird of subtropical and tropical seacoasts and it rarely strays from its preferred saltwater shores. Given the preferred habitat of this species, it is unlikely that this project will impact this species.

Golden-cheeked Warbler: The golden-cheeked warbler (*Dendroica chrysoparia*) is a small, insectivorous bird, with its habitat characterized as oak-juniper woodland. Tree species include live oak (*Q. fusiformis*), Texas oak (*Q. Texana*), juniper, cedar elm (*U. crassifolia*), hackberry, Texas ash (*F. americana* var. *texensis*), bald cypress (*Taxodium distichum*), Arizona walnut (*Juglandaceae major*), big-toothed maple (*A. grandidentatum*), Lacey oak (*Q. laceyi*), and sycamore (*Platanus occidentalis*). Canopy height for this type of habitat varies a great deal depending on species composition; however, six to eight meters is typical. The golden-cheeked warbler breeds exclusively in Texas and is present from early March to mid-August.

Interior Least Tern: The interior least tern (*Sterna antillarum athalassos*) is listed as endangered by the TPWD. It is found along river banks. Oberholser (1974) does not record any occurrences of the interior least tern in Comal County.

White-Faced Ibis: The white-faced ibis (*Plegadis mexicana*) is a medium-sized marsh bird with a long slender decurved bill that is found in the coastal regions of Texas. This bird is currently

listed as threatened by the TPWD. The preferred habitat of the white-faced ibis is freshwater marshes and sloughs and irrigated rice fields. Pesticide applications on rice fields are believed to have significantly impaired the reproduction abilities of this bird. No accounts of the white-faced ibis in Comal County have been recorded by Oberholser (1974). Given the preferred habitat, it is unlikely that this project will impact this species.

White-tailed Hawk: The white-tailed hawk (*Buteo albicaudatus*) is listed as a state threatened species by the TPWD. It is a tropical species that prefers coastal grasslands and grassy mesquite-live oak savannah. Its numbers have declined over the past century due to a combination of takeover of grasslands by mesquite, urbanization, pollution, a cooler climate, and a decline in the population of the snakes on which it feeds (Oberholser 1974). The fact that the proposed construction will not occur in the white-tailed hawk's preferred habitat make it unlikely that this project will cause an adverse impact to this species.

Wood Stork: The wood stork (*Mycteria americana*) is the only true stork native to temperate North America and is listed as threatened by the State of Texas. This bird makes its rookeries in large tracts of bald cypress (*Taxodium distichum*) and to a lesser extent in stands of red mangrove (*Rhizophora mangle*). East Texas was once included in this bird's range; however, it now apparently only nests in Florida (Oberholser 1974). While the TPWD HCP indicates that there is a possibility that these birds could be found in Comal County, it is unlikely that this project will cause an adverse impact to this species.

Zone-tailed Hawk: The zone-tailed hawk (*Buteo albonotatus*) is listed as a state threatened species by the TPWD. This hawk prefers deep, rocky canyons and streamsides in semiarid mesa, hill, and mountain areas. The only occurrences of this species in Comal County reported by Oberholser (1974) date from the 1800s. As such, no impacts on this species are anticipated.

Fish

Two fish species of special concern are listed as potentially occurring in the study area. These species include the fountain darter (*Etheostoma fonticola*), a federal and state listed endangered species and the Guadalupe bass (*Micropterus treculi*), a federally listed Category 2 species. The fountain darter does not appear in the study area on maps of endangered species occurrences maintained by the TPWD Endangered Resources Branch in Austin. Three reports of Guadalupe bass occurrences; one in Honey Creek and one each in the Guadalupe River upstream and downstream from Canyon Lake- are depicted on TPWD's maps, suggesting that this species may occur within the study area.

Plants

The are eight threatened or endangered plant species that may occur in the Comal County area. Four species are listed by the TPWD as occurring within the study area. These species include the canyon mock-orange (*Philadelphus ernestii*), the Glass Mountains coral-root (*Hexalectris nitida*), and the Hill Country wild mercury (*Argythamnia aphoroides*), all of which are listed as Category 2 species by the USFWS. The fourth species, the Texas mock-orange (*Philadelphus texensis*), is listed as a former candidate by the USFWS that has been rejected because it is more common, widespread or adequately protected than originally believed.

Four species are not listed by the TPWD as occurring in the study area; however, they are listed by TOES as occurring in Comal County. Of these four species, one plant, the Bracted Twistflower (*Streptathos bracteatus*) is listed as endangered by the State of Texas. The three other plants, the dark noseburn (*Tragia nigricans*), the Heller's Marbleseed (*Onusmodium helleri*), and the Texas gourd (*Cucurbita texana*) are not listed by TPWD or the USFWS. All of the plant species with the exception of the Glass Mountain coral-root are on the TOES watch list, as potentially endangered or threatened in Texas, although not in their range as a whole.

Natural Communities

As indicated in Table 2.3, there are five natural communities known or believed to exist in Comal County and/or the study area. However, these natural communities are not listed as federally or state threatened or endangered. Given the limited size and scope of this project, it is unlikely that these natural communities will be negatively impacted due to this project.

2.7.4 State and National Parks, Natural Areas, Forests, Etc.

There are no state or national parks, natural areas, forests, or wildlife refuges within the study area. However, the ACE maintains several parks along the Canyon Lake shoreline, including Crane's Mill, Potter's Creek, Canyon, Jacobs Creek, Comal, North, Overlook, and Guadalupe Parks. In addition, the Guadalupe River below Canyon Dam is stocked with trout every December, creating one of the most significant recreational fisheries in Texas. Recreation activities, including scuba diving, boating, fishing, etc. associated with the ACE parks, as well as the entire study area, will be addressed in terms of potential impact due to implementation of this project.

2.8 CULTURAL RESOURCES

TRC Mariah is not responsible for the Cultural Resources review for this report, in that, following standard guidelines for the EA, TPWD will perform this section.

2.9 ECONOMIC CONDITIONS

Population

According to the 1990 U.S. Census, the population of Comal County is 51,832. The population is comprised of 19,223 households, which include 14,795 families. The racial breakdown of

the population is 90.4% white, less than 1% each black, Asian, and American Indian, and 8.2% other races; persons of Hispanic origin, who are considered an ethnic rather than a racial group, presumably comprise a large proportion of those claiming to be of "other races." Just under 26% of the population is under 18 years of age, 58% is between the ages of 18 and 65, and 16% is over 65 (U.S. Department of Commerce [USDOC] 1990). Numerical breakdowns of the population of Comal County by race, gender, and age are presented in Table 2.4. Popopulation projections for Comal County, on which the need for this project is based, are presented in Table 2 of the Regional Water Plan.

Income

Residents of Comal County are generally more prosperous than average. As of 1990, the per capita income of residents of Comal County was $13,400. The median household and family incomes were $29,457 and $33,448, respectively. As shown in Table 2.5, these figures are above those for the state of Texas. In addition, slightly under 13% of the population of Comal County lives below the poverty level, compared with slightly over 18% for the state (USDOC 1990).

Table 2.4 Breakdown of Comal County Residents by Race, Gender, and Age.

Classification		No. of Persons
Racial	White	46,840
	Black	435
	American Indian	122
	Asian	160
	Other races	4,275
Gender	Male	25,188
	Female	25,644
Age	0-17	13,409
	18-65	30,081
	65+	8,342

Table 2.5 Economic Comparison of Comal County and State of Texas.

Category	Comal County	State of Texas
Per capita income	$13,400	$12,904
Median household income	$29,457	$27,016
Median family income	$33,448	$31,553
Persons below poverty level	6,576	3,000,515
Percent below poverty level	12.9%	18.1%
Children under 18 below poverty level	2,395	1,159,710

Source: USDOC 1990

Home Values

Home values for Comal County averaged $89,500, according to the 1990 U.S. Census. Out of 22,987 housing units, 19,315 were occupied (USDOC 1990).

Employment

Employment figures for Comal County show a significant increase (over 25%) since 1990 in the size of the civilian labor force. During this period the unemployment rate never exceeded 6%. As of October 1996, the civilian labor force was estimated at 32,651 persons by the Texas Employment Commission (TEC), with 932 persons (2.9%) unemployed. Table 2.6 provides employment estimates for the county since 1990, as determined by the Labor Market Information section of the TEC (TEC 1996).

Retail trade employs the greatest number of persons in Comal County. Other major employers include educational services, construction, durable goods manufacturing, health services, and nondurable goods manufacturing (USDOC 1990). A breakdown of employment by industry in the county is presented in Table 2.7.

Table 2.6 Employment Data for Comal County, 1990-1996.

Year	Total Civilian Labor Force	Employed	Unemployed	% Unemployed
1990	25,573	24,376	1,377	5.3%
1991	26,399	24,910	1,489	5.6%
1992	27,877	26,375	1,502	5.4%
1993	29,269	27,785	1,484	5.1%
1994	31,130	29,911	1,219	3.9%
1995	32,039	30,858	1,181	3.7%
1996 (Oct.)	32,651	31,719	932	2.9%

Source: TEC, 1996

Table 2.7 Employment by Industry in Comal County.

Industry	No. Persons Employed
Agriculture, forestry, fisheries	694
Mining	233
Construction	1,861
Manufacturing (nondurable goods)	1,545
Manufacturing (durable goods)	1,761
Transportation	916
Communications/utilities	772
Wholesale trade	919
Retail trade	4,164
Finance, insurance, real estate	1,563
Business, repair services	1,211
Personal services	1,189
Health services	1,731
Educational services	2,145
Other professional services	1,467
Public administration	1,028

2.10 LAND USE

By far the largest proportion (over 80%) of land in Comal County's 363,000 acres is rangeland, according to the NRCS in New Braunfels. The remainder of the county consists of cropland (6.5%), urbanized areas (6.2%), improved pastureland (2.8%), water (2.2%), and wildlife land (2.1%). Table 2.8 presents a breakdown of land use in Comal County.

Table 2.8 Land Use in Comal County.

Use	Acreage	% of Total
Rangeland	291,000	80.2%
Cropland	24,000	6.5%
Urban	23,000	6.2%
Improved Pastureland	10,000	2.8%
Water	7,900	2.2%
Wildlife Land	7,600	2.1%

3.0 ALTERNATIVES TO THE PROPOSED ACTION

3.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, customers of CLWSC would continue to rely on the Trinity Aquifer as their sole source of potable water. As previously noted, problems with both water quality and availability have occurred in many of the supply wells in the area. These problems would continue under the no-action alternative and would likely worsen as water demands increase in response to projected rapid population growth in the Canyon Lake area. In addition, there is a possibility that the TNRCC might impose pumping restrictions on water supply aquifers in the future. When contacted by TRC Mariah, personnel at TNRCC headquarters in Austin and at the TNRCC regional office in San Antonio were unaware of any specific restrictions pertaining to the Trinity Aquifer currently under consideration. However, pumping restrictions in general, and specifically for the Edwards Aquifer, appear to be supported by certain segments of the public and the regulatory community and have been the subject of recent highly-publicized legal proceedings. As such, the possibility that pumping from the Trinity or Edwards Aquifers might be limited at some point during this project's 50-year planning period must be considered. Although possible restrictions on pumping from the Edwards Aquifer would not directly impact the study area, such potential restrictions would likely increase the demand on pumping from the Trinity Aquifer and thereby exacerbate the water supply problems already occurring in CLWSC's service area. Were such limitations on pumping from either aquifer enacted, CLWSC might be unable to meet the needs of its future customers under the no-action alternative.

3.2 ALTERNATIVES FOR WATER COLLECTION AND CONVEYANCE SYSTEMS

The alternatives under consideration include three potential water main routes connecting lines following FM 2673 to those along U.S. Highway 281. North of Canyon Lake, the only water source and considered is a water treatment plant at the southern end of the Canyon Lake Shores

subdivision adjoining the old riverbed, and the only route considered follows Crane's Mill Road to the ROW on FM 306. Similarly, the only water source considered for subdivisions south of the lake is a water treatment plant located at the intersection of FM 2673 with FM 3159, in the community of Startzville, the only route considered immediately south of Canyon Lake is along FM 2673, and the only route considered in southwestern Comal County follows the ROW of U.S. Highway 281 at the intersection of State Highway 46 to that of Ammann Road to that of FM 3155. The locations of the water treatment plants were selected based on lake depth, shoreline topographical characteristics that appeared to provide suitable intake arrangements, and centralized locations with respect to conveyance system routes. The routes noted above were selected because they are in existing ROW areas and are closer to existing subdivisions and associated water main connections than any other routes would be.

3.2.1 Alternatives for Water Source for Subdivisions North of Canyon Lake

Two alternatives are under consideration to provide water from Canyon Lake to subdivisions along FM 306 north of the lake. Alternative Source #1 is the water treatment plant that would be constructed This plant would be the only treatment plant constructed under this alternative. The use of Alternative Source #1 would require the extension of water lines from the northern end of FM 2673 through Crane's Mill Park, under Canyon Lake, and through the Canyon Lake Shores subdivision to FM 306. The lake crossing would entail boring lines through the subsurface beneath the bottom of the lake.

Alternative Source #2 is a second water treatment plant that would be constructed on the north side of Canyon Lake. The plant would be located across the lake from Crane's Mill Park at the same location that the subsurface lines would emerge if Alternative Source #1 were selected. Lines from the treatment plant would then be constructed through the Canyon Lake Shores subdivision as under Alternative Source #1. Although this alternative would require construction of a second water treatment plant, it would eliminate the need to install water lines in Crane's Mill Park and beneath Canyon Lake.

3.2.2 Alternative Routes for Conveyance Systems South of Canyon Lake

As previously noted, three potential routes are under consideration to convey water from the water treatment plant in Startzville to subdivisions in the western and southern portions of CLWSC's service area. Each of these alternative water line routes would be connected to water lines along the already-selected routes described above.

Alternative Route #1, the northernmost of the proposed alternatives, follows FM 2673 north from the water treatment plant at Startzville before turning westward to the southwest corner of the Canyon Lake Mobile Home Estates subdivision. It would then follow an easement owned by the Guadalupe Valley Telephone Company (GVTC) to its intersection with Demijohn Road. After following Demijohn Road south for a short distance, it would turn westward and continue southwest through undeveloped land and through the Fox Creek subdivision, where it would cross FM 311. From this point it would pass north of the Gutierrez Ranch and Sun Valley Village subdivisions and would join a water line following U.S. Highway 281 just south of the crossing of Highway 281 over Hanz Creek. The route would then continue south to FM 1863, with a lateral pipeline following State Highway 46 eastward from U.S. Highway 281 to serve the Smithson Valley area. This route is depicted in Figure 11a in section 3.5.2 of the Regional Water Plan.

Alternative Route #2, which is depicted in Figure 11b in section 3.5.2 of the Regional Water Plan, would follow FM 3159 southwest from its intersection with FM 2673 for a distance of approximately 2.7 miles, at which point the route would either continue to follow FM 3159 or would branch northwest through undeveloped land at the point at which FM 3159 turns south and begins a relatively steep ascent. The route through the undeveloped land would extend for approximately 0.4 miles northwest and then turn southwest for approximately one mile. It would then join an unnamed ranch road, which it would follow southwest for approximately 1.7 miles. The route would rejoin FM 3159 approximately 1,500 ft east of the intersection with FM 311. It would follow FM 3159 south to FM 1863, which it would then follow to U.S. Highway

281. A lateral pipeline would extend westward from the intersection of Texas Highway 46 to U.S. Highway 281 to serve the subdivisions in the Highway 46/Highway 281 area. The decision to branch off of and eventually rejoin FM 3159 instead of following the roadway would be based on engineering difficulties posed by the pronounced change in elevation (over 100 ft) in a short distance (approximately 0.3 miles) along FM 3159.

Alternative Route #3 would initially follow the same route as Alternative Route #1 from the water treatment plant at Startzville to the GVTC telephone easement. Instead of following the easement to Demijohn Road, however, this alternative route would only extend to Bendel Ranch Road by way of the easement. It would then follow Bendel Ranch Road to Rebecca Creek Road, which it would follow south through the intersection with FM 311 and onward to FM 3159. From FM 3159 the route would proceed southwestward to State Highway 46, which it would follow westward to U.S. Highway 281. The last segment of this route, along U.S. Highway 281 south from its intersection with State Highway 46 to FM 1863, would be identical to that of Alternative Route #1. This alternative is depicted in Figure 11c in section 3.5.2 of the Regional Water Plan.

3.3 PREFERRED ALTERNATIVE ROUTE

The preferred alternative route for conveyance of water to subdivisions south and west of Canyon Lake is Alternative Route #3. This route represents the most environmentally sound alternative in that it is the only one of the three alternatives considered that does not require any clearing of undeveloped land; all water lines installed under this proposed alternative would be situated in existing roadways or easements. In addition, this alternative is also the least-cost option, as shown in Table 14 in section 3.5.2 of the Regional Water Plan.

4.0 DESCRIPTION OF THE IMPACTS OF THE PROPOSED PROJECT

This chapter provides a description of the primary and secondary impacts from the proposed project to the environmental, floodplain, social, and economic resources within the study areas. Additionally, this chapter includes mitigation measures that will be utilized to lessen these impacts.

The environmental resources section includes a discussion of the hydrological resources, the biological resources (including threatened and endangered species), cultural resources, air resources, and the potential increase in noise related to the proposed project. The floodplain section discusses the impacts to floodplain resources within the study area. Social resources identified include safety provisions, recreational areas, and scenic views. The economic resources section includes property values, land use issues, public services, utilities, and workforce resources.

An environmental consequence or impact is defined as a modification in the existing environment brought about by mission and support activities. Impacts can be beneficial or adverse, can be a direct result of an action (primary) or an indirect result (secondary), and can be permanent or long-lasting (long-term) or temporary and of short duration (short-term). Impacts can vary in degree from a slightly discernable change to a total change in the environment.

4.1 PRIMARY IMPACTS

4.1.1 Environmental Resources

4.1.1.1 Hydrological Resources

The installation of water lines and construction of water treatment plants would directly impact natural land forms, streams, and natural drainage patterns only as an unavoidable consequence

of trenching and other construction activities. The Guadalupe River and various streams may be impacted during the construction phase; however, none of these would be permanently altered. The construction of the second water treatment plant under the preferred alternative may result in minor changes in the shoreline of Canyon Lake itself if a small portion of the lake is filled in to provide a base for construction; however, the ACE will only allow such placement of fill material if an equal shoreline area is excavated and submerged to offset the reduction in lake area. As such, construction of the second water treatment plant would result in no net change in the surface area of Canyon Lake. The contractor will be required to restore the land form and drainage to their original preconstruction state to an extent that is feasible. Drainage may be temporarily blocked from streams or channels during the construction phase.

Area water courses would be expected to be affected by siltation and sedimentation as a result of the construction phase of this project. However, the contractors will be responsible for the prevention of erosion within the construction areas. Mitigation measures, including the use of Best Management Practices (BMPs), would be employed to prevent soil erosion and sediment runoff. TPWD identifies BMPs and other recommendations for construction of underground pipelines. Example of such BMPs include the following:

- The use of rip-rap in drainage areas to slow runoff and allow sediments to settle out;
- sodding, hydroseeding and/or use of loose hay to increase the effectiveness of re-vegetative efforts;
- scheduling line construction for suitable weather and provisions for the cessation of construction during unsuitable weather;
- salvaging and replacing topsoil if necessary; and
- only grading embankments with a slope factor of 4:1 or less.

Significant amounts of trenching and tunneling will be required to install the linework associated with this project. A certain degree of temporary siltation of area watercourses would be expected from the trenching. Mitigative measures include the BMPs previously discussed. Restricting the placement of heavy construction equipment to the areas around, and not in, streambeds will also minimize the impacts.

Pumping of water from Canyon Lake would also create turbulence that might upset the thermally stratified structure of the Lake, resulting in changes in concentrations of various water quality parameters. Thermal stratification has been documented in Canyon Lake from May to November and has been found to result in an overall improvement in water quality with respect to eight parameters (bicarbonate alkalinity, turbidity, total dissolved solids, dissolved organic solids, dissolved inorganic solids, nitrogen as nitrate, total nitrogen, and total organic phosphate) and an overall deterioration of water quality with respect to hydrogen sulfide and ammonia nitrogen (Young 1971). These changes in water quality, both beneficial and negative, might be eliminated in the vicinity of the pump stations as the thermal stratification is upset by pumping. These effects would be localized, however, and would impact only a small portion of the Lake. Furthermore, the resulting water quality in these areas would be the same as that between November and May, when no thermal stratification is present. Overall, the impacts on water quality from pumping-related changes in the thermal structure of Canyon Lake would be insignificant.

Natural drainage patterns along line routes will not be permanently altered because the water lines will exist approximately 15 to 20 ft below the surface of the subject areas. Drainage patterns in areas where above ground facilities (water treatment plants and pumping stations) are proposed would be permanently altered. Measures to mitigate these drainage problems, such as stormwater collection systems or drainage culverts, will be implemented in these areas.

It is estimated that the project, once completed, will divert between 10,000 and 18,000 acre-ft of water per year. This volume of water would no longer be available for downstream users of

the Guadalupe River. However, the GBRA, which is responsible for the allocation of surface water resources within the Guadalupe and Blanco River watersheds, has not yet allocated all of the water budget for Canyon Lake. The water obtained by CLWSC under the proposed action would come from the unallocated portion of the available supply. Thus, the proposed action would not reduce the amount of downstream flow, which has already been allocated by GBRA. There would therefore be no significant impacts on the Guadalupe River downstream from Canyon Dam.

Permitting Requirements

As this project will disturb more than 5 acres, CLWSC will be required to comply with the U.S. Environmental Protection Agency's (EPA) National Pollutant Discharge Elimination System - General Permit for Industrial Activity. Requirements for this process include filing a Notice of Intent (NOI) with the EPA, which states the type of proposed project and construction activities associated with project. CLWSC will also be required to develop a comprehensive Stormwater Pollutant Prevention Plan (SWPPP) which details the potential for disturbance and BMPs. The SWPPP is required to be maintained on site during the construction phase of the project. When the construction phase is completed, CLWSC will also be required to file a Notice of Completion with the EPA.

Consultation with the ACE concerning a need for a Section 404/Section 10 permit will occur when this draft document is prepared and if deemed necessary after this review.

4.1.1.2 Biological Resources

Loss of vegetation along water lines in the ROWs is expected. These losses are expected to be temporary. The contractor will be required to restore vegetation to its pre-construction status or to the fullest extent feasible, when construction is completed. Loss or injury to trees will be alleviated by use of protective fences or wooden slats.

Impacts to the areas where above ground facilities, such as pumping stations and treatment plants, are planned include a permanent loss of all vegetation, including trees, forbs and grasses. However, this loss would be expected to only occur in the immediate area where these facilities are placed; surrounding areas would not be affected. Vegetative clearing will occur only as necessary for the authorized construction of the proposed facilities. No clearing will occur in any areas protected by federal, state or local regulations.

Effects on Aquatic Species

The proposed project will not increase the amount of effluent discharged by the various wastewater treatment plant operations occurring throughout the county. The intake points would be submerged at depths of 25 to 30 ft; as such, bottom-feeding waterfowl would not be affected. The intake(s) would also be screened to prevent fish from entering or being pulled into the pumping mechanism. The noise levels of the pumping system would be low and would be expected to dissipate within a short distance of the pump stations. Overall, this proposed project is not expected to have a significant direct impact on the aquatic life of Canyon Lake.

Effects on Wildlife

No significant effects on wildlife are expected as result of this project. Some clearing of vegetation would be required under each alternative source and route. The easements would be expected to support limited habitat in the form of small native shrubs and grasses. These native shrubs and grasses would be encouraged to grow on the ROW areas.

Wildlife habitat that occurs within the area identified for the above ground structures would be lost as a result of the existence of those structures. The area of the water treatment plant at the intersection of FM 2673 with FM 3159 in Startzville is surrounded by development and has been partially cleared, and as such is low-quality habitat. The location of the water treatment plant that would be constructed under the preferred alternative (adjacent to the Canyon Lake Shores

subdivision, across the lake from Crane's Mill Park) has largely been cleared of native vegetation and includes a paved road and vehicular traffic from recreational users of the lake, making it also low-quality habitat. All linework would be installed in existing ROW areas and would thus require no clearing of native vegetation. Additionally, only a small fraction of the existing resources for wildlife habitat will be impacted.

Threatened or Endangered Species

Threatened and endangered species or their habitats are not expected to be impacted by this project. As previously noted, the locations of the proposed water treatment plants have been cleared previously and do not appear to exhibit the types of habitat preferred by the golden-cheeked warbler, the black-capped vireo, or other endangered species. The proposed line routes would be installed in existing easements and ROWs and would not require clearing of vegetation; nevertheless, proposed linework plans will be reviewed by TPWD personnel to determine if threatened or endangered plant species or species habitat are present and likely to be impacted. If such resources are identified, appropriate protective measures may need to be taken. These measures include additional survey work or re-routing the line work to avoid the immediate area, or other management measures as deemed appropriate on a case-by-case basis.

4.1.1.3 Historical, Cultural, and Archeological Resources

Coordination with the State Historic Preservation Officer (SHPO) and appropriate TWDB personal will be a necessary portion of this review. This area may contain sites of significant cultural value. Mitigation measures would depend on the comments made by SHPO and TWDB.

4.1.1.4 Air Resources

Increase in airborne dust would be excepted to occur during construction, primarily along the existing roadway. Efforts to reduce dust, including watering of the contributing areas, would be required by OSHA construction requirements as part of the construction phase operations.

Odors would not be expected directly from the proposed line work, although some highly localized odors might result from exhaust emissions from heavy equipment during construction; such odors would be expected to dissipate quickly and are not considered a significant adverse impact. No impacts to air resources from sludge incineration will occur as a result of the proposed project as solids generated by water treatment processes will be deposited in an approved landfill.

4.1.1.5 Noise

The increase in noise associated with the construction phase would be expected to adversely impact the residences and wildlife of the area. The impacts would most likely be temporary and wildlife would be expected to return to the subject areas after completion of the construction phase. Measures to reduce noise to levels acceptable to humans will be required as part of the construction phase operations and would be in compliance with OSHA standards. Such efforts include the use of mufflers on construction machinery and limiting construction activities to normal daylight working hours. Blasting is not expected to be necessary to complete this proposed project, as excavation will be performed primarily with a backhoe. Increases in noise levels that would be expected as a result of the completed project will be limited to the noise associated with the water treatment plants and pumping stations. Noise-generating machinery at the water treatment plants would be housed within permanent structures, which would eliminate noise impacts. Pumping equipment at the pumping stations would be submerged. Submersible pumps generate very little noise; such noise that is generated is a quiet hum, to

which fish and other aquatic species would quickly acclimate. Overall, noise impacts are not be expected to be significant.

4.1.2 Floodplains

Floodplain maps are included in Appendix A of this environmental assessment. Examination of the floodplain maps indicates that installation of water lines will take place within 100-year floodplains; however, construction of the water treatment plants and other facilities will not. The line installation will occur in existing road ROWs. Because the only construction in floodplain areas would be that of subsurface water lines, not impact existing surface features. To minimize effects of erosion from trenching associated with line work, standard erosion control measures (i.e., silt fences, barricades, revegetation) will be employed during construction. Mitigation measures include preparation of and adherence to a floodplain management notice (provided in Appendix B).

4.1.3 Social Resources

4.1.3.1 Safety Provisions

Traffic disruption would be limited to the areas under construction. Because most of the proposed linework will likely occur in the road ROWs, significant localized traffic disruption would be expected to occur. Alternative detours and associated safety provisions (including signs, lights, barricades, flagmen, etc.) will be required as part of the construction phase operations. Night work is not expected to occur for this project. Additionally, construction areas will be closed as soon as possible, and pedestrian/residential walkways will be constructed as necessary. Machinery, supplies, and open trenches will be fenced in and securely locked to prevent accidental or unauthorized access during construction activities.

4.1.3.2 Recreational Areas and Preserves

No significant long-term impacts on the recreational quality of Canyon Lake would result from the project. The pumping station in Comal Park would not be visible from most of the waterfront area or any of the picnic or parking areas of the park. Construction of a water treatment plant on the shoreline in the Canyon Lake Shores subdivision on the north side of the lake would result in the loss of some waterfront area that might be used for recreation; however, similar areas nearby would be unaffected. The large number of parks established by the ACE around the lake would also be more than sufficient to accommodate recreational shoreline users displaced by the plant. No boat ramps would be displaced by the proposed project. Although the immediate areas around the submerged intake points would no longer be available for scuba diving, they represent a virtually negligible proportion of the lake area still available for this use. The recreational trout fishery in the Guadalupe River downstream of Canyon Dam would be unaffected because, as previously noted, the quantity of water allocated by GBRA for downstream use would remain unchanged.

4.1.3.3 Scenic Views

Scenic views in the study area would be expected to be impacted as a result of the construction phase of the project. However, such impacts are expected to be temporary and measures will be made to reduce permanent impacts related to construction. Such measures include protection of trees immediately outside project areas with fences and wooden slats. As noted above, the pumping station in Comal Park would not be visible from most of the waterfront area or any of the picnic or parking areas of the park.

4.1.4 Economic Resources

4.1.4.1 Property Values

The county will purchase easements and property from property owners in the area, in accordance with the Uniform Relocation and Assistance Act of 1970. No homes or businesses are expected to be relocated as a result of this proposed project. All efforts will be made to provide for a fair and equitable market price for those property resources that will be permanently dedicated to the structural requirements of the proposed project.

Efforts will be made to avoid removing existing structures and/or placing water lines under or near them. No facilities would be expected to be abandoned for this project.

4.1.4.2 Land Use

Land use within the study area will not be expected to be negatively impacted by the construction phase of this proposed project. Some land use might be slightly impacted by the use of line work easements along roadway ROWs. However, permanent effects on private property will be kept to a minimum.

4.1.4.3 Public Services

No primary impacts to public services due to the construction phase of the proposed project were identified, other than the obvious benefit of improved water quality and availability to the subdivisions serviced by CLWSC. The use of the county landfill would not be expected to increase, but could potentially decrease, as a primary result of this project. This potential beneficial impact may result because, while there is no net change in the volume of water being provided by CLWSC, the quality of the raw water is higher, potentially resulting in a reduction in volume of solids generated by the water treatment process.

4.1.4.4 Utilities

All of the study areas are currently serviced by above-ground utilities for electricity, as well as for telephone service, provided by GVTC. Construction activities are not expected to impact these utilities; however, some service disruption may occur as an accidental result of these construction activities. Any disruption in service will be immediately reported to the appropriate authorities and every effort will be made to return service in a reasonable time period.

Additional utilities include water lines that are owned and operated by CLWSC and other local water supply corporations. These water lines will be upgraded with larger systems to handle the increase in water resource required by the sewer systems. Again, every effort will be made to ensure that water service is not interrupted for any excessive (longer than 48 hours) period of time.

4.1.4.5 Workforce Resources

Economic resources that would be expected to be impacted as a direct result of the construction phase of this project include an increase in the need for a specialized and non-specialized workforce and a subsequent increase in local spending during the construction phase. Indirect impacts of construction on economic resources would include a need for raw materials, construction equipment and safety related equipment.

4.2 SECONDARY IMPACTS

As previously mentioned, secondary impacts are those that may occur as an indirect result of the presence of the proposed project on the environmental, social, and economic resources of the study areas. Mitigation measures to these impacts are also addressed within this section.

4.2.1 Environmental Resources

4.2.1.1 Hydrological Resources

Slight decreases in surface water quality would be expected with the increases in population that might result from improved water systems in the subject areas. These decreases in surface water quality would mostly be from increases in trash, lawn chemicals, and other pollutants being deposited in the surface water ways either by direct dumping, wind action or stormwater runoff. Indirect effects of increased population growth facilitated by the project include increased generation of domestic wastewater (mitigated by proper maintenance, adherence to permitting requirements, and additional construction (as necessary) at area wastewater treatment facilities) and increased runoff and other non-point source pollution (mitigated by proper erosion control measures during construction and installation and maintenance of earthen channels and ditches).

4.2.1.2 Biological Resources

Indirect impacts on biological resources are associated with the potential for population growth and development resulting from improvements to water systems. A greater human presence and the accompanying increases in traffic, noise, etc. might adversely impact some wildlife populations within specific areas. The proposed project would likely facilitate, but would not directly cause, significant growth in the Canyon Lake area. Adverse impacts on wildlife can be mitigated by enforcement of resource protection regulations and continued assessment and serious consideration of the consequences of development on wildlife.

4.2.1.3 Historical, Cultural, and Archeological Resources

The presence of the water improvements may impact the historical, cultural and archeological resources of the study area. However, mitigation measures proposed by SHPO and TWDB may lessen these impacts. General increases in the development of the study area may indirectly

result in impacts to these resources as agricultural and marginal lands are converted to residential use.

4.2.1.4 Air Resources

Indirect secondary impacts to air resources include decreases in air quality. These slight decreases in air quality would be expected with increases in population density and an increase in automobile traffic. These impacts are not expected to be significant.

4.2.1.4 Noise Levels

Indirect increases in noise levels associated with increases in the population of the subject areas may occur. These indirect increases are not expected to be significant.

4.2.2 Floodplains

Comal County presently participates in the National Flood Insurance Program and any associated aspect of this project would conform to these guidelines. Secondary impacts on floodplains may include an increase in the development of floodplain areas due to an improved local water supply. Measures to reduce this development will include sizing of water lines to limit development of these areas and floodplain insurance requirements for potentially developed areas.

4.2.3 Social Resources

4.2.3.1 Safety Provisions

The secondary impacts of the existence of the proposed project on the social resources would be linked to improvements in fire safety. Although the placement of fire hydrants along the water lines is not planned at present, the greater reliability of Canyon Lake as a water supply would eliminate the low pressure and limited availability of water periodically experienced in some of the affected subdivisions. The potential for these problems to impair firefighting ability would be greatly reduced by the proposed project.

4.2.3.2 Recreational Areas and Preserves

The placement of improved sewer and water facilities at the Sabine River Authority park located in the Toledo Village study area would be expected to increase park use thus increasing potential impacts to the Toledo Bend Reservoir. Increased reliability of the local water supply could result in an increase in the housing demand within the project area, thus increasing the recreational demand on Canyon Lake, the Guadalupe River, and the numerous ACE parks surrounding the lake.

4.2.3.3 Scenic Views

No secondary impacts resulting from this project are expected to occur to scenic views in the areas. Above ground improvements would be designed to blend with the natural environment.

4.2.4 Economic Resources

4.2.4.1 Property Values

In general, property within the study area and adjacent land values would be expected to increase as the land becomes more marketable due to the improved reliability of the water supply. Other secondary impacts would include an increase in the taxes paid by landowners within the study areas and further increases in property values in response to the increased demand for housing.

4.2.4.2 Land Use

As a result of this project, it would be expected that there would be an increase in the rate and density of the residential land use within the project areas. However, as previously mentioned, the project areas are already primarily residential.

4.2.4.3 Public Services

The proposed project would have the indirect effect of increases in demands for public services both in the subject areas and those areas near the subject areas due to increases in local populations. Indirect impacts on the county landfill would include an increase in the amount of solid waste generated as a result of the increase in growth in and around the study areas. These impacts, however, would not be expected to be significant.

4.2.4.4 Utilities

A significant increase in energy consumption would be expected as a direct result of this project in order to operate the pumping systems and water treatment plants. Additional impacts would include a need for trained personnel to operate these facilities. Increases in growth in and around the project area would be expected to create an increase in demand for certain utilities,

specifically electricity and telephone as well as additional water and wastewater connections to those immediately outside the study areas.

4.2.4.5 Workforce Resources

An increase in the need for trained workers to oversee operations at the proposed water treatment plants, as well as an increase in the number of maintenance personnel, has been identified as an impact to workforce resources due to the proposed project. However, this increase in personnel will not have a significant impact on workforce resources within the entire county.

5.0 BENEFICIARIES AND NON-BENEFICIARIES

This chapter provides a discussion of the beneficiaries and the non-beneficiaries that result in the implementation of the proposed project. This section also includes a summary of the general public's acceptability of the proposed project.

5.1 BENEFICIARIES

Beneficiaries are people or groups of people that would be expected to benefit from the implementation of the proposed project. Identified beneficiaries include those residents within the subdivisions served by CLWSC. Additionally, all the residents of Comal County would be expected to benefit from an increase in general revenues associated with increases in property values.

5.2 NON-BENEFICIARIES

Non-beneficiaries are people or groups of people who would not be expected to benefit or may be adversely impacted by implementation of the proposed project. Identified non-beneficiaries include those residents living outside of the project boundaries who might not be served by the proposed system but may be assessed higher property values due to the existence of the project. Additionally, those residences that exist in close proximity to the proposed water treatment areas may be negatively affected with reduced aesthetic value. Other non-beneficiaries would include those people within the study areas that do not want the proposed improvements, but are required to accept the impacts of the improvements.

5.3 PUBLIC ACCEPTABILITY

To date, there has not been any public opposition to the environmental impacts of this project; public concerns have primarily involved economic issues. This draft environmental assessment

will be available for general review and a public comment period will occur. Comments obtained from this review period will be addressed in the final document.

6.0 ADVERSE IMPACTS WHICH CANNOT BE AVOIDED SHOULD THE PROPOSAL BE IMPLEMENTED

Most of the direct impacts which cannot be avoided, should the proposal be implemented, would be associated with the construction of the above ground facilities. These impacts include both primary impacts, associated with the construction phase of the project and the secondary impacts, associated with the presence of the project on the environment. Indirect impacts would be associated with the increase in the growth of the project areas as a result of the project.

The temporary impacts of implementing the proposed project, including destruction of vegetation and an increase in erosion, siltation and sedimentation in ditches and channels, are discussed in detail in Chapter 4.0. However, as previously mentioned, the contractor would be required to restore the impacted areas to the pre-construction status or to the fullest extent possible. The long term impacts associated with the proposed project include loss of tree habitat along some segments of the water line routes and in areas of the above ground facilities.

Indirect impacts are discussed in Section 4.2 of this report and are linked to an increase in the growth of the affected areas. These impacts include a decrease in the immediate air quality, a loss of agricultural land to residential and commercial uses, and increased demand for county services.

7.0 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The main objective of this project is to provide a reliable source of potable water to Comal County residents served by CLWSC. An additional goal is to provide for continued and planned growth for the project area communities. Achieving these goals will a require loss of certain types of habitat and, in the future, possible conversion of agricultural uses of land (ranch land) to residential and/or commercial uses.

The tradeoff between the existing water supply system and the proposed plan will result in a benefit for the current and future residents and the community in general. The current water supply system in this area is prone to exceedances of drinking water quality criteria for sulfate, chloride, fluoride, nitrate, iron, and manganese, as well as low water pressure during times of peak demand. These problems pose risks to public health and safety in the form of intake of excess quantities of the noted constituents and the potential for lack of sufficient water for firefighting.

The proposed project will benefit the current and future residents of the subject areas as they will no longer have to contend with the inconvenience of an unreliable water supply. Additionally, communities in the project area will benefit by the lower public health risks associated with the elimination of periodic exceedances of TNRCC drinking water standards, continuous availability of sufficient water pressure for firefighting, and increased income from higher property valuations.

8.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES TO THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

8.1 CURTAILMENT OF FUTURE LAND AND WATER USES

The range of future land uses would be narrowed due to the expected increases in growth as a result of these changes. Agricultural land (including ranch land) would be expected to slowly yield to residential and/or commercial uses as the property values in and around these subject areas increase.

The range of future uses for water resources would be expected to be only slightly limited by the impact of increased development in and around the subject areas. This impact could be in the form of increased erosion due to higher and faster streamflow during storm events. This increase in streamflow would occur as a result of increases in non-permeable areas associated with the increased development (i.e., roads, houses, etc).

8.2 IRRETRIEVABLE AND SIGNIFICANT COMMITMENTS OF RESOURCES

The irreversible environmental damage occurring as a result of this project will be minimized by proper construction guidelines and management of the water line easements. The risks associated with the construction activities will be minimized by following strict safety plans. The existence of this project will be a benefit to the residents and the community in general and will outweigh the risks associated with the minimal environmental damage and possibilities of construction accidents.

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APPENDIX A

Maps

APPENDIX B

Agency Correspondence

APPENDIX C

Survey Results

APPENDIX D

Floodplain Management Notice

FLOODPLAIN MANAGEMENT NOTICE

CANYON LAKE WATER SUPPLY CORPORATION
REGIONAL WATER PLAN

Appendix A-Tabular Data

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
		* OCCUPANCY RATE		2.56	5	1	1	2.5		
A110	Honey Creek Ranches Subdivision	6	166	2					5	5
A110	Oak Springs Subdivision	20	152	14				5	48	36
A110	Unplatted Acreage		11650 *55*						336	141
A110	New Development								10000	133
SUBTOTALS		**26**	**11968**	**71**	**0**	**0**	**0**	**5**	**389**	**315**
A120	Bartels Acres	1	6	1				1	5	3
A120	Knibbe Subdivision	1	17 *1*						3	3
A120	Comal Ranch Subdivision		1587 *5*						13	13
A120	Unplatted Acreage		5522 *33*						199	84
A120	New Development								10000	133
SUBTOTALS		**2**	**7132**	**40**	**0**	**0**	**0**	**1**	**220**	**236**
A130	Cypress Springs on the Guadalupe	498	2401	64				432	1244	164
A130	Guadalupe River Estates (Riverwood Estates)	156	467	68				84	384	174
A130	Rivermont	723	621	30			2	665	1741	79
A130	Spring Branch Estates 1	93	135	38				43	205	97
A130	Unplatted Acreage		774 *20*						121	51
A130	New Development								10000	133
SUBTOTALS		**1470**	**4398**	**220**	**0**	**0**	**2**	**1224**	**3695**	**565**
A140	Ahern Creek Ranches	12	753	5					13	13
A140	Benke Oaks	1	2	1					3	3
A140	Diamond D Subdivision	1	21 *1*						3	3
A140	Dillard Subdivision	2	16	2					5	5
A140	Elm Ridge Estates	21	92	16				6	56	41
A140	Flying "R" Ranch	34	551	18				8	66	46
A140	Lange Ranch Subdivision	4	8	1				3	10	3
A140	Little Creek	4	43	4					10	10
A140	Oakland Estates	95	62	82				40	310	210
A140	Singer Ranch	1	4			1			1	1
A140	Spring Branch Acres	94	115	43				44	220	110
A140	The Woods at Spring Branch	45	70	23				17	101	59
A140	Unplatted Acreage		3999 *27*						165	69
A140	New Development								10000	133
SUBTOTALS		**314**	**5736**	**223**	**0**	**1**	**0**	**118**	**963**	**706**
A150	Creekwood Ranches	250	820	70				164	589	179
A150	Gutierrez Ranch	1	5					1	3	0
A150	Ridgeview Oaks East	36	53	19				16	89	49
A150	Ridgeview Oaks West	108	249	75		2		22	249	194
A150	Sun Valley Village	113	405	83		2		27	282	214
A150	Whispering Hills	552	921	73				454	1322	187
A150	Unplatted Acreage		6172 *40*						243	102
A150	New Development								10000	133
SUBTOTALS		**1060**	**8625**	**360**	**0**	**4**	**0**	**684**	**2777**	**1,058**

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
AREA TOTAL		**2872**	**37859**	**914**	**0**	**5**	**2**	**2032**	**8044**	**2,880**
A210	Crouse Subdivision	1	9	2					5	5
A210	Dresden Wood 1	31	54	17				15	81	44
A210	North Barcroft Estates	13	39	5				9	35	13
A210	Sage Oaks	57	261	21				35	141	54
A210	Silver Hills	239	365	89				121	530	228
A210	Unplatted Acreage		7160 *36*						219	92
A210	New Development								10000	111
SUBTOTALS		**341**	**7888**	**170**	**0**	**0**	**0**	**180**	**1011**	**547**
A220	Brand Ranch	30	494	11				10	53	28
A220	Indian Creek Ridge	20	46	7				13	50	18
A220	Jahnsen Ranch 1	1	19	1					3	3
A220	Oak Cliff Acres	138	404	67		2		69	346	174
A220	Persimmon Hill Sub	38	577	24				41	164	61
A220	Shepherds Ranch	118	577	14				94	271	36
A220	Wehe Estates	3	131	3				2	13	8
A220	Unplatted Acreage		4713 *32*						196	82
A220	New Development								10000	111
SUBTOTALS		**348**	**6961**	**169**	**0**	**2**	**0**	**229**	**1096**	**521**
A230	Bulverde Estates 1	361	822	135	1	1	1	227	920	353
A230	Bulverde Hills 3	90	586	51				36	221	131
A230	Bulverde Oaks 1	49	72	15				29	111	38
A230	Bulverde Ranchettes	76	153	2				11	33	5
A230	Cox Subdivision	2	68				1		1	1
A230	Elm Valley	76	556	36				41	195	92
A230	Hogan 281 Subdivision	4	31	1		2			5	5
A230	Licata Ranch	4	23	2				3	13	5
A230	Lundgren Subdivision	1	4	1					3	3
A230	Palmer Heights	5	44	5				4	23	13
A230	Spring Oak Estates	317	343	127		2		153	710	327
A230	The Highlands	44	120	11				32	108	28
A230	Travel Mart Subdivision	1	1			1			1	1
A230	Unplatted Acreage		3849 *31*						188	79
A230	New Development								10000	111
SUBTOTALS		**1030**	**6672**	**417**	**1**	**6**	**2**	**536**	**2532**	**1,192**
A240	Ammann Oaks Sub	80	353	39				21	152	100
A240	Hidden Oaks	77	345	37				43	202	95
A240	Klar Ranch	1	3 *1*						3	3
A240	Saur Subdivision	2	6	1				2	8	3
A240	Unplatted Acreage		5808 *30*						183	77
A240	New Development								10000	111
SUBTOTALS		**160**	**6515**	**108**	**0**	**0**	**0**	**66**	**548**	**389**

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
A250	Bulverde Gardens	20	38 *5*						13	13
A250	Bulverde Ranches	34	154	21			1	8	75	55
A250	Canyon View Acres	237	471	155		5		44	512	402
A250	Lindsey Acres	1	20 *1*						3	3
A250	Unplatted Acreage		3595 *22*						134	56
A250	New Development								10000	111
SUBTOTALS		**292**	**4278**	**204**	**0**	**5**	**1**	**52**	**737**	**640**
A260	Cibolo One Subdivision	6	16 *1*						3	3
A260	Cibolo Two Subdivision	1	7 *1*						3	3
A260	Unplatted Acreage		1682 *8*						48	20
A260	New Development								10000	111
SUBTOTALS		**7**	**1705**	**10**	**0**	**0**	**0**	**0**	**54**	**137**
AREA TOTAL		**2178**	**34019**	**1068**	**1**	**13**	**3**	**1063**	**5978**	**3,426**
A310	Charles Cantu Subdivision	2	130	1					3	3
A310	Herbert M Gruen	1	34 *1*						3	3
A310	John Hall Subdivision	1	36 *1*						3	3
A310	Stoney Cliff	1	4	1					3	3
A310	Stoney Ridge	36	215	17				19	91	44
A310	Unplatted Acreage		4619 *23*						140	59
A310	New Development								10000	333
SUBTOTALS		**41**	**5038**	**44**	**0**	**0**	**0**	**19**	**243**	**448**
A320	Beam Subdivision	10	52	6				5	28	15
A320	Beck Ranch	80	680	23				43	166	59
A320	Cross Roads Estates Phase 1	15	68			1	1	13	35	2
A320	Forrest Wilson Subdivision	1	28 *1*						3	3
A320	Kappelman Subdivision	11	52 *1*						3	3
A320	McGuffin Subdivision	2	25					1	3	0
A320	Misty Hills	41	267	21				18	99	54
A320	Oak Village North	839	985	510			3	263	1966	1,309
A320	Skyridge Subdivision	74	48	13				59	181	33
A320	Smokey Mountain Ranch	16	48	6				9	38	15
A320	Stoney Creek	109	985	48				60	273	123
A320	Twin Creek Subdivision	10	558	37				11	122	95
A320	Wilson Subdivision	17	14	1					3	3
A320	Unplatted Acreage		6512 *48*						292	123
A320	New Development								10000	333
SUBTOTALS		**1225**	**10322**	**715**	**0**	**1**	**4**	**482**	**3212**	**2,170**
AREA TOTAL		**1266**	**15360**	**759**	**0**	**1**	**4**	**501**	**3455**	**2,618**
AREA A TOTAL		***6316***	***87238***	***2741***	***1***	***19***	***9***	***3596***	***17477***	***8,924***
		OCCUPANCY RATE		**1.69**	**5**	**1**	**1**	**2.5**		

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
B110	Buck Horn Ranch	10	17	2					3	3
B110	Heritage Oaks	22	88	2					3	3
B110	Unplatted Acreage		2978 *11*						45	19
B110	New Development								1000	19
SUBTOTALS		**32**	**3083**	**15**	**0**	**0**	**0**	**0**	**51**	**44**
B120	Cadillac Canyon	88	14	37	1	1		48	189	69
B120	Canyon Creek Estates	82	38	14				62	179	24
B120	Canyon Dam Hillsite	14	9	6				10	35	10
B120	Canyon Dam Sub 1	26	9	4		7		13	46	14
B120	Canyon Valley Estates 1	7	34	6				1	13	10
B120	Clear Water Estates	449	432	24		1		411	1069	42
B120	Cougar Ridge	59	21	6				8	30	10
B120	Deep Acres Estates 2	73	42	19		2		43	142	34
B120	Devils Backbone Heights	156	121	13				133	354	22
B120	Eagles Peak Ranch	294	327	13				232	602	22
B120	Emerald Valley Subdivision	340	674	25	1			247	665	47
B120	Fralick Subdivision	1	1 *1*						2	2
B120	Glen Roy	12	20	1				9	24	2
B120	Hillcrest Estates	97	146	17		1		75	217	30
B120	Horseshoe Falls Subdivision		105	81				139	484	137
B120	Maricopa Ranch	90	59	26		1		32	125	45
B120	North Lake Estates	94	77	8				63	171	14
B120	North Ridge Estates	94	9	69				8	137	117
B120	Pfeil Estates		120	13		6		20	78	28
B120	River's Edge	66	61	28				38	142	47
B120	Riverside Estates		1	1				1	4	2
B120	Spring Mountain	66	713	17				52	159	29
B120	Unplatted Acreage		3631 *25*						100	42
B120	New Development								1000	19
SUBTOTALS		**2108**	**6664**	**454**	**2**	**19**	**0**	**1645**	**4967**	**818**
B130	Eden Ranch	383	456	147		1		286	964	249
B130	Espinazo Del Diablo	56	466	24				22	96	41
B130	Meyers Mountain	7	87	2				5	16	3
B130	Pleasant View Estates	9	6	5				2	13	8
B130	Scenic River Properties	29	9	15		4		10	54	29
B130	The Summitt	410	766	29				382	1004	49
B130	Unplatted Acreage		6497 *31*						124	52
B130	New Development								1000	19
SUBTOTALS		**894**	**8287**	**253**	**0**	**5**	**0**	**707**	**2271**	**450**
AREA TOTAL		**3034**	**18034**	**722**	**2**	**24**	**0**	**2352**	**7289**	**1,312**
B200	Arroyo Bravo	7	2					6	15	0
B200	Bold Creek	27	25	4	1	2		19	61	14

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
B200	Canyon Lake Point Resort	1	29			1			1	1
B200	Canyon Lake Yacht Club		1						0	0
B200	Canyon Park Estates	60	43	13				43	129	22
B200	Crystal Heights	153	108	8				130	339	14
B200	Deer Run	18	6 *1*						2	2
B200	Hill Country Resort	8				9			9	9
B200	Jonas Subdivision		29 *1*						2	2
B200	Marty's Mountain	10	4	7				3	19	12
B200	Mt. Lookout	98	48 *5*						8	8
B200	Quail Crossing	7	27	1				1	4	2
B200	Simon Tracts	41	53	14		1		28	95	25
B200	Sunnyside Terrace	26	14	2		5		19	56	8
B200	Sunset Terrace	36	23	16				17	70	27
B200	The Heights	2	11	1				1	4	2
B200	Valhalla-Simon-Riner Subdivision		1 *1*						2	2
B200	Windjammer Resort	16	5					5	13	0
B200	Canyon Lake Acres	627	103	93				484	1367	157
B200	Unplatted Acreage		3962 *17*						69	29
B200	New Development								1000	57
AREA TOTAL		**1137**	**4494**	**184**	**1**	**18**	**0**	**756**	**2265**	**393**
B300	Charles Moore Subdivision	4	43 *1*						2	2
B300	Hancock Canyon	76	50	14	1	3		50	157	32
B300	Hancock Oak Hills	176	312	42				88	291	71
B300	Lakeside Development	59	69	7				52	142	12
B300	Royal Summit	25	19	3				6	20	5
B300	Scenic Terrace	335	171	18				316	820	30
B300	Tamarack Shores	651	209	184		1	1	441	1415	313
B300	The Point at Rancho del lago		315	13				256	662	22
B300	Linda Ledges (U.R.)	70	117	23				39	136	39
B300	Rancho Del Lago	519	516	30		1		410	1077	52
B300	Unplatted Acreage		3524 *20*						82	34
B300	New Development								1000	57
AREA TOTAL		**1915**	**5345**	**355**	**1**	**5**	**1**	**1658**	**4804**	**669**
B400	Big Walnut Springs (UR)	16	12 *1*						2	2
B400	Canyon Lake Estates	214	87	17				165	441	29
B400	Canyon Lake Island	171	115	35				122	364	59
B400	Canyon Lake Shores	797	486	155		1		600	1763	263
B400	Canyon Lake Shores (UR)	18	7	3				16	45	5
B400	Glenmare	19	140	12				38	115	20
B400	Hilltop Mobile Home Subdivision		10 *1*						2	2
B400	Kings Point	73	82	10				63	174	17

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
B400	Lakewood Hills	140	26	11				116	309	19
B400	Lazy Diamond Ranchettes	57	342	18				34	115	30
B400	Potters Creek Park Acres	10	25			3		4	13	3
B400	Tanglewood Shores	369	119	64				293	841	108
B400	The Cedars	58	66	1				18	47	2
B400	Tranquility Park	37	250	7				27	79	12
B400	Unplatted Acreage		4309 *22*						87	37
B400	New Development								1000	57
AREA TOTAL		**1979**	**6076**	**357**	**0**	**4**	**0**	**1496**	**4397**	**665**
B510	Canyon Oaks Estates	61	114	28				28	117	47
B510	Deer River	347	277	83				219	688	140
B510	Lake of the Hills	668	230	22			1	636	1628	38
B510	Unplatted Acreage		3810 *16*						63	27
B510	New Development								1000	19
SUBTOTALS		**1076**	**4431**	**149**	**0**	**0**	**1**	**883**	**2496**	**271**
B520	Fischer Thirty Two Subdivision	16	64	2				4	13	3
B520	Lakewood Estates	29	79	3				25	68	5
B520	Rocky Creek Ranch	502	349	10				499	1264	17
B520	Valley Ranch		200 *1*						2	2
B520	Whispering Oaks	17	92	9		1		9	39	16
B520	Unplatted Acreage		11601 *46*						186	78
B520	New Development								1000	19
SUBTOTALS		**564**	**12385**	**71**	**0**	**1**	**0**	**537**	**1572**	**140**
B530	Estates At Carpers Creek	21	76	3				17	48	5
B530	Fischer Ranches	18	100	9				8	35	15
B530	Forest View North	82	662	40				37	160	68
B530	Honeysuckle Rose	9	20	1				8	22	2
B530	Meister Heirs Estates	2	9					2	5	0
B530	Ranch Louise	14	756	4					7	7
B530	Stallion Springs	259	249	23				223	596	39
B530	Unplatted Acreage		8721 *39*						157	66
B530	New Development								1000	19
SUBTOTALS		**405**	**10593**	**119**	**0**	**0**	**0**	**295**	**1030**	**221**
AREA TOTAL		**2045**	**27409**	**339**	**0**	**1**	**1**	**1715**	**5098**	**632**
B600	Almy Addition	2	12	1				2	7	2
B600	Clear Creek Addition	8	30	3				5	18	5
B600	Cypress Cove	1461	650	170		1		1197	3281	288
B600	Hideaway Subdivision	25	11	14				10	49	24
B600	Rebecca Crossing	9	49	7				2	17	12
B600	Unplatted Acreage		5923 *25*						100	42
B600	New Development								1000	57

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
AREA TOTAL		**1505**	**6675**	**220**	**0**	**1**	**0**	**1216**	**3472**	**430**
B700	Acorn Acres	1	6	1					2	2
B700	Charlie's 306	1	1			1			1	1
B700	Cherry Creek Subdivision	21	162	6				14	45	10
B700	Comal Hills Subdivision	591	245	85			5	408	1169	149
B700	Coyote Ridge	8	45					5	13	0
B700	Cypress Lake Gardens		264	162			3	669	1949	277
B700	Cypress Lake Gardens Big Sky Ranchettes	874	307 *5*						8	8
B700	Fernandez Subdivision	1	9	1					2	2
B700	Finkel Subdivision	6	34					6	15	0
B700	Forest Lake Estates		12 *1*						2	2
B700	Harley Acres	1	1					1	3	0
B700	Henke Subdivision	1	9	1					2	2
B700	Indian Hills Estates	267	162	144				99	491	243
B700	Lake Gardens		17 *1*						2	2
B700	Rebecca Creek Estates	42						4	10	0
B700	Rebecca Creek Park Subdivision	1176	451	77		6	1	1093	2870	137
B700	The Springs at Rebecca Creek	189	731	34		1		157	451	58
B700	Unplatted Acreage		6511 *33*						134	56
B700	New Develolpment								1000	57
AREA TOTAL		**3179**	**8967**	**551**	**0**	**8**	**9**	**2456**	**7169**	**1,006**
AREA B TOTAL		***14794***	***77000***	***2728***	***4***	***61***	***11***	***11649***	***34494***	***5,107***
		*** OCCUPANCY RATE**		**1.57**	**5**	**1**	**1**	**2.5**		
C100	Austin B. Sheridan Properties		5 *1*						2	2
C100	Christensen Scenic River	40	6	31				8	69	49
C100	J D J Ranch	50	498	24		1		26	104	39
C100	Sattler Business Lots	29	8	4		5		12	41	11
C100	Sattler Estates Subdivision	102	58	46				57	215	72
C100	Sattler Village Subdivision	260	97	83		13	1	162	549	144
C100	The Little Ponderosa	147	22	30				105	310	47
C100	Unplatted Acreage		4582 *64*						238	100
C100	New Develolpment								1000	57
AREA TOTAL		**628**	**5276**	**283**	**0**	**19**	**1**	**370**	**1528**	**521**
C200	Arrowhead Village	97	33	14				57	164	22
C200	Bradcliff on the River	21	18					21	53	0
C200	Canyon Corner	76	29	35				44	165	55
C200	Canyon Lake Village	669	172	170		2		489	1491	269
C200	John B. Browns Peak	4	1					4	10	0
C200	Kuntry Korner Estates	8	3	4		1		3	15	7

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
C200	Lake View Heights	17	10	38	1	1		16	106	66
C200	Miles Parker Estates	2	16	1				1	4	2
C200	Netherhill Place	47	39					43	108	0
C200	River Point Estates	79		43		2		36	160	70
C200	River Valley Estates	16	13	6				5	22	9
C200	Sattler Ridge Estates	2	22 *1*						2	2
C200	Skyline Acres	87	313	27		8		48	170	50
C200	Valley View	104	7	3				8	25	5
C200	Unplatted Acreage		2130 *34*						126	53
C200	New Development								1000	57
AREA TOTAL		**1229**	**2808**	**376**	**1**	**14**	**0**	**775**	**2621**	**667**
C300	Blue Water Estates	48	78	13				34	105	20
C300	Canyon Lake Village West	706	145	350		1	1	409	1574	552
C300	Cedar Breaks Subdivision	6	19	1				5	14	2
C300	Deep Well Subdivision	11	7	3		1		5	18	6
C300	Double E Subdivision	1	3	1					2	2
C300	Five Oaks	37	31	14				20	72	22
C300	Hidden Valley Estates	25	14	1				23	59	2
C300	Highland Terrace	56	61	15				39	121	24
C300	Island View Office Addition	1	2					1	3	0
C300	Los Tres Amigos Estates	3	7	1				2	7	2
C300	Moorview Subdivision	7	9					7	18	0
C300	Mountain Oaks	25	48	4		1		19	55	7
C300	Shamrock Hills	15	16	3				3	12	5
C300	Shepherd Hill	1	12 *1*						2	2
C300	The Oaks	487	272	172				203	778	270
C300	Tripple Peak Ranch Estates	99	69	50				42	184	79
C300	Village Shores	8	43	44				56	209	69
C300	Unplatted Acreage		2440 *40*						150	63
C300	New Development								1000	57
AREA TOTAL		**1536**	**3276**	**713**	**0**	**3**	**1**	**868**	**3383**	**1,184**
C400	Canyon Lake Forest	1195	402	330	1	7		828	2600	530
C400	Oak Hideaway Estates	14	10	9				5	27	14
C400	Shadyvale Subdivision	12	4 *1*						2	2
C400	St. Andrews by the Woodlands	22	7	4				3	14	6
C400	Stanley Square	1	1			1			1	1
C400	Startz Subdivision	1	1					1	3	0
C400	Sunburst Ranch	19	96	8				11	40	13
C400	Tills Terrace Subdivision	17	21	7				9	33	11
C400	Waterfront Park	230	87	134			1	67	379	211
C400	Woodlands	362	418	56			1	268	759	89

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
C400	Unplatted Acreage		1753	*34*					126	53
C400	New Develolpment								1000	57
AREA TOTAL		**1873**	**2800**	**583**	**1**	**8**	**2**	**1192**	**3984**	**987**
C500	Astro Hills	310	101	146		1		160	630	230
C500	Canyon Lake Hills	1555	429	626		2	1	1550	4861	986
C500	Canyon Lake Hills 1	720	224	*5*					8	8
C500	Canyon Springs Resort	1041	383	300		14	4	825	2552	489
C500	Cranes Mill Landing	70	55					63	158	0
C500	Erin Glen	27	11	14				6	37	22
C500	Paradise Point	39	12	8				23	70	13
C500	Westhaven	251	122	113				118	472	177
C500	Unplatted Acreage		2308	*44*					165	69
C500	New Develolpment								1000	57
AREA TOTAL		**4013**	**3645**	**1256**	**0**	**17**	**5**	**2745**	**8953**	**2,051**
C600	Canyon Lake MH Estates	535	177	339		5		177	980	537
C600	Canyon Lake MH Estates North	164	70	91		2		77	337	145
C600	Deer Meadows	311	208	47				259	721	74
C600	Lakeview Park	382	88	202				144	677	317
C600	Linnea S. Peg Lots		5	*1*					2	2
C600	Rolling Hills	580	272	287		4		227	1022	455
C600	Scenic Heights 1	596	215	67		9		508	1384	114
C600	Tom Creek Acres	70	141	32		3		31	131	53
C600	Tom Creek Hills	2	61	*1*					2	2
C600	Unplatted Acreage		3005	*51*					190	80
C600	New Develolpment								1000	57
AREA TOTAL		**2640**	**4242**	**1118**	**0**	**23**	**0**	**1423**	**5446**	**1,836**
C700	Abbott-Barnett Subdivision	2	55	1					2	2
C700	Ancient Oaks	4	15					2	5	0
C700	Bremer Ranch	5	156	*1*					2	2
C700	Denham Estates	1	10	*1*					2	2
C700	Fox Hill	33	168	5				9	30	8
C700	Monier Ranch	35	403	16				10	50	25
C700	Park Ranch		192	*1*					2	2
C700	Smith Ranch	16	123	8				4	23	13
C700	Wiesner Ranch	19	178	9				9	37	14
C700	Unplatted Acreage		11517	*155*					578	243
C700	New Develolpment								1000	57
AREA TOTAL		**115**	**12817**	**197**	**0**	**0**	**0**	**34**	**731**	**368**
AREA C TOTAL		***12034***	***34862***	***4526***	***2***	***84***	***9***	***7407***	***26646***	***7,614***

Table A1 - Existing Land Use and Population Distribution

Area No.	Subdivision Name	Lots	Acreage	Single Family	Multi-Family	Commercial	Other	Vacant	MAX SUBDIV. POP.	Projected 1996 Population
		* OCCUPANCY RATE		2.43	5	1	1	2.5		
D110	Buzzard's Rest Ranch	1	44	1					2	2
D110	Inland Estates	72	310	26		1		46	179	64
D110	L D 3 Ranch	1	100	1					2	2
D110	Naked Indian Reservation	72	370	33		1	1	25	145	82
D110	Oliver Estates	1	57	1					2	2
D110	Unplatted Acreage		8248	75					434	182
D110	New Development									57
AREA D TOTAL		***147***	***9129***	***137***	***0***	***2***	***1***	***71***	***764***	***391***
	STUDY AREA TOTAL	**33291**	**208229**	**10132**	**7**	**166**	**30**	**22723**	**79381**	**22,036**

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
A110	Honey Creek Ranches Subdivision	5	4	4	4	4	4	4
A110	Oak Springs Subdivision	36	38	38	38	38	38	38
A110	Unplatted Acreage	141	173	238	269	269	269	269
A110	New Development	133	182	328	728	1,266	1,868	2,579
SUBTOTALS		**315**	**397**	**608**	**1,039**	**1,577**	**2,179**	**2,890**
A120	Bartels Acres	3	4	4	4	4	4	4
A120	Knibbe Subdivision	3	2	2	2	2	2	2
A120	Comal Ranch Subdivision	13	10	10	10	10	10	10
A120	Unplatted Acreage	84	103	141	159	159	159	159
A120	New Development	133	182	328	728	1,266	1,868	2,579
SUBTOTALS		**236**	**301**	**485**	**903**	**1,441**	**2,043**	**2,754**
A130	Cypress Springs on the Guadalupe	164	201	276	389	509	636	768
A130	Guadalupe River Estates (Riverwood Estates)	174	214	294	307	307	307	307
A130	Rivermont	79	97	133	188	246	308	372
A130	Spring Branch Estates 1	97	119	163	164	164	164	164
A130	Unplatted Acreage	51	63	86	97	97	97	97
A130	New Development	133	182	328	728	1,266	1,868	2,579
SUBTOTALS		**565**	**876**	**1,280**	**1,873**	**2,589**	**3,380**	**4,287**
A140	Ahern Creek Ranches	13	10	10	10	10	10	10
A140	Benke Oaks	3	2	2	2	2	2	2
A140	Diamond D Subdivision	3	2	2	2	2	2	2
A140	Dillard Subdivision	5	4	4	4	4	4	4
A140	Elm Ridge Estates	41	45	45	45	45	45	45
A140	Flying "R" Ranch	46	53	53	53	53	53	53
A140	Lange Ranch Subdivision	3	4	5	7	8	8	8
A140	Little Creek	10	8	8	8	8	8	8
A140	Oakland Estates	210	248	248	248	248	248	248
A140	Singer Ranch	1	1	1	1	1	1	1
A140	Spring Branch Acres	110	135	176	176	176	176	176
A140	The Woods at Spring Branch	59	72	81	81	81	81	81
A140	Unplatted Acreage	69	85	117	132	132	132	132
A140	New Development	133	182	328	728	1,266	1,868	2,579
SUBTOTALS		**706**	**851**	**1,080**	**1,497**	**2,036**	**2,638**	**3,349**
A150	Creekwood Ranches	179	220	302	426	471	471	471
A150	Gutierrez Ranch	0	0	0	0	0	0	0

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
A150	Ridgeview Oaks East	49	60	71	71	71	71	71
A150	Ridgeview Oaks West	194	199	199	199	199	199	199
A150	Sun Valley Village	214	226	226	226	226	226	226
A150	Whispering Hills	187	230	316	446	584	730	881
A150	Unplatted Acreage	102	125	172	194	194	194	194
A150	New Development	133	182	328	728	1,266	1,868	2,579
SUBTOTALS		**1,058**	**1,242**	**1,614**	**2,290**	**3,011**	**3,759**	**4,621**
AREA TOTAL		**2,880**	**3,667**	**5,067**	**7,602**	**10,654**	**13,999**	**17,901**
A210	Crouse Subdivision	5	4	4	4	4	4	4
A210	Dresden Wood 1	44	54	65	65	65	65	65
A210	North Barcroft Estates	13	16	22	28	28	28	28
A210	Sage Oaks	54	66	91	113	113	113	113
A210	Silver Hills	228	280	384	424	424	424	424
A210	Unplatted Acreage	92	113	155	175	175	175	175
A210	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**547**	**684**	**995**	**1,416**	**1,864**	**2,366**	**2,958**
A220	Brand Ranch	28	34	42	42	42	42	42
A220	Indian Creek Ridge	18	22	30	40	40	40	40
A220	Jahnsen Ranch 1	3	2	2	2	2	2	2
A220	Oak Cliff Acres	174	214	277	277	277	277	277
A220	Persimmon Hill Sub	61	75	103	131	131	131	131
A220	Shepherds Ranch	36	44	60	85	111	139	168
A220	Wehe Estates	8	10	10	10	10	10	10
A220	Unplatted Acreage	82	101	139	157	157	157	157
A220	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**521**	**653**	**937**	**1,351**	**1,825**	**2,355**	**2,976**
A230	Bulverde Estates 1	353	434	596	736	736	736	736
A230	Bulverde Hills 3	131	161	177	177	177	177	177
A230	Bulverde Oaks 1	38	47	65	89	89	89	89
A230	Bulverde Ranchettes	5	6	8	11	14	18	22
A230	Cox Subdivision	1	1	1	1	1	1	1
A230	Elm Valley	92	113	155	156	156	156	156
A230	Hogan 281 Subdivision	5	4	4	4	4	4	4
A230	Licata Ranch	5	6	8	10	10	10	10
A230	Lundgren Subdivision	3	2	2	2	2	2	2

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
A230	Palmer Heights	13	16	18	18	18	18	18
A230	Spring Oak Estates	327	402	552	568	568	568	568
A230	The Highlands	28	34	47	66	86	86	86
A230	Travel Mart Subdivision	1	1	1	1	1	1	1
A230	Unplatted Acreage	79	97	133	150	150	150	150
A230	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**1,192**	**1,475**	**2,041**	**2,596**	**3,067**	**3,573**	**4,169**
A240	Ammann Oaks Sub	100	122	122	122	122	122	122
A240	Hidden Oaks	95	117	161	162	162	162	162
A240	Klar Ranch	3	2	2	2	2	2	2
A240	Saur Subdivision	3	4	5	6	6	6	6
A240	Unplatted Acreage	77	95	130	146	146	146	146
A240	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**389**	**491**	**694**	**1,045**	**1,493**	**1,995**	**2,587**
A250	Bulverde Gardens	13	10	10	10	10	10	10
A250	Bulverde Ranches	55	60	60	60	60	60	60
A250	Canyon View Acres	402	410	410	410	410	410	410
A250	Lindsey Acres	3	2	2	2	2	2	2
A250	Unplatted Acreage	56	69	95	107	107	107	107
A250	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**640**	**702**	**851**	**1,196**	**1,644**	**2,146**	**2,738**
A260	Cibolo One Subdivision	3	2	2	2	2	2	2
A260	Cibolo Two Subdivision	3	2	2	2	2	2	2
A260	Unplatted Acreage	20	25	34	38	38	38	38
A260	New Development	111	151	274	607	1,055	1,557	2,149
SUBTOTALS		**137**	**180**	**312**	**649**	**1,097**	**1,599**	**2,191**
AREA TOTAL		**3,426**	**4,185**	**5,830**	**8,253**	**10,990**	**14,034**	**17,619**
A310	Charles Cantu Subdivision	3	2	2	2	2	2	2
A310	Herbert M Gruen	3	2	2	2	2	2	2
A310	John Hall Subdivision	3	2	2	2	2	2	2
A310	Stoney Cliff	3	2	2	2	2	2	2
A310	Stoney Ridge	44	54	73	73	73	73	73
A310	Unplatted Acreage	59	72	99	112	112	112	112
A310	New Development	333	454	821	1,821	3,165	4,670	6,447
SUBTOTALS		**448**	**588**	**1,001**	**2,014**	**3,358**	**4,863**	**6,640**

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
A320	Beam Subdivision	15	18	22	22	22	22	22
A320	Beck Ranch	59	72	99	133	133	133	133
A320	Cross Roads Estates Phase 1	2	2	3	4	5	6	7
A320	Forrest Wilson Subdivision	3	2	2	2	2	2	2
A320	Kappelman Subdivision	3	2	2	2	2	2	2
A320	McGuffin Subdivision	0	0	0	0	0	0	0
A320	Misty Hills	54	66	79	79	79	79	79
A320	Oak Village North	1,309	1,573	1,573	1,573	1,573	1,573	1,573
A320	Skyridge Subdivision	33	41	56	79	103	129	145
A320	Smokey Mountain Ranch	15	18	25	30	30	30	30
A320	Stoney Creek	123	151	207	218	218	218	218
A320	Twin Creek Subdivision	95	98	98	98	98	98	98
A320	Wilson Subdivision	3	2	2	2	2	2	2
A320	Unplatted Acreage	123	151	207	234	234	234	234
A320	New Development	333	454	821	1,821	3,165	4,670	6,447
SUBTOTALS		**2,170**	**2,650**	**3,196**	**4,297**	**5,666**	**7,198**	**8,992**
AREA TOTAL		**2,618**	**3,238**	**4,197**	**6,311**	**9,024**	**12,061**	**15,632**
AREA A TOTAL		***8,924***	***11,090***	***15,094***	***22,166***	***30,668***	***40,094***	***51,152***
B110	Buck Horn Ranch	3	2	2	2	2	2	2
B110	Heritage Oaks	3	2	2	2	2	2	2
B110	Unplatted Acreage	19	23	32	36	36	36	36
B110	New Development	19	26	47	104	181	267	368
SUBTOTALS		**44**	**53**	**83**	**144**	**221**	**307**	**408**
B120	Cadillac Canyon	69	85	117	151	151	151	151
B120	Canyon Creek Estates	24	29	40	56	73	91	110
B120	Canyon Dam Hillsite	10	12	16	23	28	28	28
B120	Canyon Dam Sub 1	14	17	23	32	37	37	37
B120	Canyon Valley Estates 1	10	10	10	10	10	10	10
B120	Clear Water Estates	42	52	71	100	131	164	198
B120	Cougar Ridge	10	12	16	23	24	24	24
B120	Deep Acres Estates 2	34	42	58	82	107	114	114
B120	Devils Backbone Heights	22	27	37	52	68	85	103
B120	Eagles Peak Ranch	22	27	37	52	68	85	103

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
B120	Emerald Valley Subdivision	47	58	80	113	148	185	223
B120	Fralick Subdivision	2	2	2	2	2	2	2
B120	Glen Roy	2	2	3	4	5	6	7
B120	Hillcrest Estates	30	37	51	72	94	118	142
B120	Horseshoe Falls Subdivision	137	168	231	326	387	387	387
B120	Maricopa Ranch	45	55	76	100	100	100	100
B120	North Lake Estates	14	17	23	32	42	53	64
B120	North Ridge Estates	117	110	110	110	110	110	110
B120	Pfeil Estates	28	34	47	62	62	62	62
B120	River's Edge	47	58	80	113	114	114	114
B120	Riverside Estates	2	2	3	3	3	3	3
B120	Spring Mountain	29	36	49	69	90	113	127
B120	Unplatted Acreage	42	52	71	80	80	80	80
B120	New Development	19	26	47	104	181	267	368
SUBTOTALS		**818**	**970**	**1,298**	**1,771**	**2,115**	**2,389**	**2,667**
B130	Eden Ranch	249	306	420	592	771	771	771
B130	Espinazo Del Diablo	41	50	69	77	77	77	77
B130	Meyers Mountain	3	4	5	7	9	11	13
B130	Pleasant View Estates	8	10	10	10	10	10	10
B130	Scenic River Properties	29	36	43	43	43	43	43
B130	The Summitt	49	60	82	116	152	190	229
B130	Unplatted Acreage	52	64	88	99	99	99	99
B130	New Development	19	26	47	104	181	267	368
SUBTOTALS		**450**	**556**	**764**	**1,048**	**1,342**	**1,468**	**1,610**
AREA TOTAL		**1,312**	**1,579**	**2,145**	**2,963**	**3,678**	**4,164**	**4,685**
B200	Arroyo Bravo	0	0	0	0	0	0	0
B200	Bold Creek	14	17	23	32	42	49	49
B200	Canyon Lake Point Resort	1	1	1	1	1	1	1
B200	Canyon Lake Yacht Club	0	0	0	0	0	0	0
B200	Canyon Park Estates	22	27	37	52	68	85	103
B200	Crystal Heights	14	17	23	32	42	53	64
B200	Deer Run	2	2	2	2	2	2	2
B200	Hill Country Resort	9	7	7	7	7	7	7
B200	Jonas Subdivision	2	2	2	2	2	2	2
B200	Marty's Mountain	12	15	15	15	15	15	15

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
B200	Mt. Lookout	8	6	6	6	6	6	6
B200	Quail Crossing	2	2	3	3	3	3	3
B200	Simon Tracts	25	31	43	61	76	76	76
B200	Sunnyside Terrace	8	10	14	20	26	33	40
B200	Sunset Terrace	27	33	45	56	56	56	56
B200	The Heights	2	2	3	3	3	3	3
B200	Valhalla-Simon-Riner Subdivision	2	2	2	2	2	2	2
B200	Windjammer Resort	0	0	0	0	0	0	0
B200	Canyon Lake Acres	157	193	265	374	490	613	740
B200	Unplatted Acreage	29	36	49	55	55	55	55
B200	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**393**	**481**	**681**	**1,035**	**1,439**	**1,862**	**2,329**
B300	Charles Moore Subdivision	2	2	2	2	2	2	2
B300	Hancock Canyon	32	39	54	76	99	124	126
B300	Hancock Oak Hills	71	87	119	168	220	233	233
B300	Lakeside Development	12	15	21	30	39	49	59
B300	Royal Summit	5	6	8	11	14	16	16
B300	Scenic Terrace	30	37	51	72	94	118	142
B300	Tamarack Shores	313	385	529	746	977	1,132	1,132
B300	The Point at Rancho del lago	22	27	37	52	68	85	103
B300	Linda Ledges (U.R.)	39	48	66	93	109	109	109
B300	Rancho Del Lago	52	64	88	124	162	203	245
B300	Unplatted Acreage	34	42	58	66	66	66	66
B300	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**669**	**830**	**1,174**	**1,752**	**2,393**	**2,938**	**3,338**
B400	Big Walnut Springs (UR)	2	2	2	2	2	2	2
B400	Canyon Lake Estates	29	36	49	69	90	113	136
B400	Canyon Lake Island	59	72	99	140	183	229	276
B400	Canyon Lake Shores	263	323	443	625	818	1,023	1,235
B400	Canyon Lake Shores (UR)	5	6	8	11	14	18	22
B400	Glenmare	20	25	34	48	63	79	92
B400	Hilltop Mobile Home Subdivision	2	2	2	2	2	2	2
B400	Kings Point	17	21	29	41	54	68	82
B400	Lakewood Hills	19	23	32	45	59	74	89

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
B400	Lazy Diamond Ranchettes	30	37	51	72	92	92	92
B400	Potters Creek Park Acres	3	4	5	7	9	10	10
B400	Tanglewood Shores	108	133	183	258	338	423	511
B400	The Cedars	2	2	3	4	5	6	7
B400	Tranquility Park	12	15	21	30	39	49	59
B400	Unplatted Acreage	37	45	62	70	70	70	70
B400	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**665**	**824**	**1,164**	**1,736**	**2,381**	**3,059**	**3,790**
B510	Canyon Oaks Estates	47	58	80	94	94	94	94
B510	Deer River	140	172	236	333	436	545	550
B510	Lake of the Hills	38	47	65	92	120	150	181
B510	Unplatted Acreage	27	33	45	50	50	50	50
B510	New Development	19	26	47	104	181	267	368
SUBTOTALS		**271**	**336**	**473**	**673**	**881**	**1,106**	**1,243**
B520	Fischer Thirty Two Subdivision	3	4	5	7	9	10	10
B520	Lakewood Estates	5	6	8	11	14	18	22
B520	Rocky Creek Ranch	17	21	29	41	54	68	82
B520	Valley Ranch	2	2	2	2	2	2	2
B520	Whispering Oaks	16	20	27	31	31	31	31
B520	Unplatted Acreage	78	96	132	149	149	149	149
B520	New Development	19	26	47	104	181	267	368
SUBTOTALS		**140**	**175**	**250**	**345**	**440**	**545**	**664**
B530	Estates At Carpers Creek	5	6	8	11	14	18	22
B530	Fischer Ranches	15	18	25	28	28	28	28
B530	Forest View North	68	84	115	128	128	128	128
B530	Honeysuckle Rose	2	2	3	4	5	6	7
B530	Meister Heirs Estates	0	0	0	0	0	0	0
B530	Ranch Louise	7	6	6	6	6	6	6
B530	Stallion Springs	39	48	66	93	122	153	185
B530	Unplatted Acreage	66	81	111	126	126	126	126
B530	New Development	19	26	47	104	181	267	368
SUBTOTALS		**221**	**271**	**381**	**500**	**610**	**732**	**870**
AREA TOTAL		**632**	**782**	**1,104**	**1,518**	**1,931**	**2,383**	**2,777**
B600	Almy Addition	2	2	3	4	5	6	6

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
B600	Clear Creek Addition	5	6	8	11	14	14	14
B600	Cypress Cove	288	354	486	686	898	1,123	1,356
B600	Hideaway Subdivision	24	29	39	39	39	39	39
B600	Rebecca Crossing	12	14	14	14	14	14	14
B600	Unplatted Acreage	42	52	71	80	80	80	80
B600	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**430**	**535**	**762**	**1,146**	**1,593**	**2,077**	**2,614**
B700	Acorn Acres	2	2	2	2	2	2	2
B700	Charlie's 306	1	1	1	1	1	1	1
B700	Cherry Creek Subdivision	10	12	16	23	30	36	36
B700	Comal Hills Subdivision	149	183	251	354	463	579	699
B700	Coyote Ridge	0	0	0	0	0	0	0
B700	Cypress Lake Gardens	277	340	467	659	863	1,079	1,302
B700	Cypress Lake Gardens Big Sky Ranchettes	8	6	6	6	6	6	6
B700	Fernandez Subdivision	2	2	2	2	2	2	2
B700	Finkel Subdivision	0	0	0	0	0	0	0
B700	Forest Lake Estates	2	2	2	2	2	2	2
B700	Harley Acres	0	0	0	0	0	0	0
B700	Henke Subdivision	2	2	2	2	2	2	2
B700	Indian Hills Estates	243	299	393	393	393	393	393
B700	Lake Gardens	2	2	2	2	2	2	2
B700	Rebecca Creek Estates	0	0	0	0	0	0	0
B700	Rebecca Creek Park Subdivision	137	168	231	326	427	534	645
B700	The Springs at Rebecca Creek	58	71	97	137	179	224	270
B700	Unplatted Acreage	56	69	95	107	107	107	107
B700	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**1,006**	**1,237**	**1,708**	**2,328**	**3,022**	**3,770**	**4,574**
AREA B TOTAL		***5,107***	***6,268***	***8,738***	***12,478***	***16,437***	***20,253***	***24,107***
C100	Austin B. Sheridan Properties	2	2	2	2	2	2	2
C100	Christensen Scenic River	49	55	55	55	55	55	55
C100	J D J Ranch	39	48	66	83	83	83	83
C100	Sattler Business Lots	11	14	19	27	33	33	33

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
C100	Sattler Estates Subdivision	72	88	121	171	172	172	172
C100	Sattler Village Subdivision	144	177	243	343	439	439	439
C100	The Little Ponderosa	47	58	80	113	148	185	223
C100	Unplatted Acreage	100	123	169	190	190	190	190
C100	New Development	57	78	141	312	543	801	1,105
AREA TOTAL		**521**	**643**	**896**	**1,296**	**1,665**	**1,960**	**2,302**
C200	Arrowhead Village	22	27	37	52	68	85	103
C200	Bradcliff on the River	0	0	0	0	0	0	0
C200	Canyon Corner	55	68	93	131	132	132	132
C200	Canyon Lake Village	269	330	453	639	837	1,047	1,193
C200	John B. Browns Peak	0	0	0	0	0	0	0
C200	Kuntry Korner Estates	7	9	12	12	12	12	12
C200	Lake View Heights	66	81	85	85	85	85	85
C200	Miles Parker Estates	2	2	3	3	3	3	3
C200	Netherhill Place	0	0	0	0	0	0	0
C200	River Point Estates	70	86	118	128	128	128	128
C200	River Valley Estates	9	11	15	18	18	18	18
C200	Sattler Ridge Estates	2	2	2	2	2	2	2
C200	Skyline Acres	50	61	84	118	136	136	136
C200	Valley View	5	6	8	11	14	18	20
C200	Unplatted Acreage	53	65	89	101	101	101	101
C200	New Development	57	78	141	312	543	801	1,105
AREA TOTAL		**667**	**826**	**1,140**	**1,612**	**2,079**	**2,568**	**3,038**
C300	Blue Water Estates	20	25	34	48	63	79	84
C300	Canyon Lake Village West	552	678	931	1,259	1,259	1,259	1,259
C300	Cedar Breaks Subdivision	2	2	3	4	5	6	7
C300	Deep Well Subdivision	6	7	10	14	14	14	14
C300	Double E Subdivision	2	2	2	2	2	2	2
C300	Five Oaks	22	27	37	52	58	58	58
C300	Hidden Valley Estates	2	2	3	4	5	6	7
C300	Highland Terrace	24	29	40	56	73	91	97
C300	Island View Office Addition	0	0	0	0	0	0	0
C300	Los Tres Amigos Estates	2	2	3	4	5	6	6
C300	Moorview Subdivision	0	0	0	0	0	0	0

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
C300	Mountain Oaks	7	9	12	17	22	28	34
C300	Shamrock Hills	5	6	8	10	10	10	10
C300	Shepherd Hill	2	2	2	2	2	2	2
C300	The Oaks	270	332	456	622	622	622	622
C300	Tripple Peak Ranch Estates	79	97	133	147	147	147	147
C300	Village Shores	69	85	117	165	167	167	167
C300	Unplatted Acreage	63	77	106	120	120	120	120
C300	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**1,184**	**1,460**	**2,038**	**2,838**	**3,117**	**3,418**	**3,741**
C400	Canyon Lake Forest	530	651	894	1,261	1,651	2,064	2,080
C400	Oak Hideaway Estates	14	17	22	22	22	22	22
C400	Shadyvale Subdivision	2	2	2	2	2	2	2
C400	St. Andrews by the Woodlands	6	7	10	11	11	11	11
C400	Stanley Square	1	1	1	1	1	1	1
C400	Startz Subdivision	0	0	0	0	0	0	0
C400	Sunburst Ranch	13	16	22	31	32	32	32
C400	Tills Terrace Subdivision	11	14	19	26	26	26	26
C400	Waterfront Park	211	259	303	303	303	303	303
C400	Woodlands	89	109	150	212	278	348	420
C400	Unplatted Acreage	53	65	89	101	101	101	101
C400	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**987**	**1,219**	**1,653**	**2,282**	**2,970**	**3,711**	**4,103**
C500	Astro Hills	230	283	389	504	504	504	504
C500	Canyon Lake Hills	986	1,211	1,663	2,346	3,071	3,840	3,889
C500	Canyon Lake Hills 1	8	6	6	6	6	6	6
C500	Canyon Springs Resort	489	601	825	1,164	1,524	1,906	2,042
C500	Cranes Mill Landing	0	0	0	0	0	0	0
C500	Erin Glen	22	27	30	30	30	30	30
C500	Paradise Point	13	16	22	31	41	51	56
C500	Westhaven	177	217	298	378	378	378	378
C500	Unplatted Acreage	69	85	117	132	132	132	132
C500	New Develolpment	57	78	141	312	543	801	1,105
AREA TOTAL		**2,051**	**2,524**	**3,491**	**4,903**	**6,229**	**7,648**	**8,142**

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
C600	Canyon Lake MH Estates	537	660	784	784	784	784	784
C600	Canyon Lake MH Estates North	145	178	244	270	270	270	270
C600	Deer Meadows	74	91	125	176	230	288	348
C600	Lakeview Park	317	389	534	542	542	542	542
C600	Linnea S. Peg Lots	2	2	2	2	2	2	2
C600	Rolling Hills	455	559	767	818	818	818	818
C600	Scenic Heights 1	114	140	192	271	355	444	536
C600	Tom Creek Acres	53	65	89	105	105	105	105
C600	Tom Creek Hills	2	2	2	2	2	2	2
C600	Unplatted Acreage	80	98	135	152	152	152	152
C600	New Development	57	78	141	312	543	801	1,105
AREA TOTAL		**1,836**	**2,262**	**3,015**	**3,434**	**3,803**	**4,208**	**4,664**
C700	Abbott-Barnett Subdivision	2	2	2	2	2	2	2
C700	Ancient Oaks	0	0	0	0	0	0	0
C700	Bremer Ranch	2	2	2	2	2	2	2
C700	Denham Estates	2	2	2	2	2	2	2
C700	Fox Hill	8	10	14	20	24	24	24
C700	Monier Ranch	25	31	40	40	40	40	40
C700	Park Ranch	2	2	2	2	2	2	2
C700	Smith Ranch	13	16	18	18	18	18	18
C700	Wiesner Ranch	14	17	23	30	30	30	30
C700	Unplatted Acreage	243	299	410	462	462	462	462
C700	New Development	57	78	141	312	543	801	1,105
AREA TOTAL		**368**	**459**	**654**	**890**	**1,125**	**1,383**	**1,687**
AREA C TOTAL		***7,614***	***9,393***	***12,887***	***17,255***	***20,988***	***24,896***	***27,677***
D110	Buzzard's Rest Ranch	2	2	2	2	2	2	2
D110	Inland Estates	64	79	108	143	143	143	143
D110	L D 3 Ranch	2	2	2	2	2	2	2
D110	Naked Indian Reservation	82	101	116	116	116	116	116
D110	Oliver Estates	2	2	2	2	2	2	2
D110	Unplatted Acreage	182	224	308	347	347	347	347
D110	New Development	57	78	141	312	543	801	1,105

Table A2 - Population Projections

Area No.	Subdivision Name	Projected 1996 Population	Population Projections 2000 5.28%	2010 3.22%	2020 3.50%	2030 2.73%	2040 2.26%	2050 1.90%
AREA D TOTAL		***391***	***488***	***679***	***924***	***1,155***	***1,413***	***1,717***
	STUDY AREA TOTAL	**22,036**	**27,239**	**37,398**	**52,823**	**69,248**	**86,656**	**104,653**
NORTH SIDE		**5,343**	**6,569**	**9,223**	**13,381**	**17,878**	**22,296**	**26,861**
SOUTH SIDE		**10,649**	**13,247**	**18,148**	**24,878**	**31,356**	**38,265**	**44,541**
SOUTHWEST SIDE		**6,044**	**7,423**	**10,027**	**14,564**	**20,014**	**26,095**	**33,251**
		22,036	**27,239**	**37,398**	**52,823**	**69,248**	**86,656**	**104,653**

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
A110	Honey Creek Ranches Subdivision	735	732	680	644	632	624	620
A110	Oak Springs Subdivision	5,292	6,954	6,460	6,118	6,004	5,928	5,890
A110	Unplatted Acreage	20,727	31,659	40,460	43,309	42,502	41,964	41,695
A110	New Development	19,551	33,306	55,760	117,208	200,028	291,408	399,745
SUBTOTALS		**46,305**	**72,651**	**103,360**	**167,279**	**249,166**	**339,924**	**447,950**
A120	Bartels Acres	441	732	680	644	632	624	620
A120	Knibbe Subdivision	441	366	340	322	316	312	310
A120	Comal Ranch Subdivision	1,911	1,830	1,700	1,610	1,580	1,560	1,550
A120	Unplatted Acreage	12,348	18,849	23,970	25,599	25,122	24,804	24,645
A120	New Development	19,551	33,306	55,760	117,208	200,028	291,408	399,745
SUBTOTALS		**34,692**	**55,083**	**82,450**	**145,383**	**227,678**	**318,708**	**426,870**
A130	Cypress Springs on the Guadalupe	24,108	36,783	46,920	62,629	80,422	99,216	119,040
A130	Guadalupe River Estates (Riverwood Estates)	25,578	39,162	49,980	49,427	48,506	47,892	47,585
A130	Rivermont	11,613	17,751	22,610	30,268	38,868	48,048	57,660
A130	Spring Branch Estates 1	14,259	21,777	27,710	26,404	25,912	25,584	25,420
A130	Unplatted Acreage	7,497	11,529	14,620	15,617	15,326	15,132	15,035
A130	New Development	19,551	33,306	55,760	117,208	200,028	291,408	399,745
SUBTOTALS		**102,606**	**160,308**	**217,600**	**301,553**	**409,062**	**527,280**	**664,485**
A140	Ahern Creek Ranches	1,911	1,830	1,700	1,610	1,580	1,560	1,550
A140	Benke Oaks	441	366	340	322	316	312	310
A140	Diamond D Subdivision	441	366	340	322	316	312	310
A140	Dillard Subdivision	735	732	680	644	632	624	620
A140	Elm Ridge Estates	6,027	8,235	7,650	7,245	7,110	7,020	6,975
A140	Flying "R" Ranch	6,762	9,699	9,010	8,533	8,374	8,268	8,215
A140	Lange Ranch Subdivision	441	732	850	1,127	1,264	1,248	1,240
A140	Little Creek	1,470	1,464	1,360	1,288	1,264	1,248	1,240
A140	Oakland Estates	30,870	45,384	42,160	39,928	39,184	38,688	38,440
A140	Singer Ranch	147	183	170	161	158	156	155
A140	Spring Branch Acres	16,170	24,705	29,920	28,336	27,808	27,456	27,280
A140	The Woods at Spring Branch	8,673	13,176	13,770	13,041	12,798	12,636	12,555
A140	Unplatted Acreage	10,143	15,555	19,890	21,252	20,856	20,592	20,460
A140	New Development	19,551	33,306	55,760	117,208	200,028	291,408	399,745
SUBTOTALS		**103,782**	**155,733**	**183,600**	**241,017**	**321,688**	**411,528**	**519,095**
A150	Creekwood Ranches	26,313	40,260	51,340	68,586	74,418	73,476	73,005
A150	Gutierrez Ranch	0	0	0	0	0	0	0
A150	Ridgeview Oaks East	7,203	10,980	12,070	11,431	11,218	11,076	11,005
A150	Ridgeview Oaks West	28,518	36,417	33,830	32,039	31,442	31,044	30,845
A150	Sun Valley Village	31,458	41,358	38,420	36,386	35,708	35,256	35,030

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
A150	Whispering Hills	27,489	42,090	53,720	71,806	92,272	113,880	136,555
A150	Unplatted Acreage	14,994	22,875	29,240	31,234	30,652	30,264	30,070
A150	New Development	19,551	33,306	55,760	117,208	200,028	291,408	399,745
SUBTOTALS		**155,526**	**227,286**	**274,380**	**368,690**	**475,738**	**586,404**	**716,255**
AREA TOTAL		**442,911**	**671,061**	**861,390**	**1,223,922**	**1,683,332**	**2,183,844**	**2,774,655**
A210	Crouse Subdivision	735	732	680	644	632	624	620
A210	Dresden Wood 1	6,468	9,882	11,050	10,465	10,270	10,140	10,075
A210	North Barcroft Estates	1,911	2,928	3,740	4,508	4,424	4,368	4,340
A210	Sage Oaks	7,938	12,078	15,470	18,193	17,854	17,628	17,515
A210	Silver Hills	33,516	51,240	65,280	68,264	66,992	66,144	65,720
A210	Unplatted Acreage	13,524	20,679	26,350	28,175	27,650	27,300	27,125
A210	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095
SUBTOTALS		**80,409**	**125,172**	**169,150**	**227,976**	**294,512**	**369,096**	**458,490**
A220	Brand Ranch	4,116	6,222	7,140	6,762	6,636	6,552	6,510
A220	Indian Creek Ridge	2,646	4,026	5,100	6,440	6,320	6,240	6,200
A220	Jahnsen Ranch 1	441	366	340	322	316	312	310
A220	Oak Cliff Acres	25,578	39,162	47,090	44,597	43,766	43,212	42,935
A220	Persimmon Hill Sub	8,967	13,725	17,510	21,091	20,698	20,436	20,305
A220	Shepherds Ranch	5,292	8,052	10,200	13,685	17,538	21,684	26,040
A220	Wehe Estates	1,176	1,830	1,700	1,610	1,580	1,560	1,550
A220	Unplatted Acreage	12,054	18,483	23,630	25,277	24,806	24,492	24,335
A220	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095
SUBTOTALS		**76,587**	**119,499**	**159,290**	**217,511**	**288,350**	**367,380**	**461,280**
A230	Bulverde Estates 1	51,891	79,422	101,320	118,496	116,288	114,816	114,080
A230	Bulverde Hills 3	19,257	29,463	30,090	28,497	27,966	27,612	27,435
A230	Bulverde Oaks 1	5,586	8,601	11,050	14,329	14,062	13,884	13,795
A230	Bulverde Ranchettes	735	1,098	1,360	1,771	2,212	2,808	3,410
A230	Cox Subdivision	147	183	170	161	158	156	155
A230	Elm Valley	13,524	20,679	26,350	25,116	24,648	24,336	24,180
A230	Hogan 281 Subdivision	735	732	680	644	632	624	620
A230	Licata Ranch	735	1,098	1,360	1,610	1,580	1,560	1,550
A230	Lundgren Subdivision	441	366	340	322	316	312	310
A230	Palmer Heights	1,911	2,928	3,060	2,898	2,844	2,808	2,790
A230	Spring Oak Estates	48,069	73,566	93,840	91,448	89,744	88,608	88,040
A230	The Highlands	4,116	6,222	7,990	10,626	13,588	13,416	13,330
A230	Travel Mart Subdivision	147	183	170	161	158	156	155
A230	Unplatted Acreage	11,613	17,751	22,610	24,150	23,700	23,400	23,250
A230	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
SUBTOTALS		**175,224**	**269,925**	**346,970**	**417,956**	**484,586**	**557,388**	**646,195**
A240	Ammann Oaks Sub	14,700	22,326	20,740	19,642	19,276	19,032	18,910
A240	Hidden Oaks	13,965	21,411	27,370	26,082	25,596	25,272	25,110
A240	Klar Ranch	441	366	340	322	316	312	310
A240	Saur Subdivision	441	732	850	966	948	936	930
A240	Unplatted Acreage	11,319	17,385	22,100	23,506	23,068	22,776	22,630
A240	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095
SUBTOTALS		**57,183**	**89,853**	**117,980**	**168,245**	**235,894**	**311,220**	**400,985**
A250	Bulverde Gardens	1,911	1,830	1,700	1,610	1,580	1,560	1,550
A250	Bulverde Ranches	8,085	10,980	10,200	9,660	9,480	9,360	9,300
A250	Canyon View Acres	59,094	75,030	69,700	66,010	64,780	63,960	63,550
A250	Lindsey Acres	441	366	340	322	316	312	310
A250	Unplatted Acreage	8,232	12,627	16,150	17,227	16,906	16,692	16,585
A250	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095
SUBTOTALS		**94,080**	**128,466**	**144,670**	**192,556**	**259,752**	**334,776**	**424,390**
A260	Cibolo One Subdivision	441	366	340	322	316	312	310
A260	Cibolo Two Subdivision	441	366	340	322	316	312	310
A260	Unplatted Acreage	2,940	4,575	5,780	6,118	6,004	5,928	5,890
A260	New Development	16,317	27,633	46,580	97,727	166,690	242,892	333,095
SUBTOTALS		**20,139**	**32,940**	**53,040**	**104,489**	**173,326**	**249,444**	**339,605**
AREA TOTAL		**503,622**	**765,855**	**991,100**	**1,328,733**	**1,736,420**	**2,189,304**	**2,730,945**
A310	Charles Cantu Subdivision	441	366	340	322	316	312	310
A310	Herbert M Gruen	441	366	340	322	316	312	310
A310	John Hall Subdivision	441	366	340	322	316	312	310
A310	Stoney Cliff	441	366	340	322	316	312	310
A310	Stoney Ridge	6,468	9,882	12,410	11,753	11,534	11,388	11,315
A310	Unplatted Acreage	8,673	13,176	16,830	18,032	17,696	17,472	17,360
A310	New Development	48,951	83,082	139,570	293,181	500,070	728,520	999,285
SUBTOTALS		**65,856**	**107,604**	**170,170**	**324,254**	**530,564**	**758,628**	**1,029,200**
A320	Beam Subdivision	2,205	3,294	3,740	3,542	3,476	3,432	3,410
A320	Beck Ranch	8,673	13,176	16,830	21,413	21,014	20,748	20,615
A320	Cross Roads Estates Phase 1	294	366	510	644	790	936	1,085
A320	Forrest Wilson Subdivision	441	366	340	322	316	312	310
A320	Kappelman Subdivision	441	366	340	322	316	312	310
A320	McGuffin Subdivision	0	0	0	0	0	0	0
A320	Misty Hills	7,938	12,078	13,430	12,719	12,482	12,324	12,245
A320	Oak Village North	192,423	287,859	267,410	253,253	248,534	245,388	243,815
A320	Skyridge Subdivision	4,851	7,503	9,520	12,719	16,274	20,124	22,475

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
A320	Smokey Mountain Ranch	2,205	3,294	4,250	4,830	4,740	4,680	4,650
A320	Stoney Creek	18,081	27,633	35,190	35,098	34,444	34,008	33,790
A320	Twin Creek Subdivision	13,965	17,934	16,660	15,778	15,484	15,288	15,190
A320	Wilson Subdivision	441	366	340	322	316	312	310
A320	Unplatted Acreage	18,081	27,633	35,190	37,674	36,972	36,504	36,270
A320	New Development	48,951	83,082	139,570	293,181	500,070	728,520	999,285
SUBTOTALS		**318,990**	**484,950**	**543,320**	**691,817**	**895,228**	**1,122,888**	**1,393,760**
AREA TOTAL		**384,846**	**592,554**	**713,490**	**1,016,071**	**1,425,792**	**1,881,516**	**2,422,960**
AREA A TOTAL		***1,331,379***	***2,029,470***	***2,565,980***	***3,568,726***	***4,845,544***	***6,254,664***	***7,928,560***
B110	Buck Horn Ranch	441	366	340	322	316	312	310
B110	Heritage Oaks	441	366	340	322	316	312	310
B110	Unplatted Acreage	2,793	4,209	5,440	5,796	5,688	5,616	5,580
B110	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**6,468**	**9,699**	**14,110**	**23,184**	**34,918**	**47,892**	**63,240**
B120	Cadillac Canyon	10,143	15,555	19,890	24,311	23,858	23,556	23,405
B120	Canyon Creek Estates	3,528	5,307	6,800	9,016	11,534	14,196	17,050
B120	Canyon Dam Hillsite	1,470	2,196	2,720	3,703	4,424	4,368	4,340
B120	Canyon Dam Sub 1	2,058	3,111	3,910	5,152	5,846	5,772	5,735
B120	Canyon Valley Estates 1	1,470	1,830	1,700	1,610	1,580	1,560	1,550
B120	Clear Water Estates	6,174	9,516	12,070	16,100	20,698	25,584	30,690
B120	Cougar Ridge	1,470	2,196	2,720	3,703	3,792	3,744	3,720
B120	Deep Acres Estates 2	4,998	7,686	9,860	13,202	16,906	17,784	17,670
B120	Devils Backbone Heights	3,234	4,941	6,290	8,372	10,744	13,260	15,965
B120	Eagles Peak Ranch	3,234	4,941	6,290	8,372	10,744	13,260	15,965
B120	Emerald Valley Subdivision	6,909	10,614	13,600	18,193	23,384	28,860	34,565
B120	Fralick Subdivision	294	366	340	322	316	312	310
B120	Glen Roy	294	366	510	644	790	936	1,085
B120	Hillcrest Estates	4,410	6,771	8,670	11,592	14,852	18,408	22,010
B120	Horseshoe Falls Subdivision	20,139	30,744	39,270	52,486	61,146	60,372	59,985
B120	Maricopa Ranch	6,615	10,065	12,920	16,100	15,800	15,600	15,500
B120	North Lake Estates	2,058	3,111	3,910	5,152	6,636	8,268	9,920
B120	North Ridge Estates	17,199	20,130	18,700	17,710	17,380	17,160	17,050
B120	Pfeil Estates	4,116	6,222	7,990	9,982	9,796	9,672	9,610
B120	River's Edge	6,909	10,614	13,600	18,193	18,012	17,784	17,670
B120	Riverside Estates	294	366	510	483	474	468	465
B120	Spring Mountain	4,263	6,588	8,330	11,109	14,220	17,628	19,685

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
B120	Unplatted Acreage	6,174	9,516	12,070	12,880	12,640	12,480	12,400
B120	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**120,246**	**177,510**	**220,660**	**285,131**	**334,170**	**372,684**	**413,385**
B130	Eden Ranch	36,603	55,998	71,400	95,312	121,818	120,276	119,505
B130	Espinazo Del Diablo	6,027	9,150	11,730	12,397	12,166	12,012	11,935
B130	Meyers Mountain	441	732	850	1,127	1,422	1,716	2,015
B130	Pleasant View Estates	1,176	1,830	1,700	1,610	1,580	1,560	1,550
B130	Scenic River Properties	4,263	6,588	7,310	6,923	6,794	6,708	6,665
B130	The Summitt	7,203	10,980	13,940	18,676	24,016	29,640	35,495
B130	Unplatted Acreage	7,644	11,712	14,960	15,939	15,642	15,444	15,345
B130	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**66,150**	**101,748**	**129,880**	**168,728**	**212,036**	**229,008**	**249,550**
AREA TOTAL		**192,864**	**288,957**	**364,650**	**477,043**	**581,124**	**649,584**	**726,175**
B200	Arroyo Bravo	0	0	0	0	0	0	0
B200	Bold Creek	2,058	3,111	3,910	5,152	6,636	7,644	7,595
B200	Canyon Lake Point Resort	147	183	170	161	158	156	155
B200	Canyon Lake Yacht Club	0	0	0	0	0	0	0
B200	Canyon Park Estates	3,234	4,941	6,290	8,372	10,744	13,260	15,965
B200	Crystal Heights	2,058	3,111	3,910	5,152	6,636	8,268	9,920
B200	Deer Run	294	366	340	322	316	312	310
B200	Hill Country Resort	1,323	1,281	1,190	1,127	1,106	1,092	1,085
B200	Jonas Subdivision	294	366	340	322	316	312	310
B200	Marty's Mountain	1,764	2,745	2,550	2,415	2,370	2,340	2,325
B200	Mt. Lookout	1,176	1,098	1,020	966	948	936	930
B200	Quail Crossing	294	366	510	483	474	468	465
B200	Simon Tracts	3,675	5,673	7,310	9,821	12,008	11,856	11,780
B200	Sunnyside Terrace	1,176	1,830	2,380	3,220	4,108	5,148	6,200
B200	Sunset Terrace	3,969	6,039	7,650	9,016	8,848	8,736	8,680
B200	The Heights	294	366	510	483	474	468	465
B200	Valhalla-Simon-Riner Subdivision	294	366	340	322	316	312	310
B200	Windjammer Resort	0	0	0	0	0	0	0
B200	Canyon Lake Acres	23,079	35,319	45,050	60,214	77,420	95,628	114,700
B200	Unplatted Acreage	4,263	6,588	8,330	8,855	8,690	8,580	8,525
B200	New Development	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**57,771**	**88,023**	**115,770**	**166,635**	**227,362**	**290,472**	**360,995**
B300	Charles Moore Subdivision	294	366	340	322	316	312	310
B300	Hancock Canyon	4,704	7,137	9,180	12,236	15,642	19,344	19,530

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
B300	Hancock Oak Hills	10,437	15,921	20,230	27,048	34,760	36,348	36,115
B300	Lakeside Development	1,764	2,745	3,570	4,830	6,162	7,644	9,145
B300	Royal Summit	735	1,098	1,360	1,771	2,212	2,496	2,480
B300	Scenic Terrace	4,410	6,771	8,670	11,592	14,852	18,408	22,010
B300	Tamarack Shores	46,011	70,455	89,930	120,106	154,366	176,592	175,460
B300	The Point at Rancho del lago	3,234	4,941	6,290	8,372	10,744	13,260	15,965
B300	Linda Ledges (U.R.)	5,733	8,784	11,220	14,973	17,222	17,004	16,895
B300	Rancho Del Lago	7,644	11,712	14,960	19,964	25,596	31,668	37,975
B300	Unplatted Acreage	4,998	7,686	9,860	10,626	10,428	10,296	10,230
B300	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**98,343**	**151,890**	**199,580**	**282,072**	**378,094**	**458,328**	**517,390**
B400	Big Walnut Springs (UR)	294	366	340	322	316	312	310
B400	Canyon Lake Estates	4,263	6,588	8,330	11,109	14,220	17,628	21,080
B400	Canyon Lake Island	8,673	13,176	16,830	22,540	28,914	35,724	42,780
B400	Canyon Lake Shores	38,661	59,109	75,310	100,625	129,244	159,588	191,425
B400	Canyon Lake Shores (UR)	735	1,098	1,360	1,771	2,212	2,808	3,410
B400	Glenmare	2,940	4,575	5,780	7,728	9,954	12,324	14,260
B400	Hilltop Mobile Home Subdivision	294	366	340	322	316	312	310
B400	Kings Point	2,499	3,843	4,930	6,601	8,532	10,608	12,710
B400	Lakewood Hills	2,793	4,209	5,440	7,245	9,322	11,544	13,795
B400	Lazy Diamond Ranchettes	4,410	6,771	8,670	11,592	14,536	14,352	14,260
B400	Potters Creek Park Acres	441	732	850	1,127	1,422	1,560	1,550
B400	Tanglewood Shores	15,876	24,339	31,110	41,538	53,404	65,988	79,205
B400	The Cedars	294	366	510	644	790	936	1,085
B400	Tranquility Park	1,764	2,745	3,570	4,830	6,162	7,644	9,145
B400	Unplatted Acreage	5,439	8,235	10,540	11,270	11,060	10,920	10,850
B400	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**97,755**	**150,792**	**197,880**	**279,496**	**376,198**	**477,204**	**587,450**
B510	Canyon Oaks Estates	6,909	10,614	13,600	15,134	14,852	14,664	14,570
B510	Deer River	20,580	31,476	40,120	53,613	68,888	85,020	85,250
B510	Lake of the Hills	5,586	8,601	11,050	14,812	18,960	23,400	28,055
B510	Unplatted Acreage	3,969	6,039	7,650	8,050	7,900	7,800	7,750
B510	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**39,837**	**61,488**	**80,410**	**108,353**	**139,198**	**172,536**	**192,665**
B520	Fischer Thirty Two Subdivision	441	732	850	1,127	1,422	1,560	1,550
B520	Lakewood Estates	735	1,098	1,360	1,771	2,212	2,808	3,410
B520	Rocky Creek Ranch	2,499	3,843	4,930	6,601	8,532	10,608	12,710

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
B520	Valley Ranch	294	366	340	322	316	312	310
B520	Whispering Oaks	2,352	3,660	4,590	4,991	4,898	4,836	4,805
B520	Unplatted Acreage	11,466	17,568	22,440	23,989	23,542	23,244	23,095
B520	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**20,580**	**32,025**	**42,500**	**55,545**	**69,520**	**85,020**	**102,920**
B530	Estates At Carpers Creek	735	1,098	1,360	1,771	2,212	2,808	3,410
B530	Fischer Ranches	2,205	3,294	4,250	4,508	4,424	4,368	4,340
B530	Forest View North	9,996	15,372	19,550	20,608	20,224	19,968	19,840
B530	Honeysuckle Rose	294	366	510	644	790	936	1,085
B530	Meister Heirs Estates	0	0	0	0	0	0	0
B530	Ranch Louise	1,029	1,098	1,020	966	948	936	930
B530	Stallion Springs	5,733	8,784	11,220	14,973	19,276	23,868	28,675
B530	Unplatted Acreage	9,702	14,823	18,870	20,286	19,908	19,656	19,530
B530	New Development	2,793	4,758	7,990	16,744	28,598	41,652	57,040
SUBTOTALS		**32,487**	**49,593**	**64,770**	**80,500**	**96,380**	**114,192**	**134,850**
AREA TOTAL		**92,904**	**143,106**	**187,680**	**244,398**	**305,098**	**371,748**	**430,435**
B600	Almy Addition	294	366	510	644	790	936	930
B600	Clear Creek Addition	735	1,098	1,360	1,771	2,212	2,184	2,170
B600	Cypress Cove	42,336	64,782	82,620	110,446	141,884	175,188	210,180
B600	Hideaway Subdivision	3,528	5,307	6,630	6,279	6,162	6,084	6,045
B600	Rebecca Crossing	1,764	2,562	2,380	2,254	2,212	2,184	2,170
B600	Unplatted Acreage	6,174	9,516	12,070	12,880	12,640	12,480	12,400
B600	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**63,210**	**97,905**	**129,540**	**184,506**	**251,694**	**324,012**	**405,170**
B700	Acorn Acres	294	366	340	322	316	312	310
B700	Charlie's 306	147	183	170	161	158	156	155
B700	Cherry Creek Subdivision	1,470	2,196	2,720	3,703	4,740	5,616	5,580
B700	Comal Hills Subdivision	21,903	33,489	42,670	56,994	73,154	90,324	108,345
B700	Coyote Ridge	0	0	0	0	0	0	0
B700	Cypress Lake Gardens	40,719	62,220	79,390	106,099	136,354	168,324	201,810
B700	Cypress Lake Gardens Big Sky Ranchettes	1,176	1,098	1,020	966	948	936	930
B700	Fernandez Subdivision	294	366	340	322	316	312	310
B700	Finkel Subdivision	0	0	0	0	0	0	0
B700	Forest Lake Estates	294	366	340	322	316	312	310
B700	Harley Acres	0	0	0	0	0	0	0
B700	Henke Subdivision	294	366	340	322	316	312	310
B700	Indian Hills Estates	35,721	54,717	66,810	63,273	62,094	61,308	60,915

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
B700	Lake Gardens	294	366	340	322	316	312	310
B700	Rebecca Creek Estates	0	0	0	0	0	0	0
B700	Rebecca Creek Park Subdivision	20,139	30,744	39,270	52,486	67,466	83,304	99,975
B700	The Springs at Rebecca Creek	8,526	12,993	16,490	22,057	28,282	34,944	41,850
B700	Unplatted Acreage	8,232	12,627	16,150	17,227	16,906	16,692	16,585
B700	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**147,882**	**226,371**	**290,360**	**374,808**	**477,476**	**588,120**	**708,970**
AREA B TOTAL		***750,729***	***1,147,044***	***1,485,460***	***2,008,958***	***2,597,046***	***3,159,468***	***3,736,585***
C100	Austin B. Sheridan Properties	294	366	340	322	316	312	310
C100	Christensen Scenic River	7,203	10,065	9,350	8,855	8,690	8,580	8,525
C100	J D J Ranch	5,733	8,784	11,220	13,363	13,114	12,948	12,865
C100	Sattler Business Lots	1,617	2,562	3,230	4,347	5,214	5,148	5,115
C100	Sattler Estates Subdivision	10,584	16,104	20,570	27,531	27,176	26,832	26,660
C100	Sattler Village Subdivision	21,168	32,391	41,310	55,223	69,362	68,484	68,045
C100	The Little Ponderosa	6,909	10,614	13,600	18,193	23,384	28,860	34,565
C100	Unplatted Acreage	14,700	22,509	28,730	30,590	30,020	29,640	29,450
C100	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**76,587**	**117,669**	**152,320**	**208,656**	**263,070**	**305,760**	**356,810**
C200	Arrowhead Village	3,234	4,941	6,290	8,372	10,744	13,260	15,965
C200	Bradcliff on the River	0	0	0	0	0	0	0
C200	Canyon Corner	8,085	12,444	15,810	21,091	20,856	20,592	20,460
C200	Canyon Lake Village	39,543	60,390	77,010	102,879	132,246	163,332	184,915
C200	John B. Browns Peak	0	0	0	0	0	0	0
C200	Kuntry Korner Estates	1,029	1,647	2,040	1,932	1,896	1,872	1,860
C200	Lake View Heights	9,702	14,823	14,450	13,685	13,430	13,260	13,175
C200	Miles Parker Estates	294	366	510	483	474	468	465
C200	Netherhill Place	0	0	0	0	0	0	0
C200	River Point Estates	10,290	15,738	20,060	20,608	20,224	19,968	19,840
C200	River Valley Estates	1,323	2,013	2,550	2,898	2,844	2,808	2,790
C200	Sattler Ridge Estates	294	366	340	322	316	312	310
C200	Skyline Acres	7,350	11,163	14,280	18,998	21,488	21,216	21,080
C200	Valley View	735	1,098	1,360	1,771	2,212	2,808	3,100
C200	Unplatted Acreage	7,791	11,895	15,130	16,261	15,958	15,756	15,655
C200	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
AREA TOTAL		**98,049**	**151,158**	**193,800**	**259,532**	**328,482**	**400,608**	**470,890**
C300	Blue Water Estates	2,940	4,575	5,780	7,728	9,954	12,324	13,020
C300	Canyon Lake Village West	81,144	124,074	158,270	202,699	198,922	196,404	195,145
C300	Cedar Breaks Subdivision	294	366	510	644	790	936	1,085
C300	Deep Well Subdivision	882	1,281	1,700	2,254	2,212	2,184	2,170
C300	Double E Subdivision	294	366	340	322	316	312	310
C300	Five Oaks	3,234	4,941	6,290	8,372	9,164	9,048	8,990
C300	Hidden Valley Estates	294	366	510	644	790	936	1,085
C300	Highland Terrace	3,528	5,307	6,800	9,016	11,534	14,196	15,035
C300	Island View Office Addition	0	0	0	0	0	0	0
C300	Los Tres Amigos Estates	294	366	510	644	790	936	930
C300	Moorview Subdivision	0	0	0	0	0	0	0
C300	Mountain Oaks	1,029	1,647	2,040	2,737	3,476	4,368	5,270
C300	Shamrock Hills	735	1,098	1,360	1,610	1,580	1,560	1,550
C300	Shepherd Hill	294	366	340	322	316	312	310
C300	The Oaks	39,690	60,756	77,520	100,142	98,276	97,032	96,410
C300	Tripple Peak Ranch Estates	11,613	17,751	22,610	23,667	23,226	22,932	22,785
C300	Village Shores	10,143	15,555	19,890	26,565	26,386	26,052	25,885
C300	Unplatted Acreage	9,261	14,091	18,020	19,320	18,960	18,720	18,600
C300	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**174,048**	**267,180**	**346,460**	**456,918**	**492,486**	**533,208**	**579,855**
C400	Canyon Lake Forest	77,910	119,133	151,980	203,021	260,858	321,984	322,400
C400	Oak Hideaway Estates	2,058	3,111	3,740	3,542	3,476	3,432	3,410
C400	Shadyvale Subdivision	294	366	340	322	316	312	310
C400	St. Andrews by the Woodlands	882	1,281	1,700	1,771	1,738	1,716	1,705
C400	Stanley Square	147	183	170	161	158	156	155
C400	Startz Subdivision	0	0	0	0	0	0	0
C400	Sunburst Ranch	1,911	2,928	3,740	4,991	5,056	4,992	4,960
C400	Tills Terrace Subdivision	1,617	2,562	3,230	4,186	4,108	4,056	4,030
C400	Waterfront Park	31,017	47,397	51,510	48,783	47,874	47,268	46,965
C400	Woodlands	13,083	19,947	25,500	34,132	43,924	54,288	65,100
C400	Unplatted Acreage	7,791	11,895	15,130	16,261	15,958	15,756	15,655
C400	New Develolpment	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**145,089**	**223,077**	**281,010**	**367,402**	**469,260**	**578,916**	**635,965**
C500	Astro Hills	33,810	51,789	66,130	81,144	79,632	78,624	78,120
C500	Canyon Lake Hills	144,942	221,613	282,710	377,706	485,218	599,040	602,795

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
C500	Canyon Lake Hills 1	1,176	1,098	1,020	966	948	936	930
C500	Canyon Springs Resort	71,883	109,983	140,250	187,404	240,792	297,336	316,510
C500	Cranes Mill Landing	0	0	0	0	0	0	0
C500	Erin Glen	3,234	4,941	5,100	4,830	4,740	4,680	4,650
C500	Paradise Point	1,911	2,928	3,740	4,991	6,478	7,956	8,680
C500	Westhaven	26,019	39,711	50,660	60,858	59,724	58,968	58,590
C500	Unplatted Acreage	10,143	15,555	19,890	21,252	20,856	20,592	20,460
C500	New Development	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**301,497**	**461,892**	**593,470**	**789,383**	**984,182**	**1,193,088**	**1,262,010**
C600	Canyon Lake MH Estates	78,939	120,780	133,280	126,224	123,872	122,304	121,520
C600	Canyon Lake MH Estates North	21,315	32,574	41,480	43,470	42,660	42,120	41,850
C600	Deer Meadows	10,878	16,653	21,250	28,336	36,340	44,928	53,940
C600	Lakeview Park	46,599	71,187	90,780	87,262	85,636	84,552	84,010
C600	Linnea S. Peg Lots	294	366	340	322	316	312	310
C600	Rolling Hills	66,885	102,297	130,390	131,698	129,244	127,608	126,790
C600	Scenic Heights 1	16,758	25,620	32,640	43,631	56,090	69,264	83,080
C600	Tom Creek Acres	7,791	11,895	15,130	16,905	16,590	16,380	16,275
C600	Tom Creek Hills	294	366	340	322	316	312	310
C600	Unplatted Acreage	11,760	17,934	22,950	24,472	24,016	23,712	23,560
C600	New Development	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**269,892**	**413,946**	**512,550**	**552,874**	**600,874**	**656,448**	**722,920**
C700	Abbott-Barnett Subdivision	294	366	340	322	316	312	310
C700	Ancient Oaks	0	0	0	0	0	0	0
C700	Bremer Ranch	294	366	340	322	316	312	310
C700	Denham Estates	294	366	340	322	316	312	310
C700	Fox Hill	1,176	1,830	2,380	3,220	3,792	3,744	3,720
C700	Monier Ranch	3,675	5,673	6,800	6,440	6,320	6,240	6,200
C700	Park Ranch	294	366	340	322	316	312	310
C700	Smith Ranch	1,911	2,928	3,060	2,898	2,844	2,808	2,790
C700	Wiesner Ranch	2,058	3,111	3,910	4,830	4,740	4,680	4,650
C700	Unplatted Acreage	35,721	54,717	69,700	74,382	72,996	72,072	71,610
C700	New Development	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA TOTAL		**54,096**	**83,997**	**111,180**	**143,290**	**177,750**	**215,748**	**261,485**
AREA C TOTAL		***1,119,258***	***1,718,919***	***2,190,790***	***2,778,055***	***3,316,104***	***3,883,776***	***4,289,935***

Table A3 - Water Use Projections

Area No.	Subdivision Name	Water Use Projections (gal/day) Year/Per Capita Consumption 1996 147	2000 183	2010 170	2020 161	2030 158	2040 156	2050 155
D110	Buzzard's Rest Ranch	294	366	340	322	316	312	310
D110	Inland Estates	9,408	14,457	18,360	23,023	22,594	22,308	22,165
D110	L D 3 Ranch	294	366	340	322	316	312	310
D110	Naked Indian Reservation	12,054	18,483	19,720	18,676	18,328	18,096	17,980
D110	Oliver Estates	294	366	340	322	316	312	310
D110	Unplatted Acreage	26,754	40,992	52,360	55,867	54,826	54,132	53,785
D110	New Development	8,379	14,274	23,970	50,232	85,794	124,956	171,275
AREA D TOTAL		***57,477***	***89,304***	***115,430***	***148,764***	***182,490***	***220,428***	***266,135***
	STUDY AREA TOTAL	**3,258,843**	**4,984,737**	**6,357,660**	**8,504,503**	**10,941,184**	**13,518,336**	**16,221,215**
NORTH SIDE		**785,421**	**1,202,127**	**1,567,910**	**2,154,341**	**2,824,724**	**3,478,176**	**4,163,455**
SOUTH SIDE		**1,584,954**	**2,424,201**	**3,085,160**	**4,005,358**	**4,954,248**	**5,969,340**	**6,903,855**
SOUTHWEST SIDE		**888,468**	**1,358,409**	**1,704,590**	**2,344,804**	**3,162,212**	**4,070,820**	**5,153,905**
		3,258,843	**4,984,737**	**6,357,660**	**8,504,503**	**10,941,184**	**13,518,336**	**16,221,215**

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
A110	Honey Creek Ranches Subdivision	0	1,691	1,684	1,564	1,481	1,454	1,435	1,426
A110	Oak Springs Subdivision	0	12,172	15,994	14,858	14,071	13,809	13,634	13,547
A110	Unplatted Acreage	0	47,672	72,816	93,058	99,611	97,755	96,517	95,899
A110	New Development	0	44,967	76,604	128,248	269,578	460,064	670,238	919,414
SUBTOTALS		**0**	**106,502**	**167,097**	**237,728**	**384,742**	**573,082**	**781,825**	**1,030,285**
A120	Bartels Acres	0	1,014	1,684	1,564	1,481	1,454	1,435	1,426
A120	Knibbe Subdivision	0	1,014	842	782	741	727	718	713
A120	Comal Ranch Subdivision	0	4,395	4,209	3,910	3,703	3,634	3,588	3,565
A120	Unplatted Acreage	0	28,400	43,353	55,131	58,878	57,781	57,049	56,684
A120	New Development	0	44,967	76,604	128,248	269,578	460,064	670,238	919,414
SUBTOTALS		**0**	**79,792**	**126,691**	**189,635**	**334,381**	**523,659**	**733,028**	**981,801**
A130	Cypress Springs on the Guadalupe	0	55,448	84,601	107,916	144,047	184,971	228,197	273,792
A130	Guadalupe River Estates (Riverwood Estates)	115,560	0	0	0	0	0	0	0
A130	Rivermont	0	26,710	40,827	52,003	69,616	89,396	110,510	132,618
A130	Spring Branch Estates 1	0	32,796	50,087	63,733	60,729	59,598	58,843	58,466
A130	Unplatted Acreage	0	17,243	26,517	33,626	35,919	35,250	34,804	34,581
A130	New Development	0	44,967	76,604	128,248	269,578	460,064	670,238	919,414
SUBTOTALS		**115,560**	**177,164**	**278,636**	**385,626**	**579,890**	**829,279**	**1,102,592**	**1,418,870**
A140	Ahern Creek Ranches	0	4,395	4,209	3,910	3,703	3,634	3,588	3,565
A140	Benke Oaks	0	1,014	842	782	741	727	718	713
A140	Diamond D Subdivision	0	1,014	842	782	741	727	718	713
A140	Dillard Subdivision	0	1,691	1,684	1,564	1,481	1,454	1,435	1,426
A140	Elm Ridge Estates	0	13,862	18,941	17,595	16,664	16,353	16,146	16,043
A140	Flying "R" Ranch	0	15,553	22,308	20,723	19,626	19,260	19,016	18,895
A140	Lange Ranch Subdivision	0	1,014	1,684	1,955	2,592	2,907	2,870	2,852
A140	Little Creek	0	3,381	3,367	3,128	2,962	2,907	2,870	2,852
A140	Oakland Estates	0	71,001	104,383	96,968	91,834	90,123	88,982	88,412
A140	Singer Ranch	0	338	421	391	370	363	359	357
A140	Spring Branch Acres	0	37,191	56,822	68,816	65,173	63,958	63,149	62,744
A140	The Woods at Spring Branch	0	19,948	30,305	31,671	29,994	29,435	29,063	28,877
A140	Unplatted Acreage	0	23,329	35,777	45,747	48,880	47,969	47,362	47,058
A140	New Development	0	44,967	76,604	128,248	269,578	460,064	670,238	919,414
SUBTOTALS		**0**	**238,699**	**358,186**	**422,280**	**554,339**	**739,882**	**946,514**	**1,193,919**
A150	Creekwood Ranches	0	60,520	92,598	118,082	157,748	171,161	168,995	167,912
A150	Gutierrez Ranch	0	0	0	0	0	0	0	0
A150	Ridgeview Oaks East	14,400	2,167	10,854	13,361	11,891	11,401	11,075	10,912
A150	Ridgeview Oaks West	0	65,591	83,759	77,809	73,690	72,317	71,401	70,944
A150	Sun Valley Village	0	72,353	95,123	88,366	83,688	82,128	81,089	80,569
A150	Whispering Hills	21,600	41,625	75,207	101,956	143,554	190,626	240,324	292,477
A150	Unplatted Acreage	9,360	25,126	43,253	57,892	62,478	61,140	60,247	59,801
A150	New Development	0	44,967	76,604	128,248	269,578	460,064	670,238	919,414
SUBTOTALS		**45,360**	**312,350**	**477,398**	**585,714**	**802,627**	**1,048,837**	**1,303,369**	**1,602,027**

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
AREA TOTAL		**160,920**	**914,506**	**1,408,008**	**1,820,883**	**2,655,979**	**3,714,740**	**4,867,330**	**6,226,901**
			0	0	0	0	0	0	0
A210	Crouse Subdivision	0	1,691	1,684	1,564	1,481	1,454	1,435	1,426
A210	Dresden Wood 1	0	14,876	22,729	25,415	24,070	23,621	23,322	23,173
A210	North Barcroft Estates	0	4,395	6,734	8,602	10,368	10,175	10,046	9,982
A210	Sage Oaks	0	18,257	27,779	35,581	41,844	41,064	40,544	40,285
A210	Silver Hills	0	77,087	117,852	150,144	157,007	154,082	152,131	151,156
A210	Unplatted Acreage	0	31,105	47,562	60,605	64,803	63,595	62,790	62,388
A210	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**0**	**184,941**	**287,896**	**389,045**	**524,345**	**677,378**	**848,921**	**1,054,527**
A220	Brand Ranch	0	9,467	14,311	16,422	15,553	15,263	15,070	14,973
A220	Indian Creek Ridge	0	6,086	9,260	11,730	14,812	14,536	14,352	14,260
A220	Jahnsen Ranch 1	0	1,014	842	782	741	727	718	713
A220	Oak Cliff Acres	0	58,829	90,073	108,307	102,573	100,662	99,388	98,751
A220	Persimmon Hill Sub	0	20,624	31,568	40,273	48,509	47,605	47,003	46,702
A220	Shepherds Ranch	0	12,172	18,520	23,460	31,476	40,337	49,873	59,892
A220	Wehe Estates	0	2,705	4,209	3,910	3,703	3,634	3,588	3,565
A220	Unplatted Acreage	0	27,724	42,511	54,349	58,137	57,054	56,332	55,971
A220	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**0**	**176,150**	**274,848**	**366,367**	**500,275**	**663,205**	**844,974**	**1,060,944**
A230	Bulverde Estates 1	103,680	15,669	78,991	129,356	168,861	163,782	160,397	158,704
A230	Bulverde Hills 3	0	44,291	67,765	69,207	65,543	64,322	63,508	63,101
A230	Bulverde Oaks 1	0	12,848	19,782	25,415	32,957	32,343	31,933	31,729
A230	Bulverde Ranchettes	0	1,691	2,525	3,128	4,073	5,088	6,458	7,843
A230	Cox Subdivision	0	338	421	391	370	363	359	357
A230	Elm Valley	0	31,105	47,562	60,605	57,767	56,690	55,973	55,614
A230	Hogan 281 Subdivision	0	1,691	1,684	1,564	1,481	1,454	1,435	1,426
A230	Licata Ranch	0	1,691	2,525	3,128	3,703	3,634	3,588	3,565
A230	Lundgren Subdivision	0	1,014	842	782	741	727	718	713
A230	Palmer Heights	0	4,395	6,734	7,038	6,665	6,541	6,458	6,417
A230	Spring Oak Estates	0	110,559	169,202	215,832	210,330	206,411	203,798	202,492
A230	The Highlands	0	9,467	14,311	18,377	24,440	31,252	30,857	30,659
A230	Travel Mart Subdivision	0	338	421	391	370	363	359	357
A230	Unplatted Acreage	0	26,710	40,827	52,003	55,545	54,510	53,820	53,475
A230	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**103,680**	**299,335**	**517,148**	**694,351**	**857,619**	**1,010,868**	**1,178,312**	**1,382,669**
A240	Ammann Oaks Sub	0	33,810	51,350	47,702	45,177	44,335	43,774	43,493
A240	Hidden Oaks	0	32,120	49,245	62,951	59,989	58,871	58,126	57,753
A240	Klar Ranch	0	1,014	842	782	741	727	718	713
A240	Saur Subdivision	0	1,014	1,684	1,955	2,222	2,180	2,153	2,139
A240	Unplatted Acreage	0	26,034	39,986	50,830	54,064	53,056	52,385	52,049
A240	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**0**	**131,521**	**206,662**	**271,354**	**386,964**	**542,556**	**715,806**	**922,266**

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
A250	Bulverde Gardens	0	4,395	4,209	3,910	3,703	3,634	3,588	3,565
A250	Bulverde Ranches	0	18,596	25,254	23,460	22,218	21,804	21,528	21,390
A250	Canyon View Acres	0	135,916	172,569	160,310	151,823	148,994	147,108	146,165
A250	Lindsey Acres	0	1,014	842	782	741	727	718	713
A250	Unplatted Acreage	0	18,934	29,042	37,145	39,622	38,884	38,392	38,146
A250	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**0**	**216,384**	**295,472**	**332,741**	**442,879**	**597,430**	**769,985**	**976,097**
A260	Cibolo One Subdivision	0	1,014	842	782	741	727	718	713
A260	Cibolo Two Subdivision	0	1,014	842	782	741	727	718	713
A260	Unplatted Acreage	0	6,762	10,523	13,294	14,071	13,809	13,634	13,547
A260	New Development	0	37,529	63,556	107,134	224,772	383,387	558,652	766,119
SUBTOTALS		**0**	**46,320**	**75,762**	**121,992**	**240,325**	**398,650**	**573,721**	**781,092**
AREA TOTAL		**103,680**	**1,054,651**	**1,657,787**	**2,175,850**	**2,952,406**	**3,890,086**	**4,931,719**	**6,177,494**
A310	Charles Cantu Subdivision	0	1,014	842	782	741	727	718	713
A310	Herbert M Gruen	0	1,014	842	782	741	727	718	713
A310	John Hall Subdivision	0	1,014	842	782	741	727	718	713
A310	Stoney Cliff	0	1,014	842	782	741	727	718	713
A310	Stoney Ridge	0	14,876	22,729	28,543	27,032	26,528	26,192	26,025
A310	Unplatted Acreage	0	19,948	30,305	38,709	41,474	40,701	40,186	39,928
A310	New Development	0	112,587	191,089	321,011	674,316	1,150,161	1,675,596	2,298,356
SUBTOTALS		**0**	**151,469**	**247,489**	**391,391**	**745,784**	**1,220,297**	**1,744,844**	**2,367,160**
A320	Beam Subdivision	0	5,072	7,576	8,602	8,147	7,995	7,894	7,843
A320	Beck Ranch	0	19,948	30,305	38,709	49,250	48,332	47,720	47,415
A320	Cross Roads Estates Phase 1	0	676	842	1,173	1,481	1,817	2,153	2,496
A320	Forrest Wilson Subdivision	0	1,014	842	782	741	727	718	713
A320	Kappelman Subdivision	0	1,014	842	782	741	727	718	713
A320	McGuffin Subdivision	0	0	0	0	0	0	0	0
A320	Misty Hills	0	18,257	27,779	30,889	29,254	28,709	28,345	28,164
A320	Oak Village North	305,280	137,293	356,796	309,763	277,202	266,348	259,112	255,495
A320	Skyridge Subdivision	0	11,157	17,257	21,896	29,254	37,430	46,285	51,693
A320	Smokey Mountain Ranch	0	5,072	7,576	9,775	11,109	10,902	10,764	10,695
A320	Stoney Creek	0	41,586	63,556	80,937	80,725	79,221	78,218	77,717
A320	Twin Creek Subdivision	0	32,120	41,248	38,318	36,289	35,613	35,162	34,937
A320	Wilson Subdivision	0	1,014	842	782	741	727	718	713
A320	Unplatted Acreage	0	41,586	63,556	80,937	86,650	85,036	83,959	83,421
A320	New Development	0	112,587	191,089	321,011	674,316	1,150,161	1,675,596	2,298,356
SUBTOTALS		**305,280**	**428,397**	**810,105**	**944,356**	**1,285,899**	**1,753,744**	**2,277,362**	**2,900,368**
AREA TOTAL		**305,280**	**579,866**	**1,057,594**	**1,335,747**	**2,031,683**	**2,974,042**	**4,022,207**	**5,267,528**
AREA A TOTAL		***569,880***	***2,549,022***	***4,123,388***	***5,332,480***	***7,640,068***	***10,578,867***	***13,821,256***	***17,671,923***

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
B110	Buck Horn Ranch	0	1,014	842	782	741	727	718	713
B110	Heritage Oaks	0	1,014	842	782	741	727	718	713
B110	Unplatted Acreage	0	6,424	9,681	12,512	13,331	13,082	12,917	12,834
B110	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**0**	**14,876**	**22,308**	**32,453**	**53,323**	**80,311**	**110,152**	**145,452**
B120	Cadillac Canyon	0	23,329	35,777	45,747	55,915	54,873	54,179	53,832
B120	Canyon Creek Estates	0	8,114	12,206	15,640	20,737	26,528	32,651	39,215
B120	Canyon Dam Hillsite	0	3,381	5,051	6,256	8,517	10,175	10,046	9,982
B120	Canyon Dam Sub 1	0	4,733	7,155	8,993	11,850	13,446	13,276	13,191
B120	Canyon Valley Estates 1	0	3,381	4,209	3,910	3,703	3,634	3,588	3,565
B120	Clear Water Estates	432,000	0	0	0	0	0	0	0
B120	Cougar Ridge	0	3,381	5,051	6,256	8,517	8,722	8,611	8,556
B120	Deep Acres Estates 2	0	11,495	17,678	22,678	30,365	38,884	40,903	40,641
B120	Devils Backbone Heights	70,200	0	0	0	0	0	0	0
B120	Eagles Peak Ranch	0	7,438	11,364	14,467	19,256	24,711	30,498	36,720
B120	Emerald Valley Subdivision	0	15,891	24,412	31,280	41,844	53,783	66,378	79,500
B120	Fralick Subdivision	0	676	842	782	741	727	718	713
B120	Glen Roy	0	676	842	1,173	1,481	1,817	2,153	2,496
B120	Hillcrest Estates	0	10,143	15,573	19,941	26,662	34,160	42,338	50,623
B120	Horseshoe Falls Subdivision	142,560	0	0	0	0	0	0	0
B120	Maricopa Ranch	0	15,215	23,150	29,716	37,030	36,340	35,880	35,650
B120	North Lake Estates	36,720	0	0	0	0	0	0	0
B120	North Ridge Estates	0	39,558	46,299	43,010	40,733	39,974	39,468	39,215
B120	Pfeil Estates	0	9,467	14,311	18,377	22,959	22,531	22,246	22,103
B120	River's Edge	0	15,891	24,412	31,280	41,844	41,428	40,903	40,641
B120	Riverside Estates	0	676	842	1,173	1,111	1,090	1,076	1,070
B120	Spring Mountain	0	9,805	15,152	19,159	25,551	32,706	40,544	45,276
B120	Unplatted Acreage	0	14,200	21,887	27,761	29,624	29,072	28,704	28,520
B120	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**681,480**	**203,874**	**297,155**	**365,976**	**466,948**	**540,376**	**609,960**	**682,698**
B130	Eden Ranch		84,187	128,795	164,220	219,218	280,181	276,635	274,862
B130	Espinazo Del Diablo		13,862	21,045	26,979	28,513	27,982	27,628	27,451
B130	Meyers Mountain		1,014	1,684	1,955	2,592	3,271	3,947	4,635
B130	Pleasant View Estates		2,705	4,209	3,910	3,703	3,634	3,588	3,565
B130	Scenic River Properties		9,805	15,152	16,813	15,923	15,626	15,428	15,330
B130	The Summitt	118,800	0	0	0	0	0	0	0
B130	Unplatted Acreage	43,200	0	0	0	0	0	0	0
B130	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**162,000**	**117,997**	**181,829**	**232,254**	**308,460**	**396,469**	**423,025**	**457,033**
AREA TOTAL		**843,480**	**336,748**	**501,292**	**630,683**	**828,731**	**1,017,157**	**1,143,137**	**1,285,183**
B200	Arroyo Bravo	18,000	0	0	0	0	0	0	0
B200	Bold Creek		4,733	7,155	8,993	11,850	15,263	17,581	17,469

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
B200	Canyon Lake Point Resort		338	421	391	370	363	359	357
B200	Canyon Lake Yacht Club		0	0	0	0	0	0	0
B200	Canyon Park Estates		7,438	11,364	14,467	19,256	24,711	30,498	36,720
B200	Crystal Heights	81,000	0	0	0	0	0	0	0
B200	Deer Run		676	842	782	741	727	718	713
B200	Hill Country Resort	115,200	0	0	0	0	0	0	0
B200	Jonas Subdivision	0	676	842	782	741	727	718	713
B200	Marty's Mountain		4,057	6,314	5,865	5,555	5,451	5,382	5,348
B200	Mt. Lookout		2,705	2,525	2,346	2,222	2,180	2,153	2,139
B200	Quail Crossing		676	842	1,173	1,111	1,090	1,076	1,070
B200	Simon Tracts		8,453	13,048	16,813	22,588	27,618	27,269	27,094
B200	Sunnyside Terrace		2,705	4,209	5,474	7,406	9,448	11,840	14,260
B200	Sunset Terrace	39,600	0	0	0	0	0	0	0
B200	The Heights		676	842	1,173	1,111	1,090	1,076	1,070
B200	Valhalla-Simon-Riner Subdivision		676	842	782	741	727	718	713
B200	Windjammer Resort		0	0	0	0	0	0	0
B200	Canyon Lake Acres		53,082	81,234	103,615	138,492	178,066	219,944	263,810
B200	Unplatted Acreage	105,120	0	0	0	0	0	0	0
B200	New Development		19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**358,920**	**106,163**	**163,309**	**217,787**	**327,716**	**464,789**	**606,731**	**765,406**
B300	Charles Moore Subdivision	0	676	842	782	741	727	718	713
B300	Hancock Canyon	27,000	0	0	0	1,143	8,977	17,491	17,919
B300	Hancock Oak Hills	14,400	9,605	22,218	32,129	47,810	65,548	69,200	68,665
B300	Lakeside Development	0	4,057	6,314	8,211	11,109	14,173	17,581	21,034
B300	Royal Summit	0	1,691	2,525	3,128	4,073	5,088	5,741	5,704
B300	Scenic Terrace	81,000	0	0	0	0	0	0	0
B300	Tamarack Shores	120,960	0	41,087	85,879	155,284	234,082	285,202	282,598
B300	The Point at Rancho del lago	108,000	0	0	0	0	0	0	0
B300	Linda Ledges (U.R.)	0	13,186	20,203	25,806	34,438	39,611	39,109	38,859
B300	Rancho Del Lago	0	17,581	26,938	34,408	45,917	58,871	72,836	87,343
B300	Unplatted Acreage	0	11,495	17,678	22,678	24,440	23,984	23,681	23,529
B300	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**351,360**	**58,292**	**137,804**	**213,021**	**324,955**	**451,059**	**531,559**	**546,362**
B400	Big Walnut Springs (UR)	0	676	842	782	741	727	718	713
B400	Canyon Lake Estates	0	9,805	15,152	19,159	25,551	32,706	40,544	48,484
B400	Canyon Lake Island	81,000	0	0	0	0	0	1,165	17,394
B400	Canyon Lake Shores	189,000	0	0	0	42,438	108,261	178,052	251,278
B400	Canyon Lake Shores (UR)	0	1,691	2,525	3,128	4,073	5,088	6,458	7,843
B400	Glenmare	0	6,762	10,523	13,294	17,774	22,894	28,345	32,798
B400	Hilltop Mobile Home Subdivision	0	676	842	782	741	727	718	713
B400	Kings Point	0	5,748	8,839	11,339	15,182	19,624	24,398	29,233

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
B400	Lakewood Hills	0	6,424	9,681	12,512	16,664	21,441	26,551	31,729
B400	Lazy Diamond Ranchettes	0	10,143	15,573	19,941	26,662	33,433	33,010	32,798
B400	Potters Creek Park Acres	0	1,014	1,684	1,955	2,592	3,271	3,588	3,565
B400	Tanglewood Shores	37,800	0	18,180	33,753	57,737	85,029	113,972	144,372
B400	The Cedars	0	676	842	1,173	1,481	1,817	2,153	2,496
B400	Tranquility Park	0	4,057	6,314	8,211	11,109	14,173	17,581	21,034
B400	Unplatted Acreage	0	12,510	18,941	24,242	25,921	25,438	25,116	24,955
B400	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**307,800**	**79,454**	**142,766**	**205,402**	**364,199**	**571,953**	**789,769**	**1,043,335**
B510	Canyon Oaks Estates	0	15,891	24,412	31,280	34,808	34,160	33,727	33,511
B510	Deer River	91,800	0	0	476	31,510	66,642	103,746	104,275
B510	Lake of the Hills	28,080	0	0	0	5,988	15,528	25,740	36,447
B510	Unplatted Acreage	0	9,129	13,890	17,595	18,515	18,170	17,940	17,825
B510	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**119,880**	**31,443**	**49,245**	**67,728**	**129,332**	**200,275**	**276,953**	**323,250**
B520	Fischer Thirty Two Subdivision	0	1,014	1,684	1,955	2,592	3,271	3,588	3,565
B520	Lakewood Estates	0	1,691	2,525	3,128	4,073	5,088	6,458	7,843
B520	Rocky Creek Ranch	0	5,748	8,839	11,339	15,182	19,624	24,398	29,233
B520	Valley Ranch	0	676	842	782	741	727	718	713
B520	Whispering Oaks	0	5,410	8,418	10,557	11,479	11,265	11,123	11,052
B520	Unplatted Acreage	0	26,372	40,406	51,612	55,175	54,147	53,461	53,119
B520	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**0**	**47,334**	**73,658**	**97,750**	**127,754**	**159,896**	**195,546**	**236,716**
B530	Estates At Carpers Creek	0	1,691	2,525	3,128	4,073	5,088	6,458	7,843
B530	Fischer Ranches	0	5,072	7,576	9,775	10,368	10,175	10,046	9,982
B530	Forest View North	0	22,991	35,356	44,965	47,398	46,515	45,926	45,632
B530	Honeysuckle Rose	0	676	842	1,173	1,481	1,817	2,153	2,496
B530	Meister Heirs Estates	0	0	0	0	0	0	0	0
B530	Ranch Louise	0	2,367	2,525	2,346	2,222	2,180	2,153	2,139
B530	Stallion Springs	14,400	0	5,803	11,406	20,038	29,935	40,496	51,553
B530	Unplatted Acreage	0	22,315	34,093	43,401	46,658	45,788	45,209	44,919
B530	New Development	0	6,424	10,943	18,377	38,511	65,775	95,800	131,192
SUBTOTALS		**14,400**	**61,534**	**99,664**	**134,571**	**170,750**	**207,274**	**248,242**	**295,755**
AREA TOTAL		**134,280**	**140,312**	**222,567**	**300,049**	**427,835**	**567,445**	**720,740**	**855,721**
B600	Almy Addition	0	676	842	1,173	1,481	1,817	2,153	2,139
B600	Clear Creek Addition	0	1,691	2,525	3,128	4,073	5,088	5,023	4,991
B600	Cypress Cove	201,600	0	0	0	52,426	124,733	201,332	281,814
B600	Hideaway Subdivision	0	8,114	12,206	15,249	14,442	14,173	13,993	13,904
B600	Rebecca Crossing	0	4,057	5,893	5,474	5,184	5,088	5,023	4,991
B600	Unplatted Acreage	0	14,200	21,887	27,761	29,624	29,072	28,704	28,520
B600	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
AREA TOTAL		**201,600**	**48,010**	**76,183**	**107,916**	**222,764**	**377,296**	**543,628**	**730,291**
B700	Acorn Acres	0	676	842	782	741	727	718	713
B700	Charlie's 306	0	338	421	391	370	363	359	357
B700	Cherry Creek Subdivision	0	3,381	5,051	6,256	8,517	10,902	12,917	12,834
B700	Comal Hills Subdivision	26,640	23,737	50,385	71,501	104,446	141,614	181,105	222,554
B700	Coyote Ridge	0	0	0	0	0	0	0	0
B700	Cypress Lake Gardens	0	93,654	143,106	182,597	244,028	313,614	387,145	464,163
B700	Cypress Lake Gardens Big Sky Ranchettes	0	2,705	2,525	2,346	2,222	2,180	2,153	2,139
B700	Fernandez Subdivision	0	676	842	782	741	727	718	713
B700	Finkel Subdivision	0	0	0	0	0	0	0	0
B700	Forest Lake Estates	0	676	842	782	741	727	718	713
B700	Harley Acres	0	0	0	0	0	0	0	0
B700	Henke Subdivision	0	676	842	782	741	727	718	713
B700	Indian Hills Estates	0	82,158	125,849	153,663	145,528	142,816	141,008	140,105
B700	Lake Gardens	0	676	842	782	741	727	718	713
B700	Rebecca Creek Estates	0	0	0	0	0	0	0	0
B700	Rebecca Creek Park Subdivision	131,040	0	0	0	0	24,132	60,559	98,903
B700	The Springs at Rebecca Creek	0	19,610	29,884	37,927	50,731	65,049	80,371	96,255
B700	Unplatted Acreage	0	18,934	29,042	37,145	39,622	38,884	38,392	38,146
B700	New Develolpment	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**157,680**	**267,169**	**423,302**	**550,867**	**714,701**	**940,515**	**1,194,996**	**1,472,951**
AREA B TOTAL		***2,355,120***	***1,036,147***	***1,667,223***	***2,225,725***	***3,210,900***	***4,390,214***	***5,530,560***	***6,699,248***
C100	Austin B. Sheridan Properties	0	676	842	782	741	727	718	713
C100	Christensen Scenic River	0	16,567	23,150	21,505	20,367	19,987	19,734	19,608
C100	J D J Ranch	0	13,186	20,203	25,806	30,735	30,162	29,780	29,590
C100	Sattler Business Lots	0	3,719	5,893	7,429	9,998	11,992	11,840	11,765
C100	Sattler Estates Subdivision	0	24,343	37,039	47,311	63,321	62,505	61,714	61,318
C100	Sattler Village Subdivision	0	48,686	74,499	95,013	127,013	159,533	157,513	156,504
C100	The Little Ponderosa	0	15,891	24,412	31,280	41,844	53,783	66,378	79,500
C100	Unplatted Acreage	0	33,810	51,771	66,079	70,357	69,046	68,172	67,735
C100	New Develolpment	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**0**	**176,150**	**270,639**	**350,336**	**479,909**	**605,061**	**703,248**	**820,663**
C200	Arrowhead Village	43,200	0	0	0	0	0	0	0
C200	Bradcliff on the River	0	0	0	0	0	0	0	0
C200	Canyon Corner	0	18,596	28,621	36,363	48,509	47,969	47,362	47,058
C200	Canyon Lake Village	162,000	0	0	15,123	74,622	142,166	213,664	263,305
C200	John B. Browns Peak	0	0	0	0	0	0	0	0
C200	Kuntry Korner Estates	0	2,367	3,788	4,692	4,444	4,361	4,306	4,278

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
C200	Lake View Heights	0	22,315	34,093	33,235	31,476	30,889	30,498	30,303
C200	Miles Parker Estates	0	676	842	1,173	1,111	1,090	1,076	1,070
C200	Netherhill Place	0	0	0	0	0	0	0	0
C200	River Point Estates	0	23,667	36,197	46,138	47,398	46,515	45,926	45,632
C200	River Valley Estates	0	3,043	4,630	5,865	6,665	6,541	6,458	6,417
C200	Sattler Ridge Estates	0	676	842	782	741	727	718	713
C200	Skyline Acres	0	16,905	25,675	32,844	43,695	49,422	48,797	48,484
C200	Valley View	0	1,691	2,525	3,128	4,073	5,088	6,458	7,130
C200	Unplatted Acreage	0	17,919	27,359	34,799	37,400	36,703	36,239	36,007
C200	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**205,200**	**127,126**	**197,402**	**269,273**	**415,668**	**568,797**	**728,900**	**884,328**
C300	Blue Water Estates	0	6,762	10,523	13,294	17,774	22,894	28,345	29,946
C300	Canyon Lake Village West	306,000	0	0	58,021	160,208	151,521	145,729	142,834
C300	Cedar Breaks Subdivision	0	676	842	1,173	1,481	1,817	2,153	2,496
C300	Deep Well Subdivision	0	2,029	2,946	3,910	5,184	5,088	5,023	4,991
C300	Double E Subdivision	0	676	842	782	741	727	718	713
C300	Five Oaks	0	7,438	11,364	14,467	19,256	21,077	20,810	20,677
C300	Hidden Valley Estates	0	676	842	1,173	1,481	1,817	2,153	2,496
C300	Highland Terrace	0	8,114	12,206	15,640	20,737	26,528	32,651	34,581
C300	Island View Office Addition	0	0	0	0	0	0	0	0
C300	Los Tres Amigos Estates	0	676	842	1,173	1,481	1,817	2,153	2,139
C300	Moorview Subdivision	0	0	0	0	0	0	0	0
C300	Mountain Oaks	0	2,367	3,788	4,692	6,295	7,995	10,046	12,121
C300	Shamrock Hills	0	1,691	2,525	3,128	3,703	3,634	3,588	3,565
C300	Shepherd Hill	0	676	842	782	741	727	718	713
C300	The Oaks	126,360	0	13,379	51,936	103,967	99,675	96,814	95,383
C300	Tripple Peak Ranch Estates	43,200	0	0	8,803	11,234	10,220	9,544	9,205
C300	Village Shores	216,000	0	0	0	0	0	0	0
C300	Unplatted Acreage	0	21,300	32,409	41,446	44,436	43,608	43,056	42,780
C300	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**691,560**	**72,353**	**126,180**	**275,551**	**514,252**	**596,470**	**690,899**	**798,571**
C400	Canyon Lake Forest	237,600	0	36,406	111,954	229,348	362,373	502,963	503,920
C400	Oak Hideaway Estates	0	4,733	7,155	8,602	8,147	7,995	7,894	7,843
C400	Shadyvale Subdivision	0	676	842	782	741	727	718	713
C400	St. Andrews by the Woodlands	0	2,029	2,946	3,910	4,073	3,997	3,947	3,922
C400	Stanley Square	0	338	421	391	370	363	359	357
C400	Startz Subdivision	0	0	0	0	0	0	0	0
C400	Sunburst Ranch	0	4,395	6,734	8,602	11,479	11,629	11,482	11,408
C400	Tills Terrace Subdivision	0	3,719	5,893	7,429	9,628	9,448	9,329	9,269
C400	Waterfront Park	97,200	0	11,813	21,273	15,001	12,910	11,516	10,820
C400	Woodlands	162,000	0	0	0	0	0	0	0

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
C400	Unplatted Acreage	0	17,919	27,359	34,799	37,400	36,703	36,239	36,007
C400	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**496,800**	**53,082**	**132,399**	**252,873**	**431,721**	**643,473**	**871,844**	**978,190**
C500	Astro Hills	270,000	0	0	0	0	0	0	0
C500	Canyon Lake Hills	151,200	182,167	358,510	499,033	717,524	964,801	1,226,592	1,235,229
C500	Canyon Lake Hills 1	104,400	0	0	0	0	0	0	0
C500	Canyon Springs Resort	324,000	0	0	0	107,029	229,822	359,873	403,973
C500	Cranes Mill Landing	15,840	0	0	0	0	0	0	0
C500	Erin Glen	0	7,438	11,364	11,730	11,109	10,902	10,764	10,695
C500	Paradise Point	0	4,395	6,734	8,602	11,479	14,899	18,299	19,964
C500	Westhaven	216,000	0	0	0	0	0	0	0
C500	Unplatted Acreage	0	23,329	35,777	45,747	48,880	47,969	47,362	47,058
C500	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**1,081,440**	**236,601**	**445,215**	**620,243**	**1,011,555**	**1,465,719**	**1,950,288**	**2,110,851**
C600	Canyon Lake MH Estates	212,400	0	65,394	94,144	77,915	72,506	68,899	67,096
C600	Canyon Lake MH Estates North	0	49,025	74,920	95,404	99,981	98,118	96,876	96,255
C600	Deer Meadows	0	25,019	38,302	48,875	65,173	83,582	103,334	124,062
C600	Lakeview Park	162,000	0	1,730	46,794	38,703	34,963	32,470	31,223
C600	Linnea S. Peg Lots	0	676	842	782	741	727	718	713
C600	Rolling Hills	226,800	0	8,483	73,097	76,105	70,461	66,698	64,817
C600	Scenic Heights 1	0	38,543	58,926	75,072	100,351	129,007	159,307	191,084
C600	Tom Creek Acres	0	17,919	27,359	34,799	38,882	38,157	37,674	37,433
C600	Tom Creek Hills	0	676	842	782	741	727	718	713
C600	Unplatted Acreage	0	27,048	41,248	52,785	56,286	55,237	54,538	54,188
C600	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**601,200**	**178,179**	**350,876**	**577,665**	**670,410**	**780,810**	**908,630**	**1,061,516**
C700	Abbott-Barnett Subdivision	0	676	842	782	741	727	718	713
C700	Ancient Oaks	0	0	0	0	0	0	0	0
C700	Bremer Ranch	0	676	842	782	741	727	718	713
C700	Denham Estates	0	676	842	782	741	727	718	713
C700	Fox Hill	0	2,705	4,209	5,474	7,406	8,722	8,611	8,556
C700	Monier Ranch	0	8,453	13,048	15,640	14,812	14,536	14,352	14,260
C700	Park Ranch	0	676	842	782	741	727	718	713
C700	Smith Ranch	0	4,395	6,734	7,038	6,665	6,541	6,458	6,417
C700	Wiesner Ranch	0	4,733	7,155	8,993	11,109	10,902	10,764	10,695
C700	Unplatted Acreage	0	82,158	125,849	160,310	171,079	167,891	165,766	164,703
C700	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA TOTAL		**0**	**124,421**	**193,193**	**255,714**	**329,567**	**408,825**	**496,220**	**601,416**
AREA C TOTAL		***3,076,200***	***967,911***	***1,715,904***	***2,601,655***	***3,853,081***	***5,069,156***	***6,350,030***	***7,255,534***

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

THC #201-10.11

Table A4 - Future Water Supply Requirements

Area No.	Subdivision Name	Current Well Capacity*	Net Supply Requirements (gal/day) Maximum Day Flowrate, Based on 2.3 x Average Day 1996	2000	2010	2020	2030	2040	2050
D110	Buzzard's Rest Ranch	0	676	842	782	741	727	718	713
D110	Inland Estates	0	21,638	33,251	42,228	52,953	51,966	51,308	50,980
D110	L D 3 Ranch	0	676	842	782	741	727	718	713
D110	Naked Indian Reservation	0	27,724	42,511	45,356	42,955	42,154	41,621	41,354
D110	Oliver Estates	0	676	842	782	741	727	718	713
D110	Unplatted Acreage	0	61,534	94,282	120,428	128,494	126,100	124,504	123,706
D110	New Development	0	19,272	32,830	55,131	115,534	197,326	287,399	393,933
AREA D TOTAL		***0***	***132,197***	***205,399***	***265,489***	***342,157***	***419,727***	***506,984***	***612,111***
	STUDY AREA TOTAL	**6,001,200**	**4,685,277**	**7,711,915**	**10,425,349**	**15,046,207**	**20,457,964**	**26,208,830**	**32,238,814**
NORTH SIDE		**2,355,120**	**1,115,938**	**1,793,914**	**2,415,360**	**3,545,281**	**4,913,873**	**6,263,588**	**7,681,049**
SOUTH SIDE		**3,237,120**	**1,934,822**	**3,202,620**	**4,498,392**	**6,516,836**	**8,679,963**	**10,991,316**	**13,112,744**
SOUTHWEST SIDE		**408,960**	**1,634,516**	**2,715,381**	**3,511,597**	**4,984,089**	**6,864,128**	**8,953,926**	**11,445,022**
		6,001,200	**4,685,277**	**7,711,915**	**10,425,349**	**15,046,207**	**20,457,964**	**26,208,830**	**32,238,814**
NORTH SIDE (Ac. Ft./Yr.)		**1,147**	**543**	**874**	**1,176**	**1,726**	**2,393**	**3,050**	**3,740**
SOUTH SIDE (Ac. Ft./Yr.)		**1,576**	**942**	**1,560**	**2,191**	**3,173**	**4,227**	**5,352**	**6,385**
SOUTHWEST SIDE (Ac. Ft./Yr.)		**199**	**796**	**1,322**	**1,710**	**2,427**	**3,343**	**4,360**	**5,573**
		2,922	**2,282**	**3,755**	**5,077**	**7,327**	**9,962**	**12,763**	**15,699**

* 50% of current capacity for non-CLWSC wells
75% of current capacity for CLWSC wells

Appendix B- Existing Water System Map Book

(BOUND SEPARATELY)

Appendix C-

TWDB Review Comments & Correspondence

TEXAS WATER DEVELOPMENT BOARD

August 13, 1997

Mr. Dale Yates
General Manager
Canyon Lake Water Supply Corporation
P. O. Box 1742
Canyon Lake, Texas 78130

Re: Review Comments for Revised Draft Report Submitted by Canyon Lake Water Supply Corporation (Corporation), TWDB Contract No. 96-483-155

Dear Mr. Yates Dale

Staff members of the Texas Water Development Board have completed a review of the revised draft report under TWDB Contract No. 96-483-155 and the additional comments are attached. As stated in the above referenced contract, the Corporation will consider incorporating comments from the EXECUTIVE ADMINISTRATOR shown in Attachment 1 and other commentors on the draft final report into a final report. The Corporation must include a copy of the EXECUTIVE ADMINISTRATOR's comments in the final report.

The Board looks forward to receiving one (1) unbound camera-ready original and twenty (20) bound double-sided copies of the Final Report on this planning project. In addition, please submit one (1) electronic copy of any computer programs or models and an operations manual developed under the terms of this Contract along with one (1) copy of the AutoCAD DXF files.

Please contact Mr. Gordon Thorn, Research and Regional Planning Program Manager, at (512) 463-7979, if you have any questions about the Board's comments.

Sincerely,

Tommy Knowles
Deputy Executive Administrator
for Planning

cc: Gordon Thorn, TWDB

ATTACHMENT 1
TEXAS WATER DEVELOPMENT BOARD
REVIEW COMMENTS FOR CANYON LAKE SUPPLY CORPORATION
REGIONAL WATER SUPPLY CONTRACT
CONTRACT NO. 96-483-155

1. There is mention of paying $53/acre-foot of water and also the "abundant water supply in Canyon Lake". CLWSC needs to provide evidence that the water has been or will be committed by GBRA to serve the future service areas.

2. The consultant was advised to address the on-going study by GBRA and the possible implications of such study in the CLWSC project. No evidence is found in the report as to the study by GBRA.

3. There were no supply options discussed as was called for in Part II of the scope.

4. An analysis was made of various routes to get Canyon water to the southwest area. It would be of interest to see how this development plan compares to GBRA's plan and how they could be modified to each entity's need.

5. It is recommended that the digital base map and any other digital maps that were developed in the study be made available to TWDB and that GIS section staff get the digital information.

6. The population and water requirement projections presented in the draft final report are reasonable for water supply planning purposes.

CLWSC

CANYON LAKE WATER SUPPLY CORPORATION
P.O. BOX 1742 CANYON LAKE TEXAS 78130
210-964-3854

October 7, 1997

Dr. Tommy Knowles
Planning Division
Texas Water Development Board
1700 North Congress Avenue
Austin, Texas 78711-3231

RE: Regional Water Supply Contract Between Canyon Lake Water Supply Corporation and the Texas Water Development Board
TWDB Contract No. 96-483-155

Dear Dr. Knowles;

Pursuant to your letter dated August 13, 1997 regarding you staff's review of our revised draft report for the referenced project, we offer the following responses to the comments in Attachment 1:

1. The stated price for raw water purchased from GBRA is the amount CLWSC currently pays. With regard to the adequacy of supply from the Lake, at the time that Section 3.0 of the report was prepared, and in concurrent public meetings, GBRA representatives indicated that there were approximately 18,000 acre-feet of uncommitted water. This amount appears to be adequate with respect to the Year 2040 net supply requirement projected in Table 10 of the report of 12,763 acre-feet per year for the Study planning area. This information has been formally presented to both the Trans-Texas PMC and GBRA to facilitate regional coordination of the area's supply needs.

2. The scope of work did not specifically call for a review of a GBRA study, nor did one exist at the time the CLWSC planning project was initiated. The intent of the scope was to incorporate results from other Trans-Texas plans that were prepared for the area. Section 3.0 of the report presents a comparison of three treated water transmission systems for the southwest portion of the CLWSC study area. Alternate #2 is essentially the alignment recommended by the Trans-Texas Water Program, Phase II Report, Letter of Intent Analysis, modified by our consultant to accommodate the capacity needs determined in the CLWSC study.

3. The supply options described in Part II of the scope of work were intended to be various configurations of systems, and those options were stated and compared in Section 3.0 of the report, as described above.

4. Beginning in early May of this year, as our consultant was completing the final section of the report, CLWSC initiated an earnest and diligent effort to develop a combined project jointly with GBRA that satisfied the present and future water supply needs of the study area. Through a series of meetings with the GBRA staff, a "Joint Resolution and Agreement" (see attached) was developed which was intended to establish the framework for the two entities to organize and implement a regional supply system. The configuration of this system, a map of which is included in the Joint Resolution, was composite of this Resolution on May 14, 1997.

5. Digital files containing the overall study area base map and all elements related to that map, as shown in Figures 3, 4, 5, 6, 11a, 11b, and 12 in the report, will be delivered with this final report in the format requested. The detailed base map of the existing CLWSC service area, shown in Figures 14, 15, 16, and 17 in the report, cannot be delivered in electronic format, due to copyright restrictions contained in CLWSC's purchase agreement with the developer of the map, Guadalupe Valley Telephone Cooperative. These restrictions were previously reviewed with TWDB staff, and no objections were posed.

Your prompt consideration of this request will be greatly appreciated. Please do not hesitate to call if there are any comments or questions.

Sincerely,

Dale R. Yates
General Manager

encl.

CANYON LAKE WATER SUPPLY CORPORATION

RESOLUTION

A regular monthly meeting of the Board of Directors of the Canyon Lake Water Supply Corporation was held on May 14, 1997 at 1:00 p.m. at the Corporate Office, 130 Kanz Drive, Sattler, Texas pursuant to public notice given in accordance with the Corporation By-laws and the Texas Open Meetings Act, Chapter 551 of the Texas Government Code as amended.

WHEREAS, the Board of Directors of Canyon Lake Water Supply Corporation has been made aware that additional treated water storage at the Triple Peak Surface Water Treatment Plant was needed to serve current and future customers connected to its water main distribution system, and

WHEREAS, the Canyon Lake Water Supply Corporation which is located and operated under its Certificate of Convenience and Necessity No. 10692 customers located in the Subdivisions served by this water distribution system, and

WHEREAS, the Canyon Lake Water Supply Corporation has hired the Hogan Corporation, Engineers-Planners-Consultants to engineer and request bids for the purchase and construction of a 100,000 Gallon Clearwell Storage Tank, which is served by the Triple Peak Water Treatment Plant, owned and operated by Canyon Lake Water Supply Corporation, and

WHEREAS, the Canyon Lake Water Supply Corporation has hired the Peabody TechTank, Inc. to construct said 100,000 Gallon Clearwell Storage Tank according to the plans and designs of the Hogan Corporation (THC 201-12.20), and

WHEREAS, the construction has now been completed and accepted by the Hogan Corporation and the General Manager of Canyon Lake Water Supply Corporation.

THEREFORE, BE IT RESOLVED that the Canyon Lake Water Supply Corporation Board of Directors has given its approval to pay all bills and invoices incurred from the Peabody TechTank, Inc. in relation to the Triple Peak Surface Water Treatment Plant 100,000 Clearwell, Job No. 103.

Jeff Branecky, President
Canyon Lake Water Supply Corporation
Board of Directors

JOINT RESOLUTION AND AGREEMENT

BETWEEN GUADALUPE-BLANCO RIVER AUTHORITY AND CANYON LAKE WATER SUPPLY CORPORATION AGREEING TO A COOPERATIVE VENTURE FOR CONSTRUCTION OF FACILITIES TO TREAT AND TRANSPORT WATER FROM CANYON RESERVOIR

WHEREAS, the Guadalupe-Blanco River Authority, Seguin, Texas, hereafter referred to as "Authority", and Canyon Lake Water Supply Corporation, Canyon Lake, Texas, hereafter referred to as "Corporation", each desire to enter into a cooperative venture to treat and transport water from Canyon Reservoir, located in Comal County, Texas; and

WHEREAS, it is felt that substantial savings in design, construction, and operation and maintenance costs can be realized through joint cooperation of Authority and Corporation; and

WHEREAS, it is necessary to identify proposed projects and to develop procedures for joint engineering and construction management on the proposed projects; and

WHEREAS, this Joint Resolution will provide the administrative rules on projects specifically authorized by both governing bodies, but in no case will this Resolution create funding responsibilities without the express approval of such contracts by each governing body.

NOW THEREFORE, Authority and Corporation hereby contract and agree as follows:

SECTION I. DESCRIPTION OF PROJECTS

The proposed projects to be designed and constructed are as follows:

A. Raw Water Intake and Pump Station at Canyon Reservoir

B. Raw Water Transmission Main from Canyon Reservoir to Water Treatment Plant, to be located at Startzville near the intersection of F.M. 3159 and F.M. 2673

C. A new Surface Water Treatment Plant

D. Treated Water Transmission Main along F.M. 2673 from Oblate Street to F.M. 306

E. Treated Water Transmission Main from Water Treatment Plant to the intersection of State Highway 46 and Bulverde Road

F. Treated Water Transmission Main from the intersection of Bulverde Road and State Highway 46 to the intersection of U.S. Highway 281

G. Treated Water Transmission Main in Ammann Road from Bulverde Road to Fair Oaks Ranch

H. Treated Water Transmission Main along F.M. 1863 from Ammon Road to Smithson Valley Road

I. Treated Water Transmission Main from the intersection of U.S. Highway 281 to the existing storage reservoir of Bexar Metropolitan Water District, located in the Stone Oak Subdivision in Bexar County

J. Treated Water Transmission Main from U.S. Highway 281 to SAWS Marshall Storage Reservoir

K. Treated Water Transmission Main from Fair Oaks-Ammann Road to Boerne.

Other improvements might be added to the above list as additional projects are identified.

A map showing the general locations of the projects described above is attached hereto.

The above described projects will include all necessary pumping and metering stations, storage reservoirs, and other necessary appurtenances to complete the facilities.

All projects listed above will be developed as a joint effort of the Authority and the Corporation.

Each project must be approved for design and construction by the governing bodies of the Authority and the Corporation before either party is liable for any costs associated with any project.

SECTION II. JOINT MANAGEMENT COMMITTEE

A Joint Management Committee is hereby created with two members appointed by the Authority and two members appointed by the Corporation. If majority approval on an issue cannot be reached among the Joint Management Committee members, then the issues will be referred to each governing body for final resolution.

The General Manager of the Authority shall serve as Staff Director for the Joint Management Committee. It will be his responsibility to coordinate the meetings of the Committee, to keep accurate minutes of Committee meetings, and to provide necessary information for consideration. The engineering staffs of the Authority and the Corporation will furnish necessary technical assistance when requested by the Committee.

The Joint Management Committee shall meet at least monthly to review progress being made and to make recommendations to the respective governing bodies, if appropriate. Meetings may also be held on call of either party or on call of the Staff Director.

SECTION III. ENGINEER

An Association of consulting engineering firms representing the Authority and the Corporation shall be employed to perform the engineering services on this entire project. The Association shall be responsible to the Joint Management Committee but will report to, and be supervised by, the Staff Director.

The Association shall perform professional technical services authorized by the Joint Management Committee and will be compensated therefor, in accordance with the Agreement for Engineering Services, a copy of which is attached to this Resolution. The work shall be performed in phases in accordance with the directions of the Joint Management Committee. The Association shall be responsible to both the Authority and the Corporation for the design and construction of specific facilities.

SECTION IV. CONSTRUCTION

No construction projects may be bid until the plans and specifications have received approval of the Joint Management Committee. No construction contracts can be awarded until the governing bodies of both the Authority and the Corporation have reviewed the tabulation of bids and authorized the contract to be awarded. The actual construction contracts shall be awarded by the Staff Director on behalf of the two parties. Any change orders to the contract shall be approved by both governing bodies; however, it is understood that change orders under $5,000 could be authorized by the Staff Director. Change orders up to $10,000 could be authorized by the Joint Management Committee. However, once change orders not approved by both governing bodies total $100,000.00, no additional change orders in any amount shall be approved by an authority other than both governing bodies unless said governing bodies approve another $100,000.00 change order account, and any change order over $10,000 shall be brought directly to the governing bodies prior to authorization.

It shall be the responsibility of the Joint Management Committee and its Staff Director to assure that each project is built in accordance with the approved plans and specifications; however, the Authority and the Corporation agree not to hold each other responsible for acts of God, orders of Government, or matters beyond their control in the development of these projects.

A program for right-of-way acquisition shall be developed and presented to both governing bodies at the appropriate time. Surveying involved in right-of-way acquisition shall be by separate agreement approved as if it were a contract. Engineering and other costs involved in acquiring special permits shall be considered additional work and be approved in the same manner as a contract change order.

SECTION V. FUNDING AND CAPACITY RECEIVED

Funding for each phase of the total project must be approved by the governing bodies of both the Authority and the Corporation prior to the start of any engineering and/or construction activities.

It is understood and agreed that all projects may be funded through separate bond issues or by any other legal means whereby the funds can be made available prior to commencing engineering services and award of any construction contracts.

Prior to engineering or construction contracts being awarded, the Authority must authorize adequate funds for the projects. The Staff Director shall be responsible for interim payments based upon invoices or construction estimates. On payment, both parties shall be notified of the billing amount along with adequate documentation for their records.

For and in consideration of the agreements described herein, the Authority and the Corporation will share in the capacity in all facilities constructed in the project area. Debt for the improvements will be repaid through proceeds from water sales.

Provisions are hereby made to adjust or add to the capacities described above by mutual agreement of both parties. Either party may delegate its capacity to others at any time. At the time that the debt is retired, final delegation of the capacity to each party will be according to the usage at that time. Projects I., J., and K. will be handled strictly by the Authority within its capacity. Water that is furnished outside the District that is short-term returnable will utilize the Corporation's capacity.

SECTION VI. OPERATION AND MAINTENANCE

The Staff Director shall cause the facilities included in all projects to be operated and maintained in a first class manner and condition and to meet the requirements of the governing agencies. The costs for operating and maintaining these facilities shall be included in the cost to be paid by each party for its proportionate share.

SECTION VII. OBLIGATION

Nothing in this agreement shall relieve either party of the responsibility to perform in accordance with contractual provisions of any contract jointly approved under this agreement. Any legal liability arising from contracts authorized under this agreement shall be considered the joint responsibility of the Authority and the Corporation and shall be defended accordingly.

SECTION VIII. COMPLETED PLANS

Upon termination or completion of the projects or any phases thereof, the Authority and the Corporation shall each receive one (1) set of "record drawings" and all pertinent project documents.

THIS JOINT RESOLUTION AND AGREEMENT IS APPROVED BY THE GUADALUPE-BLANCO RIVER AUTHORITY this the _____ day of _____, 1997.

_____
W.E. West, Jr.
General Manager

ATTEST

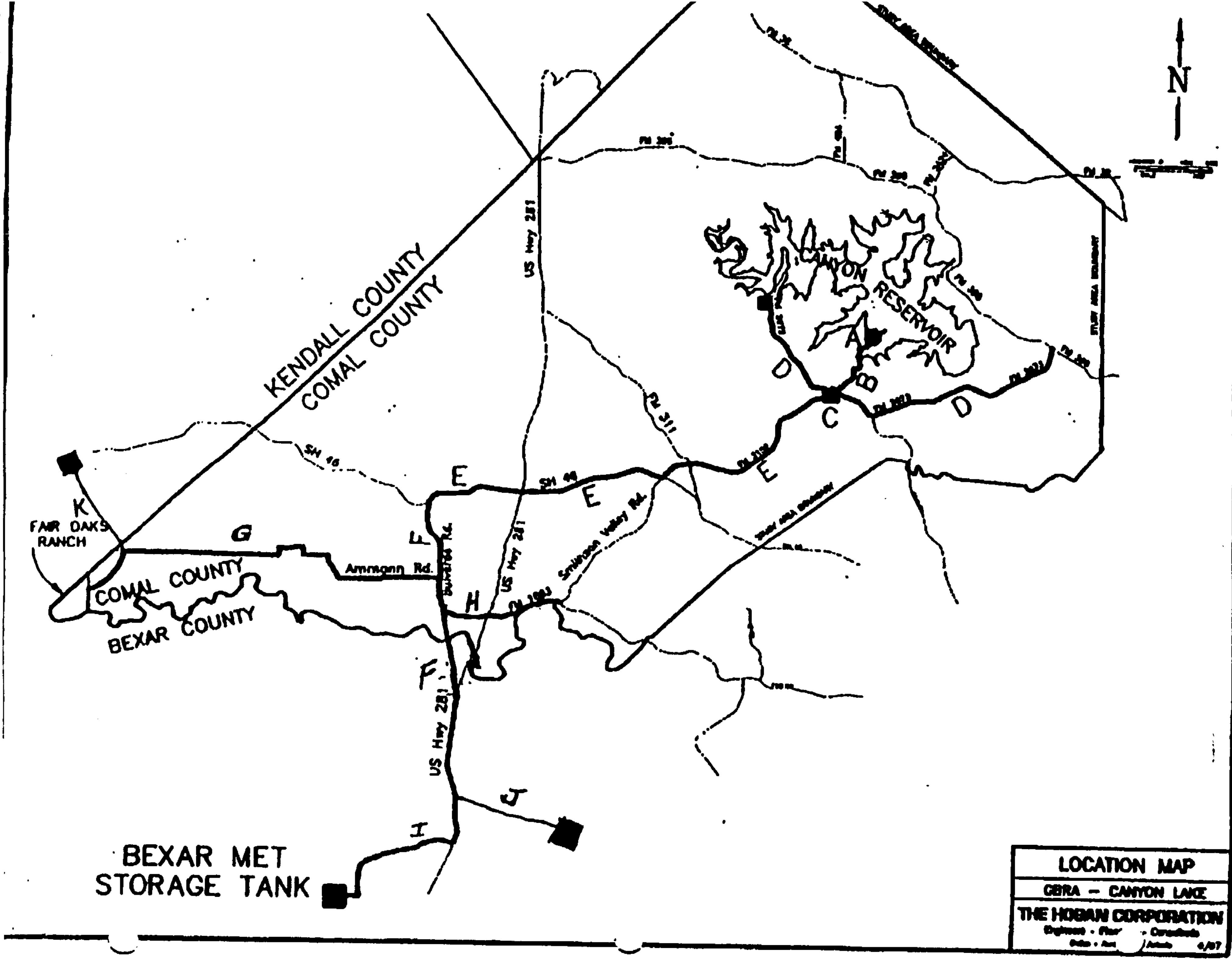
_____
Secretary

THIS JOINT RESOLUTION AND AGREEMENT IS APPROVED BY THE CANYON LAKE WATER SUPPLY CORPORATION this the 14TH day of MAY, 1997.

Jeff Branecky
President

ATTEST

Secretary



LOCATION MAP
GBRA — CANYON LAKE
THE HOBAN CORPORATION

TEXAS WATER DEVELOPMENT BOARD

October 21, 1997

Mr. Dale Yates
General Manager
Canyon Lake Water Supply Corporation
P. O. Box 1742
Canyon Lake, Texas 78130

Re: Regional Water Supply Study Contract Between Texas Water Development Board (TWDB) and Canyon Lake Water Supply Corporation (Corporation), TWDB Contract No. 96-483-155, Corporation's Response to TWDB Review Comments for Revised Draft Report

Dear Mr. Yates:

Staff of the Texas Water Development Board have completed a review of the Corporation's response to TWDB comments on the revised draft report under TWDB Contract No. 96-483-155. TWDB will accept the final report if the Corporation includes a copy of the EXECUTIVE ADMINISTRATOR's comments on the revised draft report and the Contractor's response to the EXECUTIVE ADMINISTRATOR's comments in the final report.

In addition, TWDB strongly suggests that the Corporation performs a cost comparison between the Corporation's recommended plan and the Guadalupe-Blanco River Authority's plan before the Corporation begins to implement a project.

The Board looks forward to receiving one (1) unbound camera-ready original and twenty (20) bound double-sided copies of the Final Report on this planning project. In addition, please submit one (1) electronic copy of any computer programs or models and an operations manual developed under the terms of this Contract along with one (1) copy of the AutoCAD DXF files that are not subject to copyright restrictions.

Please contact Mr. Gordon Thorn, Research and Regional Planning Program Manager, at (512) 463-7979, if you have any questions about the Board's comments.

Sincerely,

Tommy Knowles
Deputy Executive Administrator
for Planning

cc: Gordon Thorn, TWDB

V:\RPP\DRAFT\96483155.LT3

				Hydraulic Analysis							Cost Projection						
				V max =	*3 fps*				40 Yr.					12%	15%		
	Q Total	Q mxdy		Pipe Size, in		Pipe Length, ft		Future Cap.	Q Total	Pipeline Cost		Additional	Easements,	Technical		
Node	mgd	mgd	gpm	Calc	Select	Incr	Cum	@ V = 5 fps	mgd	Unit	Total	Facilities	Permits	Services	Contingency	Total
Branch 1 - From FM 306 North Along FM 484																
87							13,872									
	0.13	0.13	91	3.52	6	13,872		0.63 mgd	0.19	$20	$277,440	$105,000	$25,000	$0	$0	$407,440
86							0									
Branch 2 - From FM 306, North Along FM 3424, East Along FM 32																
83							16,044									
	0.24	0.24	169	4.80	6	8,955		0.63 mgd	0.33	$20	$179,100	$0	$0	$0	$0	$179,100
84							7,089									
	0.04	0.29	198	5.19	6	7,089		0.63 mgd	0.42	$20	$141,780	$115,000	$25,000	$0	$0	$460,880
81																
Branch 3 - Along US 281 North of SH 46																
508							27,154									
	0.46	0.46	318	6.58	8	13,384		1.13 mgd	0.86	$25	$334,600	$0	$0	$40,200	$56,200	$431,000
50							13,770									
	0.31	0.77	534	8.53	10	13,770		1.76 mgd	1.37	$35	$481,950	$0	$0	$57,800	$81,000	$1,051,750
85							0									
Branch 4 - Along SH 46 West of US 281																
88							6,394									
	0.44	0.74	514	8.37	10	6,394		1.76 mgd	1.35	$35	$223,790	$140,000	$25,000	$43,700	$64,900	$497,390
85							0									
Branch 5 - Along Ammon Road West of US 281																
70							53,850									
	0.72	0.72	499	8.24	10	32,430		1.76 mgd	1.22	$35	$1,135,050	$100,000	$25,000	$148,200	$211,200	$1,619,450
73							21,420									
	0.39	1.11	773	10.26	12	9,410		2.54 mgd	1.88	$40	$376,400	$140,000	$25,000	$62,000	$90,500	$2,313,350
71							12,010									
	0.35	1.46	1,016	11.76	12	9,600		2.54 mgd	2.49	$40	$384,000	$0	$0	$46,100	$64,500	$2,807,950
72							2,410									
	0.11	1.57	1,093	12.20	16	2,410		4.51 mgd	2.59	$60	$144,600	$0	$0	$17,400	$24,300	$2,994,250
60							0									
Branch 6 - Along FM 1863 East of US 281																
61							15,460									
	0.15	0.95	660	9.48	10	15,460		1.76 mgd	1.71	$35	$541,100	$0	$0	$64,900	$90,900	$696,900
60							0									
Branch 7 - East Along FM 2673 from Plant																
30							41,095									
	0.29	0.29	204	5.27	8	20,633		1.13 mgd	0.53	$25	$515,825	$0	$0	$61,900	$86,700	$664,425
35							20,462									
	0.29	0.29	204	5.27	10	12,404		1.76 mgd	0.53	$35	$434,140	$0	$0	$52,100	$72,900	$1,223,565
36							8,058									
	0.68	0.98	679	9.62	12	8,058		2.54 mgd	1.52	$40	$322,320	$40,000	$0	$43,500	$60,900	$1,690,285
1							0									
Branch 8 - From US 281 East Along FM 306																
100							44,545									
	0.82	0.82	571	8.82	10	16,040		1.76 mgd	1.47	$35	$561,400	$0	$0	$0	$0	$561,400
98							28,505									
	0.21	1.03	718	9.89	12	18,403		2.54 mgd	2.05	$40	$736,120	$150,000	$25,000	$0	$0	$1,472,520
97							10,102									
	0.10	1.13	788	10.36	12	10,102		2.54 mgd	2.20	$40	$404,080	$0	$0	$0	$0	$1,876,600
86							0									

	Hydraulic Analysis									Cost Projection						
				V max =	*3 fps*				40 Yr.					12%	15%	
Node	Q Total mgd	Q mxdy mgd	gpm	Pipe Size, in Calc	Select	Pipe Length, ft Incr	Cum	Future Cap. @ V = 5 fps	Q Total mgd	Pipeline Cost Unit	Total	Additional Facilities	Easements, Permits	Technical Services	Contingency	Total
Along FM 306																
80							17,339									
	0.63	0.63	435	7.70	8	2,467		1.13 mgd	0.95	$25	$61,675	$0	$0	$7,400	$10,400	$79,475
81							14,872									
	0.29	0.91	633	9.28	10	8,790		1.76 mgd	1.37	$35	$307,650	$0	$0	$36,900	$51,700	$475,725
82							6,082									
	0.00	0.91	633	9.28	10	6,082		1.76 mgd	1.37	$35	$212,870	$0	$0	$25,500	$35,800	$749,895
86							0									
From Plant North to Fm 306																
86							16,058									
	1.74	2.65	1,841	15.83	18	16,058		5.71 mgd	4.71	$75	$1,204,350	$0	$0	$144,500	$202,300	$1,551,150
1							0									
														TOTAL TRANSMISSION COST		**$2,301,045**

Flow & Connection Data			Connections:		Amount Funded	Debt Remaining
Maximum Plant Flow	**2,000,000**	gpd	Project Cost			
System Base Flow	2,000,000	gpd	Plant:	$2,200,000	$0	$2,200,000
Equivalent Connections	2,739		Transmission System:	$2,301,045	$0	$2,301,045
			Total:	$4,501,045	$0	$4,501,045

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	300	HP	$1.60	12	$5,760	225	HP	$1.60	12	$4,320	
Raw water	2,000	Kgal	$0.16	365	$118,771						
Annual Debt Service	$2,200,000	20 years		8%	$224,075	$2,310,000	20 years		8%	$235,279	
Administration				1.50%	$33,000				0.50%	$11,505	
Subtotal, Fixed Costs					$381,606					$251,104	$632,710
VARIABLE COSTS											
Electrical Power - useage	733,107	kwh	$0.07	1	$51,317	776,354	kwh	$0.07	1	$54,345	
Chemicals	2,000	Kgal	$0.06	365	$43,800						
TNRCC Inspection Fees	1	annual	$2,030	1	$2,030						
Repairs	2.00	mgd	$500	12	$12,000	6	miles	$250	1	$1,581	
Subtotal, Variable Costs					$109,147					$55,926	$165,073
Total Annual O&M Cost					$490,753					$307,030	$797,783

Treated water cost ($ per 1,000 gallons)

Plant					Transmission				Combined
Variable:				$0.15	***Variable:***			$0.08	$0.23
Fixed:					***Fixed:***				
		Conn's					Conn's		
2,000,000	gpd	2,739	$11.61	$0.52	2,000,000	gpd	2,739	$7.64	$0.34	$0.86
									$1.09

Table 16C
Operation and Maintenance Costs

Flow & Connection Data			Connections:	1,554	Amount	Debt
			Project Cost		Funded	Remaining
Maximum Plant Flow	**2,000,000**	gpd	Plant: $2,200,000	$0	$0	$2,200,000
System Base Flow	2,000,000	gpd	Transmission System: $4,177,645	$1,208	$1,877,484	$2,300,161
Equivalent Connections	2,739		Total: $6,377,645	$1,208	$1,877,484	$4,500,161

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	300	HP	$1.60	12	$5,760	375	HP	$1.60	12	$7,200	
Raw water	2,000	Kgal	$0.16	365	$118,771						
Annual Debt Service	$2,200,000	20 years		8%	$224,075	$2,310,000	20 years		8%	$235,279	
Administration				1.50%	$33,000				0.50%	$20,888	
Subtotal, Fixed Costs					$381,606					$263,367	$644,973
VARIABLE COSTS											
Electrical Power - useage	733,107	kwh	$0.07	1	$51,317	1,164,531	kwh	$0.07	1	$81,517	
Chemicals	2,000	Kgal	$0.06	365	$43,800						
TNRCC Inspection Fees	1	annual	$2,030	1	$2,030						
Repairs	2.00	mgd	$500	12	$12,000	15	miles	$250	1	$3,690	
Subtotal, Variable Costs					$109,147					$85,208	$194,355
Total Annual O&M Cost					$490,753					$348,574	$839,328

Treated water cost ($ per 1,000 gallons)

Plant					Transmission					Combined
Variable:				$0.15	***Variable:***				$0.12	$0.27
Fixed:					***Fixed:***					
		Conn's					Conn's			
2,000,000	gpd	2,739	$11.61	$0.52	2,000,000	gpd	2,739	$8.01	$0.36	$0.88
										$1.15

Flow & Connection Data			Project Cost		Cost/Connection Actual
Maximum Plant Flow	**8,000,000**	gpd	Plant:	$8,800,000	$803
System Base Flow	8,000,000	gpd	Transmission System:	$12,634,735	$1,153
Equivalent Connections	10,955		Total:	$21,434,735	$1,956

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,200	HP	$1.60	12	$23,040	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$12,640,000	20 years		8%	$1,287,412	
Administration				1.50%	$132,000				0.50%	$63,200	
Subtotal, Fixed Costs					$1,516,823					$1,373,652	$2,890,475
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	4,393,334	kwh	$0.07	1	$307,533	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	18	miles	$250	1	$4,500	
Subtotal, Variable Costs					$375,395					$312,033	$687,428
Total Annual O&M Cost					$1,892,218					$1,685,685	$3,577,903

Treated water cost ($ per 1,000 gallons)

	Plant					**Transmission**					**Combined**
Variable:					$0.13	***Variable:***				$0.11	$0.24
Fixed:						***Fixed:***					
			Conn's					Conn's			
8,000,000	gpd	10,955	$11.54	$0.52		8,000,000	gpd	10,955	$10.45	$0.47	$0.99
											$1.23

Flow & Connection Data			Connections:	1,339		Amount	Debt
			Project Cost			Funded	Remaining
Maximum Plant Flow	**8,000,000**	gpd	Plant:	$8,800,000	$0	$0	$8,800,000
System Base Flow	8,000,000	gpd	Transmission System:	$14,325,020	$1,263	$1,691,014	$12,634,006
Equivalent Connections	10,955		Total:	$23,125,020	$1,263	$1,691,014	$21,434,006

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,350	HP	$1.60	12	$25,920	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$12,640,000	20 years		8%	$1,287,412	
Administration				1.50%	$132,000				0.50%	$71,625	
Subtotal, Fixed Costs					$1,516,823					$1,384,957	$2,901,780
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	5,034,900	kwh	$0.07	1	$352,443	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	26	miles	$250	1	$6,500	
Subtotal, Variable Costs					$375,395					$358,943	$734,338
Total Annual O&M Cost					$1,892,218					$1,743,900	$3,636,118

Treated water cost ($ per 1,000 gallons)

Plant					Transmission					Combined
Variable:				$0.13	***Variable:***				$0.12	$0.25
Fixed:					***Fixed:***					
		Conn's					Conn's			
8,000,000	gpd	10,955	$11.54	$0.52	8,000,000	gpd	10,955	$10.54	$0.47	$0.99
										$1.24

Flow & Connection Data			Connections:	1,339	2,068	Amount	Debt
			Project Cost			Funded	Remaining
Maximum Plant Flow	**8,000,000**	gpd	Plant:	$8,800,000	$0	$0	$0	$8,800,000
System Base Flow	8,000,000	gpd	Transmission System:	$15,874,160	$1,263	$750	$3,241,821	$12,632,339
Equivalent Connections	10,955		Total:	$24,674,160	$1,263	$750	$3,241,821	$21,432,339

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,400	HP	$1.60	12	$26,880	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$12,640,000	20 years		8%	$1,287,412	
Administration				1.50%	$132,000				0.50%	$79,371	
Subtotal, Fixed Costs					$1,516,823					$1,393,663	$2,910,486
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	5,195,292	kwh	$0.07	1	$363,670	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	32	miles	$250	1	$8,000	
Subtotal, Variable Costs					$375,395					$371,670	$747,065
Total Annual O&M Cost					$1,892,218					$1,765,333	$3,657,551

Treated water cost ($ per 1,000 gallons)

Plant					Transmission					Combined
Variable:				$0.13	***Variable:***				$0.13	$0.26
Fixed:					***Fixed:***					
		Conn's					Conn's			
8,000,000	gpd	10,955	$11.54	$0.52	8,000,000	gpd	10,955	$10.60	$0.48	$1.00
										$1.26

Flow & Connection Data			Connections:	1,339	2,068	4,460	Amount	Debt
			Project Cost				Funded	Remaining
Maximum Plant Flow	**8,000,000**	gpd	Plant:	$8,800,000	$0	$0	$0	$8,800,000
System Base Flow	8,000,000	gpd	Transmission System:	$21,534,285	$1,263	$750	$1,270	$8,905,986	$12,628,299
Equivalent Connections	10,955		Total:	$30,334,285	$1,263	$750	$1,270	$8,905,986	$21,428,299

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,500	HP	$1.60	12	$28,800	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$12,630,000	20 years		8%	$1,286,393	
Administration				1.50%	$132,000				0.50%	$107,671	
Subtotal, Fixed Costs					$1,516,823					$1,422,865	$2,939,688
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	5,516,075	kwh	$0.07	1	$386,125	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	49	miles	$250	1	$12,250	
Subtotal, Variable Costs					$375,395					$398,375	$773,770
Total Annual O&M Cost					$1,892,218					$1,821,240	$3,713,458

Treated water cost ($ per 1,000 gallons)

	Plant					Transmission					Combined
Variable:					$0.13	***Variable:***				$0.14	$0.27
Fixed:						***Fixed:***					
			Conn's					Conn's			
	8,000,000	gpd	10,955	$11.54	$0.52	8,000,000	gpd	10,955	$10.82	$0.49	$1.01
											$1.28

Table 18
Capital Cost Summary

Description	Pipeline Cost
South Treatment Plant	$8,800,000
South - Primary System	$14,603,710
Branch 7 - East Along FM 2673 from Plant	$1,690,285
Branch 3 - Along US 281 North of SH 46	$1,051,750
Branch 4 - Along SH 46 West of US 281	$497,390
Branch 5 - Along Ammann Road West of US 281	$2,994,250
Branch 6 - Along FM 1863 East of US 281	$696,900
Subtotal	**$30,334,285**
North Treatment Plant	$2,200,000
North - Primary System	$2,301,045
Branch 8 - From US 281 East Along FM 306	$1,876,600
Branch 1 - From FM 306 North Along FM 484	$407,440
Branch 2 - From FM 306, North Along FM 3424, East Along FM 32	$460,880
Subtotal	**$7,245,965**

O & M costs have also been projected in order to illustrate the total water costs. O & M costs include purchase of raw water at $53/acre-foot, electrical power, chemicals, debt service (for the plant and primary transmission system only), and generalized projections for administration and repairs. Costs have been calculated per thousand gallons, assuming a uniform delivery equal to the treatment plant capacity for both the North and South systems. These costs have been developed for the primary systems separately, and also for the aggregate systems for each phase. The O & M cost projections for the primary South system and Phases 1, 2, and 3 are presented in detail in Tables 17A, B, and C, and are summarized in Table 19. Similarly, the O & M costs for the primary (Phase 1) North system and Phase 2 are presented in Tables 16A and 16B, with a summary cost allocation provided in Table 20.

South System

Connection Charge to Offset Debt for Lateral Systems

Table 19
System Cost Allocation

	Annual O&M Cost		Uniform Delivery	Water Cost ($/1000 gals)	
	Overall	Incremental Increase	(mgd)	Incremental Increase	Total
Primary System					
Fixed Costs	$2,890,475		8.00		$ 0.99
Variable Costs	$687,428		8.00		$ 0.24
Total	$3,577,903				$1.23
Additional Costs for Lateral Systems					
*Fixed Costs**					
Phase 1	$2,901,780	$11,305	0.62	$ 0.050	$ 1.040
Phase 2	$2,910,486	$8,706	1.06	$ 0.023	$ 1.012
Phase 3	$2,939,688	$29,202	2.47	$ 0.032	$ 1.022
Variable Costs					
Phase 1	$734,338	$46,910	0.62	$ 0.207	$ 0.443
Phase 2	$747,065	$12,727	1.06	$ 0.033	$ 0.268
Phase 3	$773,770	$26,705	2.47	$ 0.030	$ 0.265
Total*					
Phase 1	$3,636,118	$58,215		$ 0.257	$ 1.48
Phase 2	$3,657,551	$21,433		$ 0.055	$ 1.28
Phase 3	$3,713,458	$55,907		$ 0.062	$ 1.29

**Based on Initial Connection Fee:*

Phase 1	$1,263 /connection
Phase 2	$750 /connection
Phase 3	$1,270 /connection

North System

Table 20 Connection Charge to Offset Debt for Lateral Systems
System Cost Allocation

	Annual O&M Cost		Uniform Delivery	Water Cost ($/1000 gals)	
	Overall	Incremental Increase	(mgd)	Incremental Increase	Total
Primary System					
Fixed Costs	$632,710		2.00		$ 0.87
Variable Costs	$165,073		2.00		$ 0.23
Total	$797,783				$1.09
Additional Costs for Lateral Systems					
*Fixed Costs**	$644,973	$12,263	0.80	$ 0.042	$ 0.909
Variable Costs	$194,355	$29,282	0.80	$ 0.100	$ 0.326
Total*	$839,328	$41,545		$ 0.142	1.24

**Based on Initial Connection Fee:*
Phase 2 $1,208 /connection

4.0 CLWSC System Master Plan

4.0 CANYON LAKE WATER SUPPLY CORPORATION SYSTEM MASTER PLAN

4.1 General

The goal of this portion of the study is to perform a review of CLWSC's existing system and facilities, and to develop recommendations for specific improvements needed to accommodate existing and projected future demands within the areas currently served by CLWSC. The existing CLWSC water system serves approximately 45 separate subdivisions, most of which adjoin or are in the immediate vicinity of Canyon Lake. The customer base currently consists of about 4,300 active connections. Except for the Triple Peak water treatment plant, all water is currently supplied from approximately 36 active wells, and delivered to the distribution system through about 30 storage/pump station sites. A general location map of the existing CLWSC service area is presented as Figure 18.

4.2 System Mapping

A complete map of the existing CLWSC water system was developed to provide a basis for planning and presentation of recommended improvements, and to provide a working tool for use by CLWSC operations and maintenance staff. A digital base map was acquired from the Guadalupe Valley Telephone Cooperative (GVTC). The GVTC map includes parcel-based data on all subdivisions within CLWSC's existing service area, and provides a comprehensive, accurate structure on which to build the CLWSC water system maps. CWLSC's agreement with GVTC includes provisions for annual updating of the map database to reflect new development in the area.

The best available information on the existing water system was added to the base maps using computer aided drafting (CAD). CLWSC staff compiled existing paper maps and other similar background information for this purpose. Initial draft copies of the maps were printed and furnished to CLWSC staff for editing. Final corrections to the maps were performed, and the information was then organized into a map book for ongoing reference by CLWSC staff. A copy of the base map book is made of part of this report as Appendix B.

4.3 System Improvements

A capacity analysis of the CLWSC existing production facilities and distribution system was performed to identify improvements needed to support existing demands as well as future growth. This analysis was based on several overriding assumptions and conditions, as follows:

- Future growth within the affected areas was assumed to follow the same general trend as presented in Section 2. An average annual growth rate of 4% was approximated from the TWDB "1996 Consensus Texas Water Plan" for the unincorporated areas of Comal County. Growth within existing subdivisions were assumed to be limited to 80% of the existing platted lots.

- The South regional water supply and transmission system as recommended in Section 2 is assumed to be implemented in the near term.

- The capacities of individual water production sites will be maximized commensurate with the existing, dependable groundwater (well) supply available at each site, to the extent that is required to serve the projected needs within each sub-area. All remaining water supply, storage, and pumping needs within the existing CLWSC service areas adjacent to the lake will be met through regional and sub-regional distribution and delivery systems.

- Future pressure storage requirements will be met through elevated storage tanks where feasible, with pressure tanks provided to serve smaller, disjointed areas or higher ground elevations.

It is recommended that CLWSC develop its system in the vicinity of the lake based on operating three pressure planes. The primary pressure plane will utilize elevated storage located at a base elevation of approximately 1,200 feet MSL. This elevation will provide adequate pressure for a large portion of the service areas adjacent to the lake, up to a ground elevation of about 1,115' MSL. The service areas above this elevation will utilize hydropneumatic tanks for pressure storage. For the lower service area in the river valley east of the lake, it is recommended that an elevated storage base elevation of 920 feet MSL be implemented.

The analysis of the CLWSC water system facilities for the 5 year (Phase 1), 10 year (Phase 2), and 20 year (Phase 3) planning milestones is presented in Tables 21, 22, and 23, respectively. Supply, total storage, service pump, and pressure storage capacities based on minimum TNRCC criteria have been established for the various existing facility sites and the associated service areas. Capacity improvements are highlighted in boldface, and the capacity requirements have been summarized geographically to indicate the regional system needs.

The capacities of existing water distribution lines were analyzed for conformance with TNRCC minimum sizing criteria. Interconnecting, looping, and supplemental feeder mains have been proposed where needed. New trunk mains serving multiple areas or primary laterals from the regional transmission lines were sized to maintain reasonable velocity limits under maximum demand situations. A brief discussion of the more significant recommended improvements is provided below. Improvements are presented graphically in Figures 14,15,16, and 17.

4.3.1 Southwest Area

Phase 1 improvements should include upgrades to the Astro Hills, Canyon Lake Hills, Lakeview Park, and Rolling Hills plant facilities, and the interconnection of the Astro Hills and Canyon Lake Hills systems. Extension of a lateral supply main from the (new) regional transmission system to serve Canyon Lake Hills should also occur in Phase 1. It is recommended that separate well and plant facilities in Canyon Lake Forest and Waterfront Park be interconnected and combined into a single supply point, and the higher elevations in the south portion of Canyon Lake Forest should be interconnected to the upper pressure plane of the Woodlands. The principal improvement recommended for the Southwest area in Phase 2 is a new elevated storage tank centrally located to serve existing and future development in this area.

4.3.2 South Area

Key improvements recommended for Phase 1 should include interconnecting distribution lines between the Oaks and the Woodlands, and between the Oaks and Canyon Lake Village (CLV) West, and extension of a lateral feeder main from the new regional transmission line on FM 2673 connecting to the Triple Peak existing 100,000 gallon elevated ground storage tank (EGST). It is also recommended that a new storage/pump station site be implemented to serve the upper pressure plane area east of the Woodlands and west of Triple Peak. The storage tank at this pump station should be set at a base elevation of approximately 1,200 MSL, and will provide a dual function as elevated storage for the primary pressure plane.

4.3.3 East Area

Phase 1 improvements should include the establishment of elevated storage (EGST) for the river valley area at a suitable site northwest of the Horseshoe Falls subdivision. The site, which needs to have a ground elevation of approximately 920, should also be developed as a storage/pump station site to serve Crystal Heights as well as new development north of FM 306 in the future. In the Phase 2 timeframe, it is recommended that the existing 50,000 gallon tank at the Netherhill pump station be connected to the Sattler distribution system such that it functions as elevated storage for the river valley.

4.3.4 North Area

Key improvements recommended for Phase 1 include interconnecting Scenic Terrace with Hancock Canyon and upgrading the combined plant facility, and improvements to the Canyon Lake Island and Canyon Lake Shores storage/pump station facilities. Major distribution lines are proposed along FM 306 to interconnect the Hancock and Tamarack systems, and the Point/DBH and Cougar Ridge/Northlake systems. Also recommended for Phase 1 is the establishment of a central storage/pump station site in the Devil's Backbone Heights (DBH) subdivision to serve the Point, DBH, and other upper pressure plane areas north of FM 306. The tank at this site will act in a dual function, also providing elevated storage for the primary pressure plane to the south, and should be of the standpipe style to provide an adequate storage volume above elevation 1,200. Consideration should be given to relocating the existing Horseshoe Falls standpipe for this purpose, as it is no longer effective at its current location.

The key project recommended for Phase 2 is the implementation of the North surface water treatment plant (WTP). After the South regional supply and transmission system is operational and lateral connections have been made, it is proposed to decommission the Triple Peak WTP, and relocate the existing package treatment units to the North WTP. To fully implement the North surface water system, Phase 2 improvements should also include major transmission lines from the WTP to and along FM 306. Transmission lines should also be extended north along FM 3424 to connect to the Point/DBH standpipe, and north along FM 484 to a new standpipe in the Rocky Creek area. Future (Phase 3) improvements should include the continued extension of transmission lines north, east, and west.

4.3.5 West Area

Given the significant distance between the CLWSC systems north of the lake to the Deer River and Lake of the Hills systems, extension of the surface water transmission lines for those areas alone does not appear to be feasible. It is therefore projected that the transmission lines would be implemented in Phase 3, when additional new development may be in place to support the cost of the project. To provide additional water supply in the interim, it is recommended that a new well plant be constructed in Phase 1 to support the two subdivisions. Additional interconnecting and supplemental distribution lines are recommended in subsequent phases to fully integrate the two systems.

Phase 1 improvements to the Riverwood system should consist of a service pump addition and an interconnect to an adjoining water system to supplement supply. Future extensions of the South regional supply and transmission system will extend to Riverwood to support continued growth.

4.4 Capital Improvements Plan

The recommended improvements have been organized into a series of individual projects based on location and phasing, and to allow flexibility in future planning, prioritizing, and implementation efforts. Each project has been assigned an identification number, which correlates the exhibit maps (Figures 14-18) to the tabular data (Table 24). Construction costs are based on current day values for similar work in the region. An allowance of 15% of construction cost has been provided to cover typical design engineering, surveying, and other technical services, and 20% has been added for contingencies. As detailed in Table 24, the total cost for Phase 1 improvements is projected to be $3.33 million, the total for Phase 2 is $4.62 million, and the total projection for Phase 3 work is $4.14 million.

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		Stby	Rated		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Astro Hills/CL Hills 1,2,3	417	conn's		1,735 lots				
Required	2		250 gpm	83,462 gals	835 gpm	T	8,346 gals	31 gals
Provided	2		250 gpm	64,500 gals	200 gpm		10,500 gals	0 gals
Facility Design Limit	417	conn's	250 gpm	83,400 gals	834 gpm	F	8,340 gals	gals
Proposed Upgrade			0 gpm	19,000 gals	700 gpm		0 gals	0 gals
External Facility Capacity			0 gpm	62 gals	1 gpm		6 gals	31 gals
			projected					
Canyon Lake Hills 4,5,6	322	conn's		750 lots				
Required	2		193 gpm	64,483 gals	645 gpm	T	6,448 gals	8,941 gals
Provided	1		140 gpm	92,500 gals	500 gpm		5,000 gals	0 gals
Facility Design Limit	233	conn's	140 gpm	46,600 gals	466 gpm	F	4,660 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			54 gpm	17,883 gals	179 gpm		1,788 gals	8,941 gals
			projected					
Lakeview Park	232	conn's		382 lots				
Required	1		139 gpm	46,476 gals	465 gpm	T	4,648 gals	3,238 gals
Provided	2		150 gpm	88,000 gals	100 gpm		4,000 gals	0 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	400 gpm		0 gals	0 gals
External Facility Capacity			-11 gpm	-3,524 gals	-35 gpm		648 gals	3,238 gals
			projected					
Rolling Hills	380	conn's		580 lots				
Required	2		228 gpm	75,919 gals	759 gpm	T	7,592 gals	12,960 gals
Provided	2		210 gpm	44,700 gals	200 gpm		5,000 gals	0 gals
Facility Design Limit	350	conn's	210 gpm	70,000 gals	700 gpm	F	7,000 gals	gals
Proposed Upgrade			0 gpm	26,000 gals	500 gpm		0 gals	0 gals
External Facility Capacity			18 gpm	5,919 gals	59 gpm		2,592 gals	12,960 gals
Waterfront Park			projected					
Canyon Lake Forest	444	conn's		1,050 lots				
Required	2		266 gpm	88,816 gals	888 gpm	T	8,882 gals	0 gals
Provided	2		355 gpm	115600 gals	500 gpm		21000 gals	0 gals
Facility Design Limit	592	conn's	355 gpm	118,400 gals	1,000 gpm	F	11,840 gals	gals
Proposed Upgrade			0 gpm	gals	500 gpm		0 gals	0 gals
External Facility Capacity			-89 gpm	-26,784 gals	-112 gpm		-2,958 gals	0 gals
			projected					
Woodlands/CLFSo Upper	146	conn's	+26	425 lots				
Required	1		88 gpm	29,200 gals	292 gpm	T	2,920 gals	gals
Provided	1		0 gpm	29,200 gals	0 gpm		0 gals	gals
Facility Design Limit	146	conn's	88 gpm	29,200 gals	292 gpm	F	2,920 gals	gals
Proposed Upgrade			0 gpm	0 gals	400 gpm		6,000 gals	gals
External Facility Capacity			88 gpm	0 gals	0 gpm		0 gals	gals
			projected					
Woodlands	129	conn's	+0	-52 lots				
Required	1		77 gpm	25,800 gals	258 gpm	T	2,580 gals	12,900 gals
Provided	1		150 gpm	24,800 gals	0 gpm		0 gals	24,800 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		0 gals	0 gals
External Facility Capacity			-73 gpm	1,000 gals	258 gpm		2,580 gals	-11,900 gals
GROUP SUMMARY	2,071	connections						
Required	2		1,242 gpm	414,156 gals	2,495 gpm	F	30,000 gals	0 gals
Provided	11		1,255 gpm	459,300 gals	1,500 gpm		45,500 gals	24,800 gals
Difference (capacity)	ok		13 gpm	45,144 gals	-985 gpm		15,500 gals	24,800 gals
Difference (conn's)			21	228	(492)		775	248
Adjusted Net			*13 gpm*	*6,444 gals*	*-350 gpm*			*-13,270 gals*
			projected					
Upper Plane	30	conn's	+5	134 lots				
Required	1		18 gpm	6,083 gals	61 gpm	T	608 gals	gals
Provided			gpm	gals	gpm		gals	gals
Facility Design Limit	30	conn's	18 gpm	6,083 gals	61 gpm		608 gals	gals
Proposed Upgrade			gpm	50,000 gals	100 gpm		0 gals	gals
External Facility Capacity			18 gpm	0 gals	0 gpm		608 gals	gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
The Oaks	215	conn's	+38	353 lots				
Required	1		129 gpm	43,070 gals	129 gpm	T	4,307 gals	5,735 gals
Provided	2		95 gpm	89,917 gals	400 gpm		7,000 gals	43,917 gals
Facility Design Limit	158	conn's	95 gpm	31,600 gals	316 gpm	F	3,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			34 gpm	11,470 gals	-187 gpm		1,147 gals	-38,182 gals
			projected					
Village West	580	conn's	+103	706 lots				
Required	2		348 gpm	116,069 gals	1,000 gpm	F	11,607 gals	58,034 gals
Provided	2	241	0 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit		conn's	gpm	gals	gpm	F	gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			348 gpm	116,069 gals	1,000 gpm		11,607 gals	58,034 gals
			projected					
Triple Peak	102	conn's	+0	99 lots				
Required	1		61 gpm	20,400 gals	61 gpm	T	2,040 gals	0 gals
Provided	1	40	*1,050* gpm	200,000 gals	1,050 gpm		2,180 gals	100,000 gals
Facility Design Limit	1750	conn's	1,050 gpm	350,000 gals	2,100 gpm	F	30,000 gals	gals
Proposed Upgrade			gpm	gals	gpm		0 gals	0 gals
External Facility Capacity			-989 gpm	-179,600 gals	-989 gpm		-140 gals	-100,000 gals
			projected					
Canyon Lake Village	275	conn's	+49	1,060 lots				
Required	2		165 gpm	54,993 gals	550 gpm	T	5,499 gals	14,996 gals
Provided	1		150 gpm	70,000 gals	260 gpm		2,500 gals	0 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	300 gpm		0 gals	0 gals
External Facility Capacity			15 gpm	4,993 gals	50 gpm		2,999 gals	14,996 gals
			projected					
Summit	221	conn's	+39	410 lots				
Required	1		133 gpm	44,286 gals	443 gpm	T	4,429 gals	9,643 gals
Provided	1		110 gpm	*130,000* gals	*720* gpm		2,500 gals	0 gals
Facility Design Limit	183	conn's	110 gpm	36,600 gals	366 gpm	F	3,660 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			23 gpm	7,686 gals	77 gpm		1,929 gals	9,643 gals
GROUP SUMMARY	1,425	connections						
Required	2		955 gpm	284,900 gals	1,709 gpm	F	28,490 gals	0 gals
Provided	7	281	1,405 gpm	489,917 gals	2,430 gpm		14,180 gals	143,917 gals
Difference (capacity)	ok		550 gpm	205,018 gals	721 gpm		-14,310 gals	143,917 gals
Difference (conn's)			817	1,025	360		(716)	1,439
Adjusted Net			*550 gpm*	*39,283 gals*	*49 gpm*			*55,508 gals*
Sattler	195	conn's	+0	0 lots				
Required	1		117 gpm	39,000 gals	390 gpm	T	3,900 gals	19,500 gals
Provided	0		0 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit		conn's	gpm	gals	gpm		gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			117 gpm	39,000 gals	390 gpm		3,900 gals	19,500 gals
			projected					
Riverside	79	conn's	+0	79 lots				
Required	1		47 gpm	15,800 gals	158 gpm	T	1,580 gals	7,900 gals
Provided	0		0 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit		conn's	gpm	gals	gpm		gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			47 gpm	15,800 gals	158 gpm		1,580 gals	7,900 gals
			projected					
Horseshoe Falls	225	conn's	+40	304 lots				
Required	1		135 gpm	45,016 gals	450 gpm	T	4,502 gals	22,508 gals
Provided	1	136	gpm	43,917 gals	0 gpm		0 gals	43,917 gals
Facility Design Limit		conn's	gpm	gals	gpm	F	gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			135 gpm	1,099 gals	450 gpm		4,502 gals	-21,409 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA	*Stby*	*Rated*			0.60 gpm			
Primary		0.60 gpm		200 gals	2 gpm		20 gals	100 gals
Secondary		50			2 pk dy		30,000 gals	200 gals
Service area limit		250 conn's			1000 gpm		2,500 conn's	2,500 conn's
		projected						
Crystal Heights	30	conn's +5		153 lots				
Required	1		18 gpm	6,083 gals	61 gpm	T	608 gals	0 gals
Provided	73		gpm	6,083 gals	0 gpm		2,500 gals	0 gals
Facility Design Limit	30	conn's	18 gpm	gals	gpm		608 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			18 gpm	0 gals	61 gpm		0 gals	0 gals
GROUP SUMMARY	929	connections						
Required	2		318 gpm	105,899 gals	1,059 gpm	T	10,590 gals	0 gals
Provided	1	209	0 gpm	50,000 gals	0 gpm		2,500 gals	43,917 gals
Difference (capacity)	Deficit		-318 gpm	-55,899 gals	-1,059 gpm		-8,090 gals	43,917 gals
Difference (conn's)			(529)	(279)	(529)		(404)	439
Adjusted Net			*(318) gpm*	*(55,899) gals*	*(1,059) gpm*			*(5,991) gals*
North Lake Estates			projected					
Cougar Ridge	30	conn's +6		153 lots				
Required	1		18 gpm	6,083 gals	61 gpm	T	608 gals	0 gals
Provided	2		35 gpm	0 gals	0 gpm		5000 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	12,000 gals	200 gpm		0 gals	0 gals
External Facility Capacity			-17 gpm	-5,517 gals	-55 gpm		-552 gals	0 gals
The Point			projected					
DBH/Hillcrest	75	conn's +13		393 lots				
Required	1		45 gpm	15,086 gals	151 gpm	T	1,509 gals	0 gals
Provided	2		130 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit	217	conn's	130 gpm	43,400 gals	434 gpm	T	4,340 gals	gals
Proposed Upgrade			0 gpm	50,000 gals	500 gpm		5,000 gals	34,914 gals
External Facility Capacity			-85 gpm	-28,314 gals	-283 gpm		-2,831 gals	-34,914 gals
			projected					
Canyon Lake Acres	111	conn's +20		627 lots				
Required	1		66 gpm	22,143 gals	221 gpm	T	2,214 gals	11,072 gals
Provided	1		35 gpm	42,000 gals	0 gpm		0 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			32 gpm	10,543 gals	221 gpm		2,214 gals	11,072 gals
Scenic Terrace			projected					
Hancock Canyon	57	conn's +11		411 lots				
Required	1		34 gpm	11,437 gals	114 gpm	T	1,144 gals	0 gals
Provided	1		75 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
External Facility Capacity			-41 gpm	-13,563 gals	-136 gpm		-1,356 gals	0 gals
			projected					
Lakeside Valley	6	conn's +1		59 lots				
Required	1		4 gpm	1,217 gals	12 gpm	T	122 gals	0 gals
Provided	1		25 gpm	0 gals	0 gpm		*500* gals	0 gals
Facility Design Limit	6	conn's	4 gpm	1,217 gals	12 gpm	F	122 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		gals	0 gals
External Facility Capacity			0 gpm	1,217 gals	12 gpm		0 gals	0 gals
			projected					
Tamarack Shores	232	conn's +41		651 lots				
Required	1		139 gpm	46,476 gals	465 gpm	T	4,648 gals	4,538 gals
Provided	1		112 gpm	39,500 gals	400 gpm		5,000 gals	0 gals
Facility Design Limit	187	conn's	112 gpm	37,400 gals	374 gpm	F	3,740 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			27 gpm	9,076 gals	91 gpm		908 gals	4,538 gals
			projected					
Tanglewood Shores	120	conn's +21		369 lots				
Required	1		72 gpm	24,090 gals	241 gpm	T	2,409 gals	10,245 gals
Provided	1		35 gpm	54,000 gals	40 gpm		360 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			37 gpm	12,490 gals	201 gpm		2,049 gals	10,245 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Canyon Lake Island	9	conn's	+2	171 lots				
Required	1		5 gpm	1,703 gals	17 gpm	T	170 gals	0 gals
Provided	1		75 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
External Facility Capacity			-70 gpm	-23,297 gals	-233 gpm		-2,330 gals	0 gals
			projected					
Canyon Lake Shores	158	conn's	+28	779 lots				
Required	1		95 gpm	31,633 gals	316 gpm	T	3,163 gals	0 gals
Provided	2		175 gpm	20,000 gals	95 gpm		840 gals	0 gals
Facility Design Limit	200	conn's	120 gpm	40,000 gals	400 gpm	F	4,000 gals	gals
Proposed Upgrade			0 gpm	20,000 gals	400 gpm		4,000 gals	0 gals
External Facility Capacity			-25 gpm	-8,367 gals	-84 gpm		-837 gals	0 gals
GROUP SUMMARY	799	connections						
Required	2		480 gpm	159,868 gals	1,599 gpm	T	15,987 gals	0 gals
Provided	12		697 gpm	155,500 gals	535 gpm		41,700 gals	0 gals
Difference (capacity)	ok		217 gpm	-4,368 gals	-1,064 gpm		25,713 gals	0 gals
Difference (conn's)			362	(22)	(532)		1,286	0
Adjusted Net			*141 gpm*	*45,732 gals*	*265 gpm*			*9,059 gals*
Deer River	133		conn's +24	347 lots				
Required	1		80 gpm	26,523 gals	265 gpm	T	2,652 gals	0 gals
Provided	2		*123* gpm	26,175 gals	255 gpm		1,050 gals	0 gals
Facility Design Limit	205	conn's	123 gpm	41,000 gals	410 gpm	F	4,100 gals	gals
Proposed Upgrade	1		60 gpm	26,000 gals	200 gpm		2,200 gals	0 gals
External Facility Capacity			-43 gpm	-14,477 gals	-145 gpm		-598 gals	0 gals
Lake of the Hills	75		conn's +13	668 lots				
Required	1		45 gpm	15,086 gals	151 gpm	T	1,509 gals	3,243 gals
Provided	2		26 gpm	13,860 gals	90 gpm		1,220 gals	0 gals
Facility Design Limit	43	conn's	26 gpm	8,600 gals	86 gpm	F	860 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			19 gpm	6,486 gals	65 gpm		649 gals	3,243 gals
			projected					
Riverwood	101		conn's +18	156 lots				
Required	1		61 gpm	20,196 gals	202 gpm	T	2,020 gals	898 gals
Provided	2		55 gpm	16,000 gals	160 gpm		5,000 gals	0 gals
Facility Design Limit	92	conn's	55 gpm	18,400 gals	184 gpm	F	1,840 gals	gals
Proposed Upgrade			0 gpm	gals	100 gpm		0 gals	0 gals
External Facility Capacity			5 gpm	4,196 gals	18 gpm		180 gals	898 gals
OVERALL SUMMARY	5,193	connections						
Required	2		3,060 gpm	1,026,630 gals	5,189 gpm	F	FALSE gals	513,315 gals
Provided	38		3,581 gpm	1,160,752 gals	4,970 gpm		108,650 gals	168,717 gals
Difference (capacity)	ok		481 gpm	134,122 gals	-1,190 gpm		108,650 gals	-344,598 gals
Difference (conn's)			302	871	(595)		6,433	13,448

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Astro Hills/CL Hills 1,2,3	**508**	**conn's**		**1,735**	**lots**			
Required	2		305 gpm	101,545 gals	305 gpm	T	10,154 gals	50,772 gals
Provided	2		250 gpm	83,500 gals	900 gpm		0 gals	250,000 gals
Facility Design Limit	417	conn's	250 gpm	83,400 gals	834 gpm	F	8,340 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			54 gpm	18,145 gals	-529 gpm		10,154 gals	-199,228 gals
			projected					
Canyon Lake Hills 4,5,6	**392**	**conn's**		**750**	**lots**			
Required	2		235 gpm	78,453 gals	785 gpm	T	7,845 gals	39,226 gals
Provided	1		140 gpm	92,500 gals	500 gpm		0 gals	0 gals
Facility Design Limit	233	conn's	140 gpm	46,600 gals	466 gpm	F	4,660 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			96 gpm	31,853 gals	319 gpm		7,845 gals	39,226 gals
			projected					
Lakeview Park	**283**	**conn's**		**382**	**lots**			
Required	2		170 gpm	56,545 gals	565 gpm	T	5,655 gals	28,273 gals
Provided	2		150 gpm	88,000 gals	500 gpm		0 gals	0 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			20 gpm	6,545 gals	65 gpm		5,655 gals	28,273 gals
			projected					
Rolling Hills	**462**	**conn's**		**580**	**lots**			
Required	2		277 gpm	92,367 gals	924 gpm	T	9,237 gals	46,184 gals
Provided	2		210 gpm	70,700 gals	700 gpm		0 gals	0 gals
Facility Design Limit	350	conn's	210 gpm	70,000 gals	700 gpm	F	7,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			67 gpm	22,367 gals	224 gpm		9,237 gals	46,184 gals
Waterfront Park			projected					
Canyon Lake Forest	**526**	**conn's**		**1,050**	**lots**			
Required	2		316 gpm	105,187 gals	1,000 gpm	F	10,519 gals	0 gals
Provided	2		355 gpm	115600 gals	1,000 gpm		21000 gals	0 gals
Facility Design Limit	592	conn's	355 gpm	118,400 gals	1,000 gpm	F	11,840 gals	gals
Proposed Upgrade			0 gpm	gals	0 gpm		0 gals	0 gals
External Facility Capacity			-40 gpm	-10,413 gals	0 gpm		-1,321 gals	0 gals
			projected					
Woodlands/CLFSo Upper	***178***	**conn's**	*+ 58*	**425**	**lots**			
Required	1		107 gpm	35,526 gals	355 gpm	T	3,553 gals	[redacted] gals
Provided	1		0 gpm	35,526 gals	400 gpm		6,000 gals	[redacted] gals
Facility Design Limit	178	conn's	107 gpm	35,526 gals	355 gpm	F	3,553 gals	[redacted] gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	[redacted] gals
External Facility Capacity			107 gpm	0 gals	0 gpm		0 gals	[redacted] gals
			projected					
Woodlands	**129**	**conn's**	*+ 0*	**-52**	**lots**			
Required	1		77 gpm	25,800 gals	258 gpm	T	2,580 gals	12,900 gals
Provided	1		150 gpm	18,474 gals	0 gpm		0 gals	18,474 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		0 gals	0 gals
External Facility Capacity			-73 gpm	7,326 gals	258 gpm		2,580 gals	-5,574 gals
GROUP SUMMARY	***2,477***	**connections**						
Required	2		1,486 gpm	495,423 gals	2,973 gpm	F	30,000 gals	0 gals
Provided	11		1,255 gpm	504,300 gals	4,000 gpm		27,000 gals	268,474 gals
Difference (capacity)	ok		-231 gpm	8,877 gals	1,027 gpm		-3,000 gals	268,474 gals
Difference (conn's)			(355)	44	514		(150)	2,685
Adjusted Net			*-231 gpm*	*-76,823 gals*	*-336 gpm*			*91,119 gals*
			projected					
Upper Plane	***37***	**conn's**	*+ 12*	**134**	**lots**			
Required	1		22 gpm	7,401 gals	74 gpm	T	740 gals	[redacted] gals
Provided			gpm	50,000 gals	100 gpm		gals	[redacted] gals
Facility Design Limit	37	conn's	22 gpm	7,401 gals	74 gpm		740 gals	[redacted] gals
Proposed Upgrade			gpm	0 gals	0 gpm		0 gals	[redacted] gals
External Facility Capacity			22 gpm	0 gals	0 gpm		740 gals	[redacted] gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		Stby / Rated			0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
		projected						
The Oaks	262	conn's +85		353 lots				
Required	2		157 gpm	52,401 gals	524 gpm	T	5,240 gals	10,400 gals
Provided	2		95 gpm	88,599 gals	400 gpm		7,000 gals	42,599 gals
Facility Design Limit	158	conn's	95 gpm	31,600 gals	316 gpm	F	3,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			62 gpm	20,801 gals	208 gpm		2,080 gals	-32,198 gals
		projected						
Village West	706	conn's +229		706 lots				
Required	2		424 gpm	141,200 gals	1,000 gpm	F	14,120 gals	70,600 gals
Provided	2	241	0 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit		conn's	gpm	gals	gpm	F	gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			424 gpm	141,200 gals	1,000 gpm		14,120 gals	70,600 gals
		projected						
Triple Peak	102	conn's +0		99 lots				
Required	1		61 gpm	20,400 gals	61 gpm	T	2,040 gals	10,200 gals
Provided	1	40	0 gpm	200,000 gals	1,050 gpm		2,180 gals	100,000 gals
Facility Design Limit	0	conn's	0 gpm	0 gals	gpm	F	0 gals	gals
Proposed Upgrade			gpm	gals	gpm		0 gals	0 gals
External Facility Capacity			61 gpm	-179,600 gals	-989 gpm		2,040 gals	-89,800 gals
		projected						
Canyon Lake Village	335	conn's +109		1,060 lots				
Required	2		201 gpm	66,907 gals	669 gpm	T	6,691 gals	20,954 gals
Provided	1		150 gpm	70,000 gals	260 gpm		2,500 gals	0 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	300 gpm		0 gals	0 gals
External Facility Capacity			51 gpm	16,907 gals	169 gpm		4,191 gals	20,954 gals
		projected						
Summit	269	conn's +87		410 lots				
Required	2		162 gpm	53,881 gals	539 gpm	T	5,388 gals	14,440 gals
Provided	1		110 gpm	80,000 gals	720 gpm		2,500 gals	0 gals
Facility Design Limit	183	conn's	110 gpm	36,600 gals	366 gpm	F	3,660 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			52 gpm	17,281 gals	173 gpm		2,888 gals	14,440 gals
GROUP SUMMARY	1,711	connections						
Required	2		1,027 gpm	342,190 gals	2,053 gpm	F	30,000 gals	0 gals
Provided	7	261	355 gpm	486,599 gals	2,530 gpm		14,180 gals	142,599 gals
Difference (capacity)	ok		-672 gpm	144,409 gals	477 gpm		-15,820 gals	142,599 gals
Difference (conn's)			(1,119)	732	238		(791)	1,426
Adjusted Net			*-672 gpm*	*-16,689 gals*	*-561 gpm*			*16,004 gals*
Sattler	195	conn's +0		0 lots				
Required	1		117 gpm	39,000 gals	117 gpm	T	3,900 gals	19,500 gals
Provided	0		0 gpm	50,000 gals	0 gpm		0 gals	50,000 gals
Facility Design Limit		conn's	gpm	gals	gpm		gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			117 gpm	-11,000 gals	117 gpm		3,900 gals	-30,500 gals
		projected						
Riverside	79	conn's +0		79 lots				
Required	1		47 gpm	15,800 gals	158 gpm	T	1,580 gals	7,900 gals
Provided	0		0 gpm	0 gals	0 gpm		0 gals	0 gals
Facility Design Limit		conn's	gpm	gals	gpm		gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			47 gpm	15,800 gals	158 gpm		1,580 gals	7,900 gals
		projected						
Horseshoe Falls	274	conn's +89		304 lots				
Required	2		164 gpm	54,769 gals	548 gpm	T	5,477 gals	27,385 gals
Provided	1	136	gpm	42,599 gals	0 gpm		0 gals	42,599 gals
Facility Design Limit		conn's	gpm	gals	gpm	F	gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			164 gpm	12,170 gals	548 gpm		5,477 gals	-15,214 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Crystal Heights	37	conn's	+12	153 lots				
Required	1		22 gpm	7,401 gals	74 gpm	T	740 gals	0 gals
Provided	73		gpm	7,401 gals	0 gpm		2,500 gals	0 gals
Facility Design Limit	37	conn's	22 gpm	gals	gpm		740 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			22 gpm	0 gals	74 gpm		0 gals	0 gals
GROUP SUMMARY	585	connections						
Required	2		351 gpm	116,970 gals	1,170 gpm	T	11,697 gals	0 gals
Provided	1	209	0 gpm	100,000 gals	0 gpm		2,500 gals	92,599 gals
Difference (capacity)	Deficit		-351 gpm	-16,970 gals	-1,170 gpm		-9,197 gals	92,599 gals
Difference (conn's)			(585)	(85)	(585)		(480)	926
Adjusted Net			*(351) gpm*	*(16,970) gals*	*(697) gpm*			*37,814 gals*
North Lake Estates			projected					
Cougar Ridge	37	conn's	+13	153 lots				
Required	1		22 gpm	7,401 gals	74 gpm	T	740 gals	0 gals
Provided	2		35 gpm	12,000 gals	200 gpm		5000 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-13 gpm	-4,199 gals	-42 gpm		-420 gals	0 gals
The Point			projected					
DBH/Hillcrest	92	conn's	+30	393 lots				
Required	1		55 gpm	18,355 gals	55 gpm	T	1,836 gals	0 gals
Provided	2		130 gpm	50,000 gals	500 gpm		5,000 gals	31,645 gals
Facility Design Limit	217	conn's	130 gpm	43,400 gals	434 gpm	F	4,340 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-75 gpm	-25,045 gals	-379 gpm		-2,504 gals	-31,645 gals
			projected					
Canyon Lake Acres	135	conn's	+44	627 lots				
Required	1		81 gpm	26,940 gals	269 gpm	T	2,694 gals	13,470 gals
Provided	1		35 gpm	42,000 gals	0 gpm		0 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			46 gpm	15,340 gals	269 gpm		2,694 gals	13,470 gals
Scenic Terrace			projected					
Hancock Canyon	70	conn's	+24	411 lots				
Required	1		42 gpm	13,914 gals	139 gpm	T	1,391 gals	0 gals
Provided	1		75 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-33 gpm	-11,086 gals	-111 gpm		-1,109 gals	0 gals
			projected					
Lakeside Valley	7	conn's	+2	59 lots				
Required	1		4 gpm	1,480 gals	15 gpm	T	148 gals	0 gals
Provided	1		25 gpm	0 gals	0 gpm		*500* gals	0 gals
Facility Design Limit	7	conn's	4 gpm	1,480 gals	15 gpm	F	148 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		gals	0 gals
External Facility Capacity			0 gpm	1,480 gals	15 gpm		0 gals	0 gals
			projected					
Tamarack Shores	283	conn's	+92	651 lots				
Required	2		170 gpm	56,545 gals	565 gpm	T	5,655 gals	9,573 gals
Provided	1		112 gpm	39,500 gals	400 gpm		5,000 gals	0 gals
Facility Design Limit	187	conn's	112 gpm	37,400 gals	374 gpm	F	3,740 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			57 gpm	19,145 gals	191 gpm		1,915 gals	9,573 gals
			projected					
Tanglewood Shores	147	conn's	+48	369 lots				
Required	1		88 gpm	29,309 gals	293 gpm	T	2,931 gals	12,854 gals
Provided	1		35 gpm	54,000 gals	40 gpm		360 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			53 gpm	17,709 gals	253 gpm		2,571 gals	12,854 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Canyon Lake Island	*10*	conn's	+3	171 lots				
Required	1		6 gpm	2,072 gals	21 gpm	T	207 gals	0 gals
Provided	1		75 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-69 gpm	-22,928 gals	-229 gpm		-2,293 gals	0 gals
			projected					
Canyon Lake Shores	192	conn's	+62	779 lots				
Required	1		115 gpm	38,486 gals	385 gpm	T	3,849 gals	0 gals
Provided	2	175	700 gpm	40,000 gals	400 gpm		4,000 gals	0 gals
Facility Design Limit	1167	conn's	700 gpm	233,400 gals	1,400 gpm	T	23,340 gals	gals
Proposed Upgrade			0 gpm	194,000 gals	1,100 gpm		gals	25,000 gals
External Facility Capacity			-585 gpm	-194,914 gals	-1,016 gpm		-151 gals	-25,000 gals
GROUP SUMMARY	973	connections						
Required	2		584 gpm	194,504 gals	1,945 gpm	T	19,450 gals	0 gals
Provided	12		1,222 gpm	200,500 gals	1,140 gpm		47,360 gals	0 gals
Difference (capacity)	ok		638 gpm	5,996 gals	-805 gpm		27,910 gals	0 gals
Difference (conn's)			1,064	30	(402)		1,395	0
Adjusted Net			*618 gpm*	*204,498 gals*	*1,048 gpm*			*20,748 gals*
Deer River	161		conn's +62	347 lots				
Required	1		97 gpm	32,269 gals	323 gpm	T	3,227 gals	0 gals
Provided	2		123 gpm	52,175 gals	455 gpm		3,250 gals	0 gals
Facility Design Limit	205	conn's	123 gpm	41,000 gals	410 gpm	F	4,100 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-26 gpm	-8,731 gals	-87 gpm		-23 gals	0 gals
Lake of the Hills	92		conn's +30	668 lots				
Required	1		55 gpm	18,355 gals	184 gpm	T	1,836 gals	4,878 gals
Provided	2		26 gpm	13,860 gals	90 gpm		1,220 gals	0 gals
Facility Design Limit	43	conn's	26 gpm	8,600 gals	86 gpm	F	860 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			29 gpm	9,755 gals	98 gpm		976 gals	4,878 gals
			projected					
Riverwood	123		conn's +40	156 lots				
Required	1		74 gpm	24,572 gals	246 gpm	T	2,457 gals	3,086 gals
Provided	2		55 gpm	16,000 gals	260 gpm		5,000 gals	0 gals
Facility Design Limit	92	conn's	55 gpm	18,400 gals	184 gpm	F	1,840 gals	gals
Proposed Upgrade			0 gpm	gals	0 gpm		0 gals	0 gals
External Facility Capacity			19 gpm	8,572 gals	62 gpm		617 gals	3,086 gals
OVERALL SUMMARY	6,121	connections						
Required	2		3,673 gpm	1,224,264 gals	7,348 gpm	F	FALSE gals	612,142 gals
Provided	98		3,036 gpm	1,275,434 gals	8,475 gpm		98,010 gals	411,073 gals
Difference (capacity)	ok		-637 gpm	51,150 gals	1,129 gpm		95,010 gals	-201,069 gals
Difference (conn's)			11,061	256	568		4,901	12,011

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		Stby	Rated		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Astro Hills/CL Hills 1,2,3	752	conn's		1,735 lots				
Required	2		451 gpm	150,311 gals	451 gpm	T	15,031 gals	75,156 gals
Provided	2		250 gpm	83,500 gals	900 gpm		0 gals	250,000 gals
Facility Design Limit	417	conn's	250 gpm	83,400 gals	834 gpm	F	8,340 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			201 gpm	66,911 gals	-383 gpm		15,031 gals	-174,844 gals
			projected					
Canyon Lake Hills 4,5,6	581	conn's		750 lots				
Required	2		348 gpm	116,130 gals	1,000 gpm	F	11,613 gals	58,065 gals
Provided	1		140 gpm	92,500 gals	500 gpm		0 gals	0 gals
Facility Design Limit	233	conn's	140 gpm	46,600 gals	466 gpm	F	4,660 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			209 gpm	69,530 gals	534 gpm		11,613 gals	58,065 gals
			projected					
Lakeview Park	306	conn's		382 lots				
Required	2		183 gpm	61,120 gals	611 gpm	T	6,112 gals	30,560 gals
Provided	2		150 gpm	88,000 gals	500 gpm		0 gals	0 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			33 gpm	11,120 gals	111 gpm		6,112 gals	30,560 gals
			projected					
Rolling Hills	464	conn's		580 lots				
Required	2		278 gpm	92,800 gals	928 gpm	T	9,280 gals	46,400 gals
Provided	2		210 gpm	70,700 gals	700 gpm		0 gals	0 gals
Facility Design Limit	350	conn's	210 gpm	70,000 gals	700 gpm	F	7,000 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			68 gpm	22,800 gals	228 gpm		9,280 gals	46,400 gals
Waterfront Park			projected					
Canyon Lake Forest	690	conn's		1,050 lots				
Required	2		414 gpm	138,030 gals	1,000 gpm	F	13,803 gals	9,815 gals
Provided	2		355 gpm	115600 gals	1,000 gpm		21000 gals	0 gals
Facility Design Limit	592	conn's	355 gpm	118,400 gals	1,000 gpm	F	11,840 gals	gals
Proposed Upgrade			0 gpm	gals	0 gpm		0 gals	0 gals
External Facility Capacity			59 gpm	22,430 gals	0 gpm		1,963 gals	9,815 gals
			projected					
Woodlands/CLFSo Upper	263	conn's	+143	425 lots				
Required	2		158 gpm	52,587 gals	526 gpm	T	5,259 gals	[redacted] gals
Provided	1		0 gpm	52,587 gals	400 gpm		0 gals	[redacted] gals
Facility Design Limit	263	conn's	158 gpm	52,587 gals	526 gpm	F	5,259 gals	[redacted] gals
Proposed Upgrade			0 gpm	0 gals	200 gpm		0 gals	[redacted] gals
External Facility Capacity			158 gpm	0 gals	0 gpm		5,259 gals	[redacted] gals
			projected					
Woodlands	129	conn's	+0	-52 lots				
Required	1		77 gpm	25,800 gals	258 gpm	T	2,580 gals	12,900 gals
Provided	1		150 gpm	1,413 gals	0 gpm		0 gals	1,413 gals
Facility Design Limit	250	conn's	150 gpm	50,000 gals	500 gpm	F	5,000 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		0 gals	0 gals
External Facility Capacity			-73 gpm	24,387 gals	258 gpm		2,580 gals	11,487 gals
GROUP SUMMARY	3,184	connections						
Required	2		1,910 gpm	636,777 gals	3,821 gpm	F	FALSE gals	316,389 gals
Provided	11		1,255 gpm	504,300 gals	4,000 gpm		21,000 gals	251,413 gals
Difference (capacity)	ok		-655 gpm	-132,477 gals	179 gpm		21,000 gals	-86,976 gals
Difference (conn's)			(1,092)	(662)	90		1,050	(870)
Adjusted Net			*-655 gpm*	*-217,177 gals*	*-748 gpm*			*18,518 gals*
			projected					
Upper Plane	55	conn's	+30	134 lots				
Required	1		33 gpm	10,956 gals	110 gpm	T	1,096 gals	[redacted] gals
Provided			gpm	50,000 gals	100 gpm		gals	[redacted] gals
Facility Design Limit	55	conn's	33 gpm	10,956 gals	110 gpm		1,096 gals	[redacted] gals
Proposed Upgrade			gpm	0 gals	100 gpm		0 gals	[redacted] gals
External Facility Capacity			33 gpm	0 gals	0 gpm		1,096 gals	[redacted] gals

Description			Supply Capacity (gpm)		Total Storage (gal's)		Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		Stby	Rated				0.60 gpm			
Primary			0.60 gpm		200	gals	2 gpm		20 gals	100 gals
Secondary			50				2 pk dy		30,000 gals	200 gals
Service area limit			250	conn's			1000 gpm		2,500 conn's	2,500 conn's
			projected							
The Oaks	**282**	**conn's**	*+105*		**353**	**lots**				
Required	2		169	gpm	56,480	gals	565	gpm T	5,648 gals	12,440 gals
Provided	2		95	gpm	85,044	gals	400	gpm	7,000 gals	39,044 gals
Facility Design Limit	158	conn's	95	gpm	31,600	gals	95	gpm T	3,160 gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	50,000 gals
External Facility Capacity			75	gpm	24,880	gals	470	gpm	2,488 gals	-76,604 gals
			projected							
Village West	**706**	**conn's**	*+229*		**706**	**lots**				
Required	2		424	gpm	141,200	gals	1,000	gpm F	14,120 gals	70,600 gals
Provided	2	241	0	gpm	0	gals	0	gpm	0 gals	0 gals
Facility Design Limit		conn's		gpm		gals		gpm F	gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	0 gals
External Facility Capacity			424	gpm	141,200	gals	1,000	gpm	14,120 gals	70,600 gals
			projected							
Triple Peak	**102**	**conn's**	*+0*		**99**	**lots**				
Required	1		61	gpm	20,400	gals	61	gpm T	2,040 gals	10,200 gals
Provided	1	40	0	gpm	200,000	gals	1,050	gpm	2,180 gals	100,000 gals
Facility Design Limit	0	conn's	0	gpm	0	gals		gpm F	0 gals	gals
Proposed Upgrade				gpm		gals		gpm	0 gals	0 gals
External Facility Capacity			61	gpm	-179,600	gals	-989	gpm	2,040 gals	-89,800 gals
			projected							
Canyon Lake Village	**495**	**conn's**	*+269*		**1,060**	**lots**				
Required	2		297	gpm	99,039	gals	990	gpm T	9,904 gals	37,019 gals
Provided	1		150	gpm	70,000	gals	260	gpm	2,500 gals	0 gals
Facility Design Limit	250	conn's	150	gpm	50,000	gals	500	gpm F	5,000 gals	gals
Proposed Upgrade			0	gpm	0	gals	300	gpm	0 gals	0 gals
External Facility Capacity			147	gpm	49,039	gals	490	gpm	7,404 gals	37,019 gals
			projected							
Summit	**399**	**conn's**	*+217*		**410**	**lots**				
Required	2		239	gpm	79,757	gals	798	gpm T	7,976 gals	27,378 gals
Provided	1		110	gpm	80,000	gals	720	gpm	2,500 gals	0 gals
Facility Design Limit	183	conn's	110	gpm	36,600	gals	366	gpm F	3,660 gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	0 gals
External Facility Capacity			129	gpm	43,157	gals	432	gpm	5,476 gals	27,378 gals
GROUP SUMMARY	**2,029**	**connections**								
Required	2		1,223	gpm	407,831	gals	2,447	gpm F	30,000 gals	0 gals
Provided	7	281	386	gpm	486,044	gals	2,530	gpm	14,160 gals	139,044 gals
Difference (capacity)	ok		-838	gpm	77,213	gals	83	gpm	-15,829 gals	139,044 gals
Difference (conn's)			(1,447)		386		42		(791)	1,380
Adjusted Net			*-869*	*gpm*	*-78,676*	*gals*	*1,403*	*gpm*		*31,407 gals*
Sattler	**195**	**conn's**	*+0*		**0**	**lots**				
Required	1		117	gpm	39,000	gals	117	gpm T	3,900 gals	19,500 gals
Provided	0		0	gpm	50,000	gals	0	gpm	0 gals	50,000 gals
Facility Design Limit		conn's		gpm		gals		gpm	gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	0 gals
External Facility Capacity			117	gpm	-11,000	gals	117	gpm	3,900 gals	-30,500 gals
			projected							
Riverside	**79**	**conn's**	*+0*		**79**	**lots**				
Required	1		47	gpm	15,800	gals	158	gpm T	1,580 gals	7,900 gals
Provided	0		0	gpm	0	gals	0	gpm	0 gals	0 gals
Facility Design Limit		conn's		gpm		gals		gpm	gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	0 gals
External Facility Capacity			47	gpm	15,800	gals	158	gpm	1,580 gals	7,900 gals
			projected							
Horseshoe Falls	**304**	**conn's**	*+119*		**304**	**lots**				
Required	2		182	gpm	60,800	gals	608	gpm T	6,080 gals	30,400 gals
Provided	1	136		gpm	39,044	gals	0	gpm	0 gals	39,044 gals
Facility Design Limit		conn's		gpm		gals		gpm F	gals	gals
Proposed Upgrade			0	gpm	0	gals	0	gpm	0 gals	0 gals
External Facility Capacity			182	gpm	21,756	gals	608	gpm	6,080 gals	-8,644 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		*Stby*	*Rated*		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Crystal Heights	**55**	**conn's**	*+30*	**153** **lots**				
Required	1		33 gpm	10,956 gals	110 gpm	T	1,096 gals	0 gals
Provided		73	gpm	10,956 gals	0 gpm		2,500 gals	0 gals
Facility Design Limit	55	conn's	33 gpm	gals	gpm		1,096 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			33 gpm	0 gals	110 gpm		0 gals	0 gals
GROUP SUMMARY	**633**	**connections**						
Required	2		380 gpm	126,556 gals	1,266 gpm	T	12,656 gals	0 gals
Provided	1	209	0 gpm	100,000 gals	0 gpm		2,500 gals	89,044 gals
Difference (capacity)	Deficit		-380 gpm	-26,556 gals	-1,266 gpm		-10,156 gals	89,044 gals
Difference (conn's)			(633)	(133)	(633)		(508)	890
Adjusted Net			*(380) gpm*	*(26,556) gals*	*(993) gpm*			*51,244 gals*
North Lake Estates			projected					
Cougar Ridge	**55**	**conn's**	*+31*	**153** **lots**				
Required	1		33 gpm	10,956 gals	110 gpm	T	1,096 gals	0 gals
Provided	2		35 gpm	12,000 gals	200 gpm		5000 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-2 gpm	-644 gals	-6 gpm		-64 gals	0 gals
The Point			projected					
DBH/Hillcrest	**136**	**conn's**	*+74*	**393** **lots**				
Required	1		82 gpm	27,170 gals	272 gpm	T	2,717 gals	0 gals
Provided	2		130 gpm	50,000 gals	500 gpm		5,000 gals	22,830 gals
Facility Design Limit	217	conn's	130 gpm	43,400 gals	434 gpm	F	4,340 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-49 gpm	-16,230 gals	-162 gpm		-1,623 gals	-22,830 gals
			projected					
Canyon Lake Acres	**199**	**conn's**	*+108*	**627** **lots**				
Required	1		120 gpm	39,878 gals	399 gpm	T	3,988 gals	19,939 gals
Provided	1		35 gpm	42,000 gals	0 gpm		0 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			85 gpm	28,278 gals	399 gpm		3,988 gals	19,939 gals
Scenic Terrace			projected					
Hancock Canyon	**103**	**conn's**	*+67*	**411** **lots**				
Required	1		62 gpm	20,597 gals	206 gpm	T	2,060 gals	0 gals
Provided	1		75 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-13 gpm	-4,403 gals	-44 gpm		-440 gals	0 gals
			projected					
Lakeside Valley	***11***	**conn's**	*+6*	**59** **lots**				
Required	1		7 gpm	2,191 gals	22 gpm	T	219 gals	0 gals
Provided	1		25 gpm	0 gals	0 gpm		*500* gals	0 gals
Facility Design Limit	11	conn's	7 gpm	2,191 gals	22 gpm	F	219 gals	gals
Proposed Upgrade			0 gpm	gals	gpm		gals	0 gals
External Facility Capacity			0 gpm	2,191 gals	22 gpm		0 gals	0 gals
			projected					
Tamarack Shores	**419**	**conn's**	*+228*	**651** **lots**				
Required	2		251 gpm	83,701 gals	837 gpm	T	8,370 gals	23,150 gals
Provided	1		112 gpm	39,500 gals	400 gpm		5,000 gals	0 gals
Facility Design Limit	187	conn's	112 gpm	37,400 gals	112 gpm	T	3,740 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	50,000 gals
External Facility Capacity			139 gpm	46,301 gals	725 gpm		4,630 gals	-26,850 gals
			projected					
Tanglewood Shores	**217**	**conn's**	*+118*	**369** **lots**				
Required	1		130 gpm	43,384 gals	434 gpm	T	4,338 gals	19,892 gals
Provided	1		35 gpm	54,000 gals	40 gpm		360 gals	0 gals
Facility Design Limit	58	conn's	35 gpm	11,600 gals	116 gpm	F	1,160 gals	gals
Proposed Upgrade			0 gpm	0 gals	gpm		0 gals	0 gals
External Facility Capacity			95 gpm	31,784 gals	394 gpm		3,978 gals	19,892 gals

Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		Stby	Rated		0.60 gpm			
Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary			50		2 pk dy		30,000 gals	200 gals
Service area limit			250 conn's		1000 gpm		2,500 conn's	2,500 conn's
			projected					
Canyon Lake Island	15	conn's	+8	171 lots				
Required	1		9 gpm	3,068 gals	31 gpm	T	307 gals	0 gals
Provided	1		75 gpm	25,000 gals	300 gpm		2,500 gals	0 gals
Facility Design Limit	125	conn's	75 gpm	25,000 gals	250 gpm	F	2,500 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			-66 gpm	-21,932 gals	-219 gpm		-2,193 gals	0 gals
			projected					
Canyon Lake Shores	285	conn's	+155	779 lots				
Required	2		171 gpm	56,969 gals	570 gpm	T	5,697 gals	0 gals
Provided	2		700 gpm	234,000 gals	1,500 gpm		4,000 gals	25,000 gals
Facility Design Limit	1167	conn's	700 gpm	233,400 gals	1,400 gpm	F	23,340 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		19,400 gals	0 gals
External Facility Capacity			-529 gpm	-176,431 gals	-831 gpm		-17,643 gals	-25,000 gals
GROUP SUMMARY	1,440	connections						
Required	2		864 gpm	287,914 gals	1,727 gpm	F	28,781 gals	0 gals
Provided	12		1,222 gpm	394,500 gals	2,240 gpm		47,360 gals	25,000 gals
Difference (capacity)	ok		358 gpm	106,586 gals	513 gpm		18,569 gals	25,000 gals
Difference (conn's)			597	533	256		928	250
Adjusted Net			*340 gpm*	*111,086 gals*	*(277) gpm*			*34,848 gals*
Deer River	239		conn's +130	347 lots				
Required	1		143 gpm	47,766 gals	478 gpm	T	4,777 gals	0 gals
Provided	2		*203* gpm	52,175 gals	455 gpm		3,250 gals	0 gals
Facility Design Limit	338	conn's	203 gpm	67,600 gals	676 gpm	F	6,760 gals	gals
Proposed Upgrade			80 gpm	15,500 gals	300 gpm		3,800 gals	0 gals
External Facility Capacity			-60 gpm	-19,834 gals	-198 gpm		-1,983 gals	0 gals
Lake of the Hills	136		conn's +74	668 lots				
Required	1		82 gpm	27,170 gals	272 gpm	T	2,717 gals	9,285 gals
Provided	2		26 gpm	13,860 gals	90 gpm		1,220 gals	0 gals
Facility Design Limit	43	conn's	26 gpm	8,600 gals	86 gpm	F	860 gals	gals
Proposed Upgrade			0 gpm	0 gals	0 gpm		0 gals	0 gals
External Facility Capacity			56 gpm	18,570 gals	186 gpm		1,857 gals	9,285 gals
			projected					
Riverwood	156		conn's +73	156 lots				
Required	1		94 gpm	31,200 gals	312 gpm	T	3,120 gals	6,400 gals
Provided	2		55 gpm	16,000 gals	260 gpm		5,000 gals	0 gals
Facility Design Limit	92	conn's	55 gpm	18,400 gals	184 gpm	F	1,840 gals	gals
Proposed Upgrade			0 gpm	gals	0 gpm		0 gals	0 gals
External Facility Capacity			38 gpm	15,200 gals	128 gpm		1,280 gals	6,400 gals
OVERALL SUMMARY	7,828	connections						
Required	2		4,698 gpm	1,565,214 gals	9,391 gpm	F	FALSE gals	782,607 gals
Provided	36		3,116 gpm	1,465,879 gals	9,575 gpm		92,010 gals	416,457 gals
Difference (capacity)	ok		-1,580 gpm	-99,335 gals	184 gpm		92,010 gals	-367,150 gals
Difference (conn's)			(2,833)	(497)	92		4,601	(3,671)

Segment No.	Phase	System	Line Size (in.)	Unit	Unit Price	Quantity (L.F.)	Subtotal	Engr./Conting. 35%	Total Cost
1	1	Astro Hills/CLH 1,2,3	Plant Upgrade	LS	$ 55,000	1	$55,000	$19,250	$74,250
2	1	Astro Hills/CLH 1,2,3	8	L.F.	$ 30	4,658	$139,740	$48,909	$188,649
3	1	Astro Hills/CLH 1,2,3	8	L.F.	$ 30	5,947	$178,410	$62,444	$240,854
4	1	Astro Hills/CLH 1,2,3	12	L.F.	$ 40	1,607	$64,280	$22,498	$86,778
8	1	Lakeview Park	6	L.F.	$ 25	804	$20,100	$7,035	$27,135
9	1	Lakeview Park	Plant Upgrade	LS	$ 20,000	1	$20,000	$7,000	$27,000
10	1	Rolling Hills	Plant Upgrade	LS	$ 50,000	1	$50,000	$17,500	$67,500
16	1	Woodlands/CL Forest	Plant Upgrade	LS	$ 45,000	1	$45,000	$15,750	$60,750
17	1	Woodlands/CL Forest	8	L.F.	$ 30	719	$21,570	$7,550	$29,120
18	1	CL Forest/Waterfront Park	6	L.F.	$ 25	1,272	$31,800	$11,130	$42,930
19	1	CL Forest/Waterfront Park	8	L.F.	$ 30	432	$12,960	$4,536	$17,496
20	1	CL Forest/Waterfront Park	6	L.F.	$ 25	391	$9,775	$3,421	$13,196
21	1	CL Forest/Waterfront Park	6	L.F.	$ 25	712	$17,800	$6,230	$24,030
22	1	CL Forest/Waterfront Park	Plant Upgrade	LS	$ 23,000	1	$23,000	$8,050	$31,050
25	1	The Oaks	6	L.F.	$ 25	2,148	$53,700	$18,795	$72,495
26	1	The Oaks	6	L.F.	$ 25	778	$19,450	$6,808	$26,258
27	1	The Oaks	6	L.F.	$ 25	837	$20,925	$7,324	$28,249
28	1	The Oaks	6	L.F.	$ 25	783	$19,575	$6,851	$26,426
30	1	The Oaks	EGST/Pump Station	LS	$ 75,000	1	$75,000	$26,250	$101,250
31	1	The Oaks	8	L.F.	$ 40	3,921	$156,840	$54,894	$211,734
32	1	The Oaks	6	L.F.	$ 25	600	$15,000	$5,250	$20,250
50	1	CLV West/Triple Peak	12	L.F.	$ 40	2,433	$97,320	$34,062	$131,382
51	1	CLV West/Triple Peak	Plant Upgrade	LS	$ 45,000	1	$45,000	$15,750	$60,750
51	1	CLV West/Triple Peak	Expand EGST	LS	$ 35,000	1	$35,000	$12,250	$47,250
60	1	Sattler	6	L.F.	$ 25	668	$16,700	$5,845	$22,545
61	1	Sattler	4	L.F.	$ 18	506	$9,108	$3,188	$12,296
62	1	Sattler	6	L.F.	$ 25	1,022	$25,550	$8,943	$34,493
76	1	Horseshoe Falls	6	L.F.	$ 25	944	$23,600	$8,260	$31,860
77	1	Horseshoe Falls	8	L.F.	$ 30	896	$26,880	$9,408	$36,288
78	1	Horseshoe Falls	Plant Upgrade	LS	$ 50,000	1	$50,000	$17,500	$67,500
79	1	Crystal Heights	6	L.F.	$ 25	2,311	$57,775	$20,221	$77,996
80	1	Crystal Heights	6	L.F.	$ 25	1,339	$33,475	$11,716	$45,191
81	1	Crystal Heights	4	L.F.	$ 18	614	$11,052	$3,868	$14,920
92	1	Northlake/Cougar Ridge	8	L.F.	$ 30	1,977	$59,310	$20,759	$80,069
93	1	Canyon Lake Acres	10	L.F.	$ 35	2,906	$101,710	$35,599	$137,309
94	1	Northeast Area	6	L.F.	$ 25	515	$12,875	$4,506	$17,381
97	1	Point/DBH/Hillcrest	6	L.F.	$ 25	735	$18,375	$6,431	$24,806
98	1	Point/DBH/Hillcrest	4	L.F.	$ 18	936	$16,848	$5,897	$22,745
99	1	Point/DBH/Hillcrest	4	L.F.	$ 18	1,497	$26,946	$9,431	$36,377
100	1	Point/DBH/Hillcrest	Plant Upgrade	LS	$ 90,000	1	$90,000	$31,500	$121,500
101	1	Point/DBH/Hillcrest	6	L.F.	$ 25	735	$18,375	$6,431	$24,806
112	1	Hancock Canyon	Plant Upgrade	LS	$ 65,000	1	$65,000	$22,750	$87,750

Segment No.	Phase	System	Line Size (In.)	Unit	Unit Price	Quantity (L.F.)	Subtotal	Engr./Conting. 35%	Total Cost
115	1	North Area	12	L.F.	$ 40	4,049	$161,960	$56,686	$218,646
116	1	Tamarack Shores	6	L.F.	$ 25	418	$10,450	$3,658	$14,108
117	1	Tamarack Shores	6	L.F.	$ 25	1,078	$26,950	$9,433	$36,383
118	1	Tamarack Shores	6	L.F.	$ 25	636	$15,900	$5,565	$21,465
132	1	Tanglewood	6	L.F.	$ 25	847	$21,175	$7,411	$28,586
133	1	Tanglewood	6	L.F.	$ 25	905	$22,625	$7,919	$30,544
134	1	Glenmare	6	L.F.	$ 25	566	$14,150	$4,953	$19,103
135	1	Canyon Lake Island	6	L.F.	$ 25	1,533	$38,325	$13,414	$51,739
136	1	Canyon Lake Island	Plant Upgrade	L.S.	$ 75,000	1	$75,000	$26,250	$101,250
145	1	Canyon Lake Shores	Plant Upgrade	L.S.	$ 60,000	1	$60,000	$21,000	$81,000
146	1	Canyon Lake Shores	6	L.F.	$ 25	1,212	$30,300	$10,605	$40,905
175	1	Deer River/ Lake of the Hills	Well Plant	L.S.	$ 90,000	1	$90,000	$31,500	$121,500
180	1	Riverwood	Plant Upgrade	L.S.	$ 10,000	1	$10,000	$3,500	$13,500
		Phase 1 Totals							**$3,331,340**
5	2	Southwest area	Elev. Storage Tank	LS	$ 375,000	1	$375,000	$131,250	$506,250
6	2	Lakeview Park	8	L.F.	$ 30	1,139	$34,170	$11,960	$46,130
7	2	Lakeview Park	6	L.F.	$ 24	3,127	$75,048	$26,267	$101,315
15	2	Woodlands/CL Forest	6	L.F.	$ 25	2,195	$54,875	$19,206	$74,081
33	2	The Oaks	6	L.F.	$ 25	837	$20,925	$7,324	$28,249
34	2	The Oaks	6	L.F.	$ 25	1,381	$34,525	$12,084	$46,609
40	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	532	$13,300	$4,655	$17,955
41	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	1,791	$44,775	$15,671	$60,446
42	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	969	$24,225	$8,479	$32,704
43	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	1,425	$35,625	$12,469	$48,094
44	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	1,298	$32,450	$11,358	$43,808
45	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	847	$21,175	$7,411	$28,586
46	2	The Oaks/Canyon Lake Village	6	L.F.	$ 25	248	$6,200	$2,170	$8,370
63	2	Sattler	8	L.F.	$ 30	2,109	$63,270	$22,145	$85,415
66	2	Sattler/Horseshoe Falls	6	L.F.	$ 25	7,458	$186,450	$65,258	$251,708
67	2	Sattler/Horseshoe Falls	6	L.F.	$ 25	4,051	$101,275	$35,446	$136,721
91	2	Northeast Area	8	L.F.	$ 30	4,843	$145,290	$50,852	$196,142
95	2	Northeast Area	6	L.F.	$ 25	787	$19,675	$6,886	$26,561
96	2	Northeast Area	6	L.F.	$ 25	2,660	$66,500	$23,275	$89,775
110	2	North Area	12	L.F.	$ 40	3,910	$156,400	$54,740	$211,140
111	2	North Area	12	L.F.	$ 40	1,445	$57,800	$20,230	$78,030
120	2	North Area	12	L.F.	$ 40	4,859	$194,360	$68,026	$262,386
121	2	North Area	12	L.F.	$ 40	489	$19,560	$6,846	$26,406
122	2	North Area	6	L.F.	$ 25	4,051	$101,275	$35,446	$136,721
123	2	North Area	6	L.F.	$ 25	704	$17,600	$6,160	$23,760

Segment No.	Phase	System	Line Size (In.)	Unit	Unit Price	Quantity (L.F.)	Subtotal	Engr./Conting. 35%	Total Cost
124	2	North Area	EGST/Standpipe	LS	$ 75,000	1	$75,000	$26,250	$101,250
130	2	North Area	12	L.F.	$ 40	7,094	$283,760	$99,316	$383,076
131	2	Tanglewood	6	L.F.	$ 25	995	$24,875	$8,706	$33,581
140	2	North Area	12	L.F.	$ 40	5,210	$208,400	$72,940	$281,340
141	2	North Area	12	L.F.	$ 40	2,526	$101,040	$35,364	$136,404
142	2	North Area	12	L.F.	$ 40	1,059	$42,360	$14,826	$57,186
143	2	North Area	16	L.F.	$ 40	2,956	$118,240	$41,384	$159,624
144	2	North WTP	Plant	L.S.	$ 600,000	1	$600,000	$210,000	$810,000
171	2	Deer River/ Lake of the Hills	6	L.F.	$ 25	1,510	$37,750	$13,213	$50,963
172	2	Deer River/ Lake of the Hills	3	L.F.	$ 15	509	$7,635	$2,672	$10,307
173	2	Deer River/ Lake of the Hills	6	L.F.	$ 25	960	$24,000	$8,400	$32,400
		Phase 2 Totals							**$4,623,491**
16a	3	Woodlands/CL Forest	Plant Upgrade	LS	$ 7,000	1	$7,000	$2,450	$9,450
30a	3	The Oaks	EGST	LS	$ 40,000	1	$40,000	$14,000	$54,000
65	3	Sattler/Horseshoe Falls	6	L.F.	$ 25	1,853	$46,325	$16,214	$62,539
70	3	Summit	6	L.F.	$ 25	7,060	$176,500	$61,775	$238,275
75	3	Horseshoe Falls	8	L.F.	$ 30	3,093	$92,790	$32,477	$125,267
90	3	Northeast Area	8	L.F.	$ 30	4,075	$122,250	$42,788	$165,038
105	3	Northeast Area	6	L.F.	$ 25	3,039	$75,975	$26,591	$102,566
106	3	Northeast Area	6	L.F.	$ 25	7,402	$185,050	$64,768	$249,818
113	3	North Area	EGST/Standpipe	LS	$ 75,000	1	$75,000	$26,250	$101,250
114	3	North Area	8	L.F.	$ 30	2,700	$81,000	$28,350	$109,350
125	3	North Area	6	L.F.	$ 25	3,032	$75,800	$26,530	$102,330
147	3	Canyon Lake Shores	6	L.F.	$ 25	700	$17,500	$6,125	$23,625
150	3	North Area	12	L.F.	$ 40	5,284	$211,360	$73,976	$285,336
151	3	North Area	12	L.F.	$ 40	4,749	$189,960	$66,486	$256,446
152	3	North Area	8	L.F.	$ 40	3,200	$128,000	$44,800	$172,800
155	3	North Area	12	L.F.	$ 40	20,000	$800,000	$280,000	$1,080,000
157	3	North Area	Tank/Pump Sta.	L.S.	$ 150,000	1	$150,000	$52,500	$202,500
160	3	North Area	10	L.F.	$ 35	8,900	$311,500	$109,025	$420,525
165	3	North Area	10	L.F.	$ 35	5,000	$175,000	$61,250	$236,250
170	3	Deer River/ Lake of the Hills	Plant Upgrade	L.S.	$ 80,000	1	$80,000	$28,000	$108,000
174	3	Deer River/ Lake of the Hills	6	L.F.	$ 25	1,116	$27,900	$9,765	$37,665
		Phase 3 Totals							**$4,143,029**

Table 4
WATER USE PROJECTION - UNINCORPORATED COUNTY AREAS

	(Acre-Feet, w/ Expected Conservation)							
Precipitation	1980	1990	2000	2010	2020	2030	2040	2050
Below Normal	2,616	3,817	7,921	10,100	13,502	17,299	21,460	25,713
Normal	2,616	3,817	6,319	8,019	10,651	13,566	16,791	20,074
	(Gallons per Person per Day, w/ Expected Conservation)							
Below Normal	166	147	183	170	161	158	156	155
Normal	166	147	146	135	127	124	122	121

Source: TWDB 1996 Consensus Texas Water Plan, Projections of Population and Municipal Water Use for Comal County.

2.4 Existing Water Systems

Existing community water systems in the planning area were identified from available TWDB and TNRCC data. Maps and tabular data for existing water system Certificates of Convenience and Necessity (CCN) were obtained from TNRCC. TWDB supplied ownership and general consumption information from its water system database. The two data sources were merged to produce a master list of water system names and ownership data. Letters were sent to all identified entities to request specific information for each system, including source and quantity of supply, and configuration and capacity of existing water storage and distribution facilities. Voluntary response to these inquiries was very limited. The system ownership, location, and service area information was further refined through telephone inquiries. Field observations were performed on all of the larger systems (i.e., > 50 connections) to obtain accurate data on the location and configuration of existing facilities.

Existing community water production facilities are located on the System Location Map (Figure 5) along with the boundaries of existing CCN's. The capacities of existing supply, storage, and distribution facilities for each system are presented in detail in Table 5, Water System Capacity Data, and are summarized by planning area in Table 6. Table 5 also presents the required capacities for each system based on the reported number of existing connections and TNRCC criteria. Required capacities of each system component are compared to the existing capacities, and differences are noted as either surpluses (positive values) or deficiencies (negative values) on a capacity and equivalent connection basis. Of the 73 systems thus evaluated, it appears that 20 systems have an existing deficiency in supply capacity, 9 systems have a deficiency in total storage, 16 have a deficiency in service pump capacity, and 32 systems have a deficiency in pressure storage.

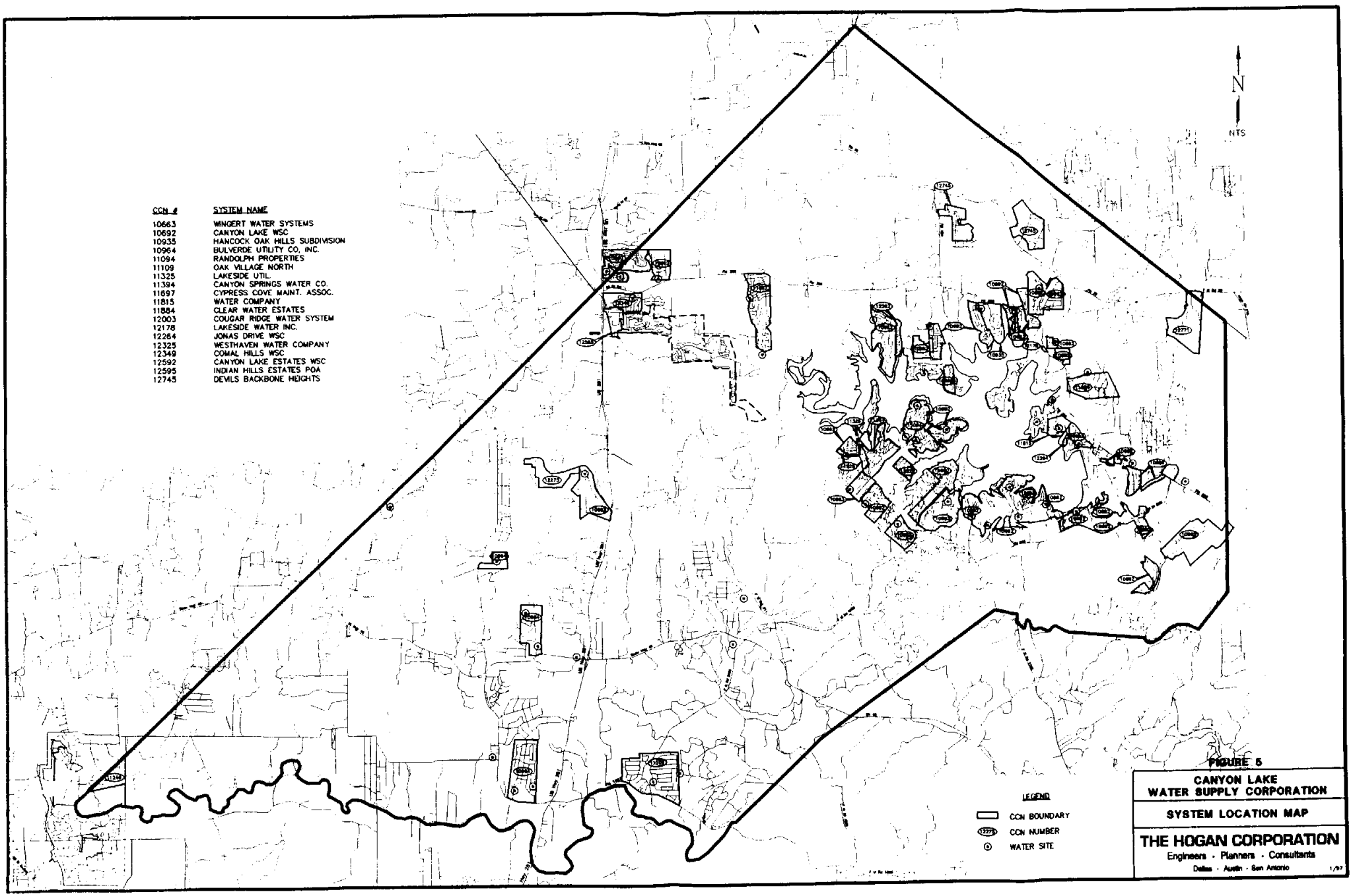
Table 6
Capacity Data Summary

Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
GROUP A SUMMARY	**2,702**	**conn's**					
Required	2	1,770 gpm	629,600 gals	2,757 gpm	T	50,860 gals	116,005 gals
Provided	58	3,154 gpm	2,470,100 gals	3,609 gpm		47,364 gals	1,127,100 gals
Difference (capacity)	ok	1,384 gpm	1,840,500 gals	852 gpm		-3,496 gals	1,011,095 gals
Deficiencies		0	3	2		5	2
GROUP B SUMMARY	**2,163**	**conn's**					
Required	2	1,443 gpm	477,200 gals	6,664 gpm	F	43,220 gals	85,375 gals
Provided	51	2,613 gpm	1,018,860 gals	8,203 gpm		82,850 gals	87,400 gals
Difference (capacity)	ok	1,170 gpm	541,660 gals	1,540 gpm		39,630 gals	2,025 gals
Deficiencies		14	3	8		18	16
GROUP C SUMMARY	**4,017**	**conn's**					
Required	2	2,416 gpm	803,400 gals	4,831 gpm	F	80,340 gals	66,500 gals
Provided	34	3,210 gpm	1,242,600 gals	7,635 gpm		100,085 gals	422,000 gals
Difference (capacity)	ok	794 gpm	439,200 gals	2,804 gpm		19,745 gals	355,500 gals
Deficiencies		6	3	6		9	3

2.5 Existing Water Wells

As described earlier, essentially all of the existing public water supply in the study area is provided by groundwater wells pumping from the upper and middle Trinity Group aquifers. Existing information indicates that wells in the area are typically founded in the Lower and Upper Glen Rose Limestone formations, and the Cow Creek Limestone formations. According to information obtained from the TNRCC, groundwater supplies in the area located above the Edward's Aquifer recharge zone are typically of poor quality and limited supply. The groundwater storage coefficient in this area is only 2 to 3 percent, meaning that the percentage of saturated rock is very small. Groundwater in this area is very hard and includes high levels of sulfates contributing to odor problems. The Texas Water Commission has designated the Canyon Lake area a "Critical Groundwater Zone".

Data on existing public water supply wells was compiled from the TWDB Ground Water Data System, TNRCC survey reports, and system owners. A total number of 121 wells have been identified, the locations of which are shown on Figure 6. Identifying numbers on the exhibit map correspond to individual well line items in Table 7, which presents the available, reported data for each well. This table also presents excursions of TNRCC water quality limits for constituents measured by TWDB as reported in the TWDB Ground Water Data System. The data indicate that of the 72 wells previously sampled, 30 exceeded at least one of the TNRCC maximum contaminant levels.


CCN #
SYSTEM NAME
10663 WINGERT WATER SYSTEMS
10692 CANYON LAKE WSC
10935 HANCOCK OAK HILLS SUBDIVISION
10964 BULVERDE UTILITY CO, INC.
11094 RANDOLPH PROPERTIES
11109 OAK VILLAGE NORTH
11325 LAKESIDE UTIL
11394 CANYON SPRINGS WATER CO.
11697 CYPRESS COVE MAINT. ASSOC.
11815 WATER COMPANY
11884 CLEAR WATER ESTATES
12003 COUGAR RIDGE WATER SYSTEM
12178 LAKESIDE WATER INC.
12264 JONAS DRIVE WSC
12325 WESTHAVEN WATER COMPANY
12349 COMAL HILLS WSC
12592 CANYON LAKE ESTATES WSC
12595 INDIAN HILLS ESTATES POA
12745 DEVILS BACKBONE HEIGHTS
N
NTS
LEGEND
CCN BOUNDARY
CCN NUMBER
WATER SITE
FIGURE 5
CANYON LAKE
WATER SUPPLY CORPORATION
SYSTEM LOCATION MAP
THE HOGAN CORPORATION
Engineers · Planners · Consultants
Dallas · Austin · San Antonio
1/97

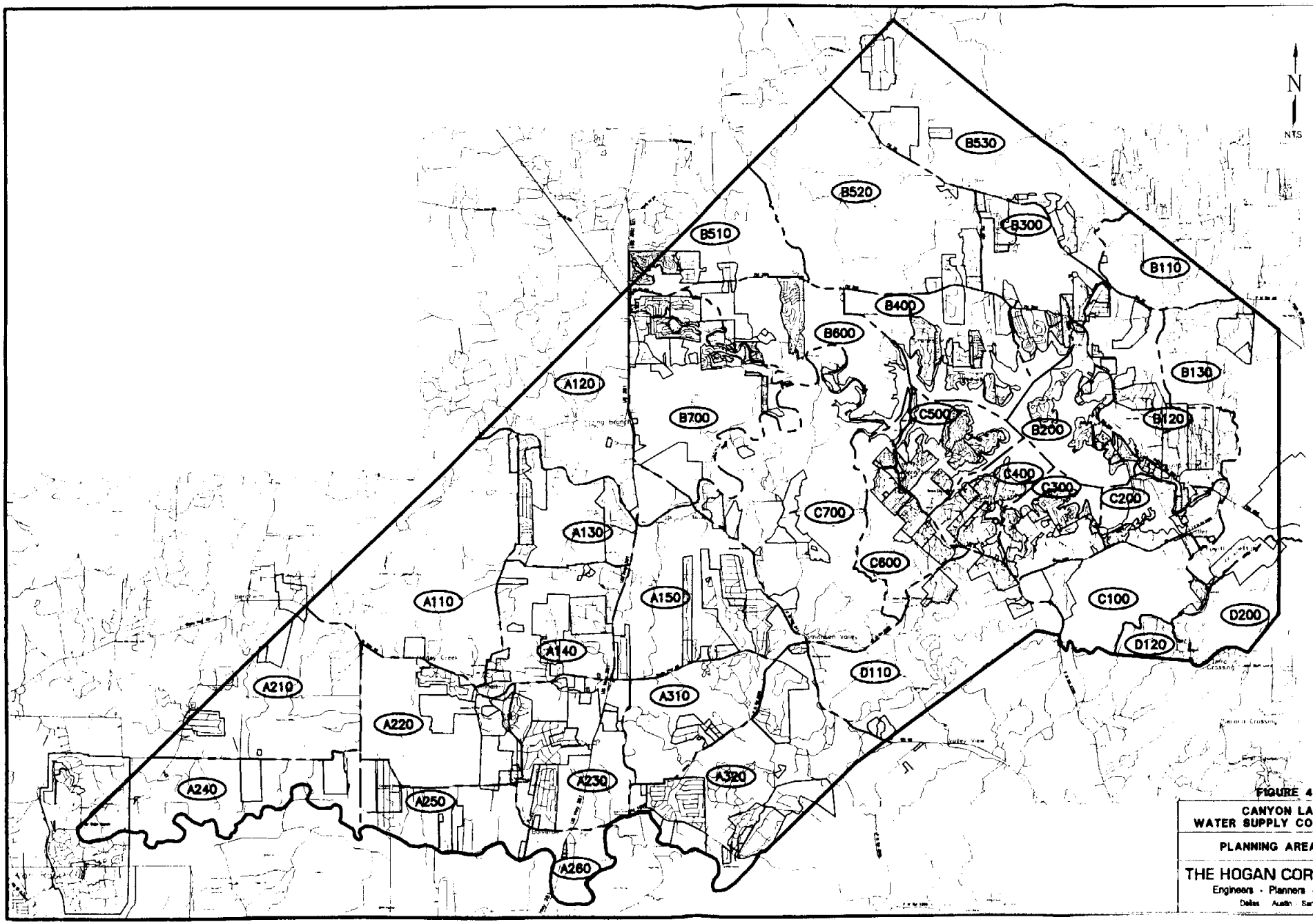


FIGURE 4

CANYON LAKE
WATER SUPPLY CORPORATION

PLANNING AREA MAP

THE HOGAN CORPORATION
Engineers - Planners - Consultants
Dallas Austin San Antonio

\projects\CLW-2011\10\planning area map Mon Jan 20 14:24:54 199/

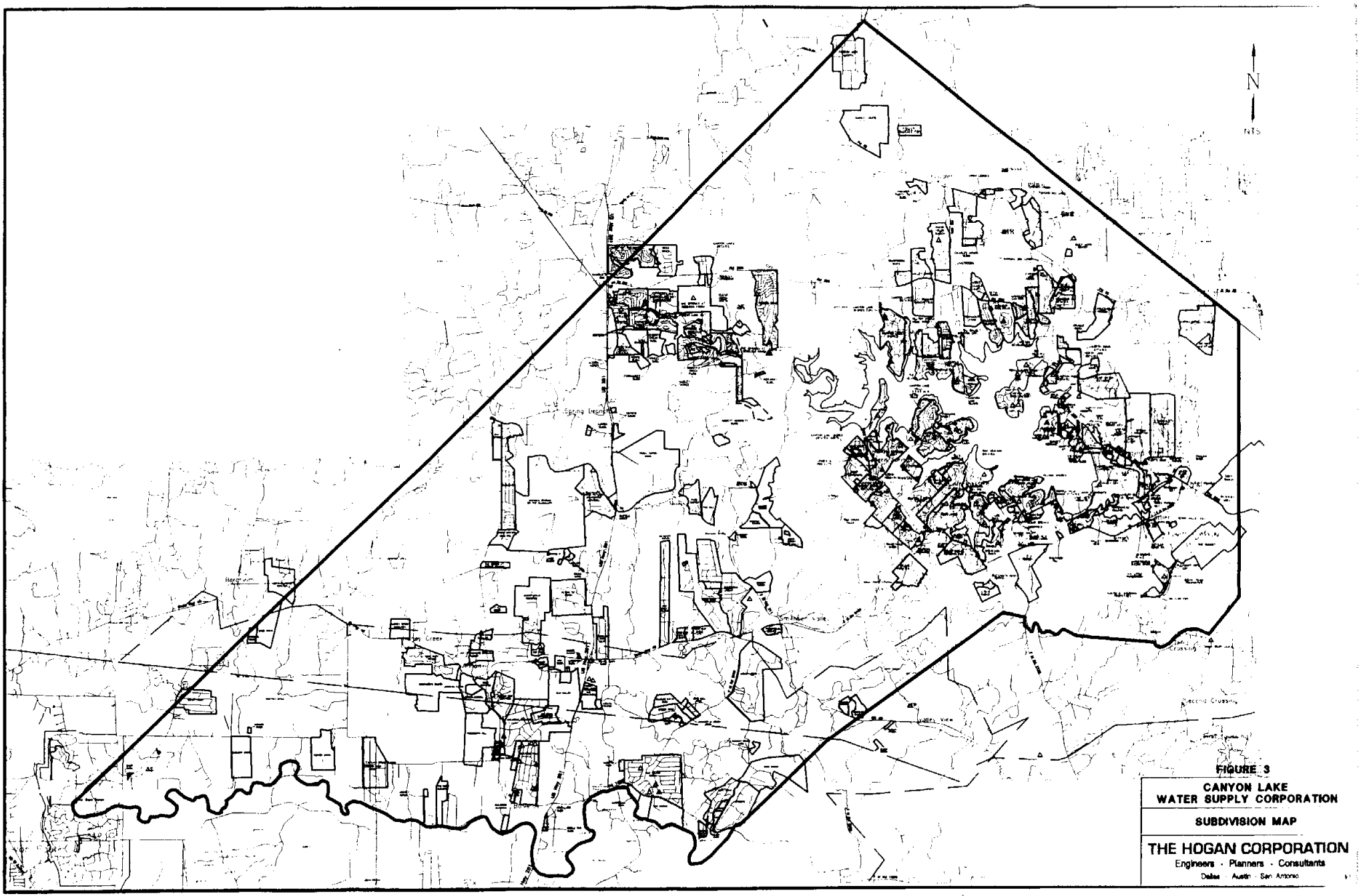


Table 5
Water System Capacity Data

AREA NUMBER	Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
	Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
A110	TX P&WD, Guadalupe River S.P.	20 conn's						
	Required	1	12 gpm	4,000 gals	40 gpm	T	400 gals	2,000 gals
	Provided		14 gpm	6,000 gals	gpm		gals	gals
	Difference (capacity)	Deficit	2 gpm	2,000 gals	N/A gpm		-400 gals	-2,000 gals
	Difference (conn's)		3	10	N/A		(20)	(20)
A130	*Guadalupe River Est./Riverwood*	90 conn's						
	Required	1	54 gpm	18,000 gals	180 gpm	T	1,800 gals	0 gals
	Provided	2	80 gpm	16,000 gals	160 gpm		5,000 gals	gals
	Difference (capacity)	ok	26 gpm	-2,000 gals	-20 gpm		3,200 gals	0 gals
	Difference (conn's)		43	(10)	(10)		160	0
A130	*Riverwood*	77 conn's						
	Required	1	46 gpm	15,400 gals	154 gpm	T	1,540 gals	0 gals
	Provided	2	52 gpm	16,000 gals	160 gpm		5,000 gals	0 gals
	Difference (capacity)	ok	6 gpm	600 gals	6 gpm		3,460 gals	0 gals
	Difference (conn's)		10	3	3		173	0
A150	Guadalupe Valley Tel. Co-Op	2 conn's						
	Required	1	1 gpm	400 gals	4 gpm	T	40 gals	0 gals
	Provided	1	13 gpm	8,400 gals	60 gpm		225 gals	gals
	Difference (capacity)	ok	12 gpm	8,000 gals	56 gpm		185 gals	0 gals
	Difference (conn's)		20	40	28		9	0
A150	Hart-N-Hart Mobile Home Park	30 conn's						
	Required	1	18 gpm	6,000 gals	60 gpm	T	600 gals	0 gals
	Provided	1	20 gpm	8,700 gals	60 gpm		880 gals	gals
	Difference (capacity)	ok	2 gpm	2,700 gals	0 gpm		280 gals	0 gals
	Difference (conn's)		3	14	0		14	0
A150	Tamiga Acres	28 conn's						
	Required	1	17 gpm	5,600 gals	56 gpm	T	560 gals	280 gals
	Provided	2	30 gpm	4,800 gals	60 gpm		504 gals	gals
	Difference (capacity)	ok	13 gpm	-800 gals	4 gpm		-56 gals	-280 gals
	Difference (conn's)		22	(4)	2		(3)	(3)
A230	Bulverde Hills	212 conn's						
	Required	1	127 gpm	42,400 gals	424 gpm	T	4,240 gals	0 gals
	Provided	12	144 gpm	286,000 gals	655 gpm		10,000 gals	gals
	Difference (capacity)	ok	17 gpm	243,600 gals	231 gpm		5,760 gals	0 gals
	Difference (conn's)		28	1,218	116		288	0
A240	Fairco, Inc.	1,461 conn's						
	Required	2	877 gpm	292,200 gals	877 gpm	T	29,220 gals	3,600 gals
	Provided	27	2,357 gpm	1,972,000 gals	2,400 gpm		28,500 gals	1,000,000 gals
	Difference (capacity)	ok	1,480 gpm	1,679,800 gals	1,523 gpm		-720 gals	996,400 gals
	Difference (conn's)		2,467	8,399	762		(36)	9,964
A320	Oak Village North	459 conn's						
	Required	2	275 gpm	91,800 gals	551 gpm	F	9,180 gals	15,900 gals
	Provided	9	424 gpm	181,000 gals	575 gpm		6,000 gals	80,000 gals
	Difference (capacity)	ok	149 gpm	89,200 gals	24 gpm		-3,180 gals	64,100 gals
	Difference (conn's)		248	446	12		(159)	641
A320	Wingert Water Supply	323 conn's						
	Required	2	194 gpm	64,600 gals	388 gpm	F	6,460 gals	30,125 gals
	Provided	2	295 gpm	63,000 gals	30 gpm		*435* gals	63,000 gals
	Difference (capacity)	ok	101 gpm	-1,600 gals	-358 gpm		-6,025 gals	32,875 gals
	Difference (conn's)		169	(8)	(179)		(301)	329
	GROUP A SUMMARY	2,702 conn's						
	Required	2	1,770 gpm	629,600 gals	2,757 gpm	T	50,860 gals	116,005 gals
	Provided	58	3,154 gpm	2,470,100 gals	3,609 gpm		47,364 gals	1,127,100 gals
	Difference (capacity)	ok	1,384 gpm	1,840,500 gals	852 gpm		-3,496 gals	1,011,095 gals
	Deficiencies		0	3	2		5	2

Table 5
Water System Capacity Data

AREA NUMBER	Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
	Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
B120	Clear Water Estates	60 conn's						
	Required	1	36 gpm	12,000 gals	120 gpm	T	1,200 gals	6,000 gals
	Provided	2	600 gpm	100,000 gals	600 gpm		gals	gals
	Difference (capacity)	ok	564 gpm	88,000 gals	480 gpm		-1,200 gals	-6,000 gals
	Difference (conn's)		940	440	240		(60)	(60)
B120	Cougar Ridge	24 conn's						
	Required	1	36 gpm	4,800 gals	48 gpm	T	480 gals	2,400 gals
	Provided	1	gpm	gals	0 gpm		gals	gals
	Difference (capacity)	ok	-36 gpm	N/A gals	N/A gpm		-480 gals	-2,400 gals
	Difference (conn's)		(60)	N/A	N/A		(24)	(24)
B120	DBH/Hillcrest	29 conn's						
	Required	1	17 gpm	5,800 gals	58 gpm	T	580 gals	2,200 gals
	Provided	2	95 gpm	9,000 gals	60 gpm		140 gals	gals
	Difference (capacity)	ok	78 gpm	3,200 gals	2 gpm		-440 gals	-2,200 gals
	Difference (conn's)		129	16	1		(22)	(22)
B120	Horseshoe Falls	166 conn's						
	Required	1	100 gpm	33,200 gals	332 gpm	T	3,320 gals	4,100 gals
	Provided	2	132 gpm	65,800 gals	150 gpm		2,500 gals	gals
	Difference (capacity)	ok	32 gpm	32,600 gals	-182 gpm		-820 gals	-4,100 gals
	Difference (conn's)		54	163	(91)		(41)	(41)
B120	North Lake Estates	12 conn's						
	Required	1	7 gpm	2,400 gals	24 gpm	T	240 gals	0 gals
	Provided	1	34 gpm	15,000 gals	0 gpm		5,000 gals	gals
	Difference (capacity)	ok	27 gpm	12,600 gals	N/A gpm		4,760 gals	0 gals
	Difference (conn's)		45	63	N/A		238	0
B120	Rivers Edge/Cadillac Canyon	1 conn's						
	Required	1	2 gpm	200 gals	2 gpm	T	20 gals	100 gals
	Provided		gpm	gals	0 gpm		gals	gals
	Difference (capacity)	Deficit	-2 gpm	N/A gals	N/A gpm		-20 gals	-100 gals
	Difference (conn's)		(3)	N/A	N/A		(1)	(1)
B120	Riverside W.S.	77 conn's						
	Required	1	46 gpm	15,400 gals	154 gpm	T	1,540 gals	7,700 gals
	Provided	0	0 gpm	0 gals	0 gpm		0 gals	0 gals
	Difference (capacity)	Deficit	-46 gpm	-15,400 gals	-154 gpm		-1,540 gals	-7,700 gals
	Difference (conn's)		(77)	(77)	(77)		(77)	(77)
B130	Summit	358 conn's						
	Required	2	215 gpm	71,800 gals	431 gpm	F	7,180 gals	23,400 gals
	Provided	2	110 gpm	130,000 gals	720 gpm		2,500 gals	gals
	Difference (capacity)	ok	-105 gpm	58,200 gals	289 gpm		-4,680 gals	-23,400 gals
	Difference (conn's)		(176)	291	145		(234)	(234)
B130	Whitewater Sprots, Inc.	26 conn's						
	Required	1	16 gpm	5,200 gals	52 gpm	T	520 gals	0 gals
	Provided	1	60 gpm	13,500 gals	100 gpm		1,005 gals	gals
	Difference (capacity)	ok	44 gpm	8,300 gals	48 gpm		485 gals	0 gals
	Difference (conn's)		74	42	24		24	0
B200	Crystal Heights	11 conn's						
	Required	1	17 gpm	2,200 gals	22 gpm	T	220 gals	0 gals
	Provided	1	75 gpm	gals	0 gpm		2,500 gals	gals
	Difference (capacity)	ok	59 gpm	N/A gals	N/A gpm		2,280 gals	0 gals
	Difference (conn's)		98	N/A	N/A		114	0
B200	Hill Country Resort	96 conn's						
	Required	1	58 gpm	19,200 gals	192 gpm	T	1,920 gals	0 gals
	Provided	1	160 gpm	40,000 gals	400 gpm		10,000 gals	gals
	Difference (capacity)	ok	102 gpm	20,800 gals	208 gpm		8,080 gals	0 gals
	Difference (conn's)		171	104	104		404	0

Table 5
Water System Capacity Data

AREA NUMBER	Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA			1.5 gpm		0.60 gpm		50 conn's	
	Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary			50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit			250 conn's		250 conn's		2,500 conn's	2,500 conn's
B200	Jonas Dr. W.S.C.	12	conn's						
	Required	1		7 gpm	2,400 gals	24 gpm	T	240 gals	0 gals
	Provided			gpm	2,000 gals	0 gpm		5,000 gals	gals
	Difference (capacity)	Deficit		-7 gpm	-400 gals	N/A gpm		4,760 gals	0 gals
	Difference (conn's)			(12)	(2)	N/A		238	0
B200	Log Cabin at Jacobs Creek	20	conn's						
	Required	1		12 gpm	4,000 gals	40 gpm	T	400 gals	425 gals
	Provided	1		25 gpm	5,000 gals	40 gpm		315 gals	gals
	Difference (capacity)	ok		13 gpm	1,000 gals	0 gpm		-85 gals	-425 gals
	Difference (conn's)			22	5	0		(4)	(4)
B200	The Water Co.	65	conn's						
	Required	1		39 gpm	13,000 gals	130 gpm	T	1,300 gals	3,500 gals
	Provided	1		55 gpm	9,000 gals	120 gpm		600 gals	gals
	Difference (capacity)	ok		16 gpm	-4,000 gals	-10 gpm		-700 gals	-3,500 gals
	Difference (conn's)			27	(20)	(5)		(35)	(35)
B200	U.S.A.F., Randolph Rec. Area	17	conn's						
	Required	1		26 gpm	3,400 gals	34 gpm	T	340 gals	0 gals
	Provided	2		55 gpm	gals	0 gpm		440 gals	gals
	Difference (capacity)	ok		30 gpm	N/A gals	N/A gpm		100 gals	0 gals
	Difference (conn's)			49	N/A	N/A		5	0
B200	U.S.C.O.E., Canyon Park #1	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		16 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		7 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			12	N/A	N/A		0	0
B200	U.S.C.O.E., Canyon Park #2	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		17 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		8 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			13	N/A	N/A		0	0
B200	U.S.C.O.E., Canyon Park #4	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		16 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		7 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			12	N/A	N/A		0	0
B200	U.S.C.O.E., Canyon Park #5	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		15 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		6 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			10	N/A	N/A		0	0
B200	U.S.C.O.E., Jacobs Creek #2	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		15 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		6 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			10	N/A	N/A		0	0
B200	U.S.C.O.E., North Park	6	conn's						
	Required	1		9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1		12 gpm	gals	0 gpm		120 gals	gals
	Difference (capacity)	ok		3 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			5	N/A	N/A		0	0
B300	*Canyon Lake Acres*	81	conn's						
	Required	1		49 gpm	16,200 gals	49 gpm	T	1,620 gals	8,100 gals
	Provided	1		34 gpm	42,000 gals	0 gpm		gals	*45,000* gals
	Difference (capacity)	ok		-15 gpm	25,800 gals	-49 gpm		-1,620 gals	36,900 gals
	Difference (conn's)			(24)	129	(24)		(81)	369

Table 5
Water System Capacity Data

AREA NUMBER	Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
	Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
B300	*Hancock Canyon*	26 conn's						
	Required	1	16 gpm	5,200 gals	52 gpm	T	520 gals	0 gals
	Provided	1	24 gpm	6,400 gals	0 gpm		1,050 gals	gals
	Difference (capacity)	ok	8 gpm	1,200 gals	N/A gpm		530 gals	0 gals
	Difference (conn's)		14	6	N/A		27	0
B300	Hancock Oak Hills Sub.	20 conn's						
	Required	1	12 gpm	4,000 gals	40 gpm	T	400 gals	0 gals
	Provided	1	20 gpm	5,000 gals	70 gpm		500 gals	gals
	Difference (capacity)	ok	8 gpm	1,000 gals	30 gpm		100 gals	0 gals
	Difference (conn's)		13	5	15		5	0
B300	*Lakeside Park*	1 conn's						
	Required	1	2 gpm	200 gals	2 gpm	T	20 gals	100 gals
	Provided		gpm	gals	0 gpm		gals	gals
	Difference (capacity)	Deficit	-2 gpm	N/A gals	N/A gpm		-20 gals	-100 gals
	Difference (conn's)		(3)	N/A	N/A		(1)	(1)
B300	Lakeside Water Co.	14 conn's						
	Required	1	21 gpm	2,800 gals	28 gpm	T	280 gals	0 gals
	Provided	1	11 gpm	gals	0 gpm		1,000 gals	gals
	Difference (capacity)	ok	-10 gpm	N/A gals	N/A gpm		720 gals	0 gals
	Difference (conn's)		(17)	N/A	N/A		36	0
B300	*Scenic Terrace*	16 conn's						
	Required	1	24 gpm	3,200 gals	32 gpm	T	320 gals	0 gals
	Provided	1	75 gpm	gals	0 gpm		30,000 gals	gals
	Difference (capacity)	ok	51 gpm	N/A gals	N/A gpm		29,680 gals	0 gals
	Difference (conn's)		85	N/A	N/A		1,484	0
B300	*Tamarack Shores*	182 conn's						
	Required	1	109 gpm	36,400 gals	364 gpm	T	3,640 gals	0 gals
	Provided	1	112 gpm	39,500 gals	400 gpm		5,000 gals	gals
	Difference (capacity)	ok	3 gpm	3,100 gals	36 gpm		1,360 gals	0 gals
	Difference (conn's)		5	16	18		68	0
B300	*The Point*	20 conn's						
	Required	1	12 gpm	4,000 gals	40 gpm	T	400 gals	1,600 gals
	Provided	3	65 gpm	4,500 gals	25 gpm		80 gals	gals
	Difference (capacity)	ok	53 gpm	500 gals	-15 gpm		-320 gals	-1,600 gals
	Difference (conn's)		88	3	(8)		(16)	(16)
B400	*Canyon Lake Island*	12 conn's						
	Required	1	7 gpm	2,400 gals	24 gpm	T	240 gals	0 gals
	Provided	1	75 gpm	4,500 gals	30 gpm		315 gals	gals
	Difference (capacity)	ok	68 gpm	2,100 gals	6 gpm		75 gals	0 gals
	Difference (conn's)		113	11	3		4	0
B400	*Canyon Lake Shores*	126 conn's						
	Required	1	76 gpm	25,200 gals	252 gpm	T	2,520 gals	7,600 gals
	Provided	2	112 gpm	60,000 gals	95 gpm		1,000 gals	gals
	Difference (capacity)	ok	36 gpm	34,800 gals	-157 gpm		-1,520 gals	-7,600 gals
	Difference (conn's)		61	174	(79)		(76)	(76)
B400	*Lakewood Hills*	1 conn's						
	Required	1	2 gpm	200 gals	2 gpm	T	20 gals	100 gals
	Provided		gpm	gals	0 gpm		gals	gals
	Difference (capacity)	Deficit	-2 gpm	N/A gals	N/A gpm		-20 gals	-100 gals
	Difference (conn's)		(3)	N/A	N/A		(1)	(1)

Table 5
Water System Capacity Data

AREA NUMBER	Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
	Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
B400	*Tanglewood Shores*	89 conn's						
	Required	1	53 gpm	17,800 gals	178 gpm	T	1,780 gals	7,100 gals
	Provided	1	33 gpm	54,000 gals	40 gpm		360 gals	gals
	Difference (capacity)	ok	-20 gpm	36,200 gals	-138 gpm		-1,420 gals	-7,100 gals
	Difference (conn's)		(34)	181	(69)		(71)	(71)
B510	*Deer River*	76 conn's						
	Required	1	46 gpm	15,200 gals	152 gpm	T	1,520 gals	0 gals
	Provided	2	85 gpm	20,800 gals	340 gpm		1,575 gals	gals
	Difference (capacity)	ok	39 gpm	5,600 gals	188 gpm		55 gals	0 gals
	Difference (conn's)		66	28	94		3	0
B510	*Lake of the Hills*	62 conn's						
	Required	1	37 gpm	12,400 gals	124 gpm	T	1,240 gals	100 gals
	Provided	2	32 gpm	13,860 gals	90 gpm		1,220 gals	gals
	Difference (capacity)	ok	-5 gpm	1,460 gals	-34 gpm		-20 gals	-100 gals
	Difference (conn's)		(9)	7	(17)		(1)	(1)
B530	Stallion Springs	17 conn's						
	Required	1	10 gpm	3,400 gals	34 gpm	T	340 gals	0 gals
	Provided	2	20 gpm	8,400 gals	45 gpm		360 gals	gals
	Difference (capacity)	ok	10 gpm	5,000 gals	11 gpm		20 gals	0 gals
	Difference (conn's)		16	25	6		1	0
B600	Cypress Cove Maint. Assoc.	177 conn's						
	Required	1	106 gpm	35,400 gals	354 gpm	T	3,540 gals	0 gals
	Provided	4	280 gpm	170,000 gals	760 gpm		6,000 gals	gals
	Difference (capacity)	ok	174 gpm	134,600 gals	406 gpm		2,460 gals	0 gals
	Difference (conn's)		290	673	203		123	0
B700	Comal Co. F.W.S.D. #1	220 conn's						
	Required	1	132 gpm	44,000 gals	132 gpm	T	4,400 gals	18,450 gals
	Provided	2	182 gpm	190,000 gals	740 gpm		710 gals	*50,000* gals
	Difference (capacity)	ok	50 gpm	146,000 gals	608 gpm		-3,690 gals	31,550 gals
	Difference (conn's)		83	730	304		(185)	316
B700	Comal Hills W.S.C.	10 conn's						
	Required	1	6 gpm	2,000 gals	20 gpm	T	200 gals	0 gals
	Provided	2	37 gpm	16,000 gals	200 gpm		2,500 gals	gals
	Difference (capacity)	ok	31 gpm	14,000 gals	180 gpm		2,300 gals	0 gals
	Difference (conn's)		52	70	90		115	0
B700	Indian Hills Estates	1 conn's						
	Required	1	1 gpm	200 gals	2 gpm	T	20 gals	0 gals
	Provided		gpm	10,000 gals	0 gpm		1,500 gals	gals
	Difference (capacity)	Deficit	-1 gpm	9,800 gals	N/A gpm		1,480 gals	0 gals
	Difference (conn's)		(1)	49	N/A		74	0
B700	Spring Branch/Indian Hills Estates	1 conn's						
	Required	1	1 gpm	200 gals	2 gpm	T	20 gals	0 gals
	Provided	1	gpm	10,000 gals	0 gpm		1,500 gals	gals
	Difference (capacity)	ok	-1 gpm	9,800 gals	N/A gpm		1,480 gals	0 gals
	Difference (conn's)		(1)	49	N/A		74	0
	GROUP B SUMMARY	2,163 conn's						
	Required	2	1,443 gpm	477,200 gals	6,664 gpm	F	43,220 gals	85,375 gals
	Provided	51	2,613 gpm	1,018,860 gals	8,203 gpm		82,850 gals	87,400 gals
	Difference (capacity)	ok	1,170 gpm	541,660 gals	1,540 gpm		39,630 gals	2,025 gals
	Deficiencies		14	3	8		18	16
C200	Arrowhead Village W.S.	15 conn's						
	Required	1	9 gpm	3,000 gals	30 gpm	T	300 gals	250 gals
	Provided	1	60 gpm	6,600 gals	40 gpm		250 gals	gals
	Difference (capacity)	ok	51 gpm	3,600 gals	10 gpm		-50 gals	-250 gals
	Difference (conn's)		85	18	5		(3)	(3)

Table 5
Water System Capacity Data

AREA NUMBER	Description			Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA			1.5 gpm		0.60 gpm		50 conn's	
	Primary			0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary			50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit			250 conn's		250 conn's		2,500 conn's	2,500 conn's
C200	*Canyon Lake Village*	222	conn's						
	Required	1		133 gpm	44,400 gals	444 gpm	T	4,440 gals	9,700 gals
	Provided	2		85 gpm	70,000 gals	260 gpm		2,500 gals	35,000 gals
	Difference (capacity)	ok		-48 gpm	25,600 gals	-184 gpm		-1,940 gals	25,300 gals
	Difference (conn's)			(80)	128	(92)		(97)	253
C300	Canyon Lake Village West	670	conn's						
	Required	2		402 gpm	134,000 gals	804 gpm	F	13,400 gals	0 gals
	Provided	3		425 gpm	136,000 gals	1,450 gpm		14,000 gals	gals
	Difference (capacity)	ok		23 gpm	2,000 gals	646 gpm		600 gals	0 gals
	Difference (conn's)			38	10	323		30	0
C300	*Moorwood Ranch*	0	conn's						
	Required	1		0 gpm	0 gals	#DIV/0! gpm	#	0 gals	0 gals
	Provided			gpm	gals	gpm		gals	gals
	Difference (capacity)	Deficit		0 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)			0	N/A	N/A		0	0
C300	*The Oaks*	199	conn's						
	Required	1		119 gpm	39,800 gals	398 gpm	T	3,980 gals	0 gals
	Provided	2		98 gpm	46,000 gals	400 gpm		7,000 gals	gals
	Difference (capacity)	ok		-21 gpm	6,200 gals	2 gpm		3,020 gals	0 gals
	Difference (conn's)			(36)	31	1		151	0
C300	*Triple Peak*	97	conn's						
	Required	1		58 gpm	19,400 gals	58 gpm	T	1,940 gals	0 gals
	Provided	1		350 gpm	100,000 gals	350 gpm		2,180 gals	100,000 gals
	Difference (capacity)	ok		292 gpm	80,600 gals	292 gpm		240 gals	100,000 gals
	Difference (conn's)			486	403	146		12	1,000
C300	*Village West*	468	conn's						
	Required	2		281 gpm	93,600 gals	562 gpm	F	9,360 gals	2,300 gals
	Provided	3		200 gpm	74,000 gals	1,270 gpm		8,900 gals	gals
	Difference (capacity)	ok		-81 gpm	-19,600 gals	708 gpm		-460 gals	-2,300 gals
	Difference (conn's)			(135)	(98)	354		(23)	(23)
C400	*Canyon Lake Forest*	326	conn's						
	Required	2		196 gpm	65,200 gals	391 gpm	F	6,520 gals	0 gals
	Provided	1		147 gpm	88,000 gals	770 gpm		20,525 gals	gals
	Difference (capacity)	Deficit		-49 gpm	22,800 gals	379 gpm		14,005 gals	0 gals
	Difference (conn's)			(81)	114	189		700	0
C400	*Waterfront Park System*	134	conn's						
	Required	1		80 gpm	26,800 gals	80 gpm	T	2,680 gals	13,400 gals
	Provided	1		105 gpm	36,000 gals	gpm		gals	36,000 gals
	Difference (capacity)	ok		25 gpm	9,200 gals	-80 gpm		-2,680 gals	22,600 gals
	Difference (conn's)			41	46	(40)		(134)	226
C400	*Woodlands*	115	conn's						
	Required	1		69 gpm	23,000 gals	69 gpm	T	2,300 gals	10,950 gals
	Provided	1		110 gpm	54,000 gals	20 gpm		110 gals	54,000 gals
	Difference (capacity)	ok		41 gpm	31,000 gals	-49 gpm		-2,190 gals	43,050 gals
	Difference (conn's)			68	155	(25)		(110)	431
C500	*Astro Hills/Canyon Lake Hills*	324	conn's		1,735				
	Required	2		194 gpm	64,800 gals	389 gpm	F	6,480 gals	0 gals
	Provided	2		139 gpm	64,500 gals	200 gpm		10,500 gals	gals
	Difference (capacity)	ok		-55 gpm	-300 gals	-189 gpm		4,020 gals	0 gals
	Difference (conn's)			(92)	(2)	(94)		201	0
C500	Canyon Lake Hills - Unit 1	180	conn's						
	Required	1		108 gpm	36,000 gals	360 gpm	T	3,600 gals	0 gals
	Provided	1		145 gpm	63,000 gals	600 gpm		5,000 gals	gals
	Difference (capacity)	ok		37 gpm	27,000 gals	240 gpm		1,400 gals	0 gals
	Difference (conn's)			62	135	120		70	0

Table 5
Water System Capacity Data

AREA NUMBER	Description		Supply Capacity (gpm)	Total Storage (gal's)	Service Pumps (gpm)		Pressure Storage (gal's)	Elevated Storage (gal's)
	CRITERIA		1.5 gpm		0.60 gpm		50 conn's	
	Primary		0.60 gpm	200 gals	2 gpm		20 gals	100 gals
	Secondary		50 conn's		2 pk dy		30,000 gals	200 gals
	Service area limit		250 conn's		250 conn's		2,500 conn's	2,500 conn's
C500	*Canyon Lake Hills 4,5,6*	267 conn's						
	Required	2	160 gpm	53,400 gals	320 gpm	F	5,340 gals	1,700 gals
	Provided	1	143 gpm	92,500 gals	500 gpm		5,000 0	gals
	Difference (capacity)	Deficit	-17 gpm	39,100 gals	180 gpm		-340 gals	-1,700 gals
	Difference (conn's)		(29)	196	90		(17)	(17)
C500	Canyon Springs Resort	280 conn's						
	Required	2	168 gpm	56,000 gals	336 gpm	F	5,600 gals	0 gals
	Provided	3	450 gpm	92,000 gals	600 gpm		15,000 gals	gals
	Difference (capacity)	ok	282 gpm	36,000 gals	264 gpm		9,400 gals	0 gals
	Difference (conn's)		470	180	132		470	0
C500	U.S.C.O.E., Cranes Mill Park	6 conn's						
	Required	1	9 gpm	1,200 gals	12 gpm	T	120 gals	0 gals
	Provided	1	22 gpm	gals	gpm		120 gals	gals
	Difference (capacity)	ok	13 gpm	N/A gals	N/A gpm		0 gals	0 gals
	Difference (conn's)		22	N/A	N/A		0	0
C500	Westhaven Water Co.	115 conn's						
	Required	1	69 gpm	23,000 gals	69 gpm	T	2,300 gals	11,500 gals
	Provided	2	300 gpm	142,000 gals	575 gpm		gals	*85,000* gals
	Difference (capacity)	ok	231 gpm	119,000 gals	506 gpm		-2,300 gals	73,500 gals
	Difference (conn's)		385	595	253		(115)	735
C600	Lakeside Utilities	115 conn's						
	Required	1	69 gpm	23,000 gals	69 gpm	T	2,300 gals	11,500 gals
	Provided	2	107 gpm	30,000 gals	0 gpm		0 gals	*30,000* gals
	Difference (capacity)	ok	38 gpm	7,000 gals	-69 gpm		-2,300 gals	18,500 gals
	Difference (conn's)		63	35	(35)		(115)	185
C600	*Lakeview Park*	182 conn's						
	Required	1	109 gpm	36,400 gals	364 gpm	T	3,640 gals	0 gals
	Provided	1	134 gpm	88,000 gals	100 gpm		4,000 gals	*22,000* gals
	Difference (capacity)	ok	25 gpm	51,600 gals	-264 gpm		360 gals	22,000 gals
	Difference (conn's)		41	258	(132)		18	220
C600	*Rolling Hills*	302 conn's						
	Required	2	181 gpm	60,400 gals	362 gpm	F	6,040 gals	5,200 gals
	Provided	2	190 gpm	60,000 gals	500 gpm		5,000 gals	*60,000* gals
	Difference (capacity)	ok	9 gpm	-400 gals	138 gpm		-1,040 gals	54,800 gals
	Difference (conn's)		15	(2)	69		(52)	548
	GROUP C SUMMARY	4,017 conn's						
	Required	2	2,416 gpm	803,400 gals	4,831 gpm	F	80,340 gals	66,500 gals
	Provided	34	3,210 gpm	1,242,600 gals	7,635 gpm		100,085 gals	422,000 gals
	Difference (capacity)	ok	794 gpm	439,200 gals	2,804 gpm		19,745 gals	355,500 gals
	Deficiencies		6	3	6		9	3

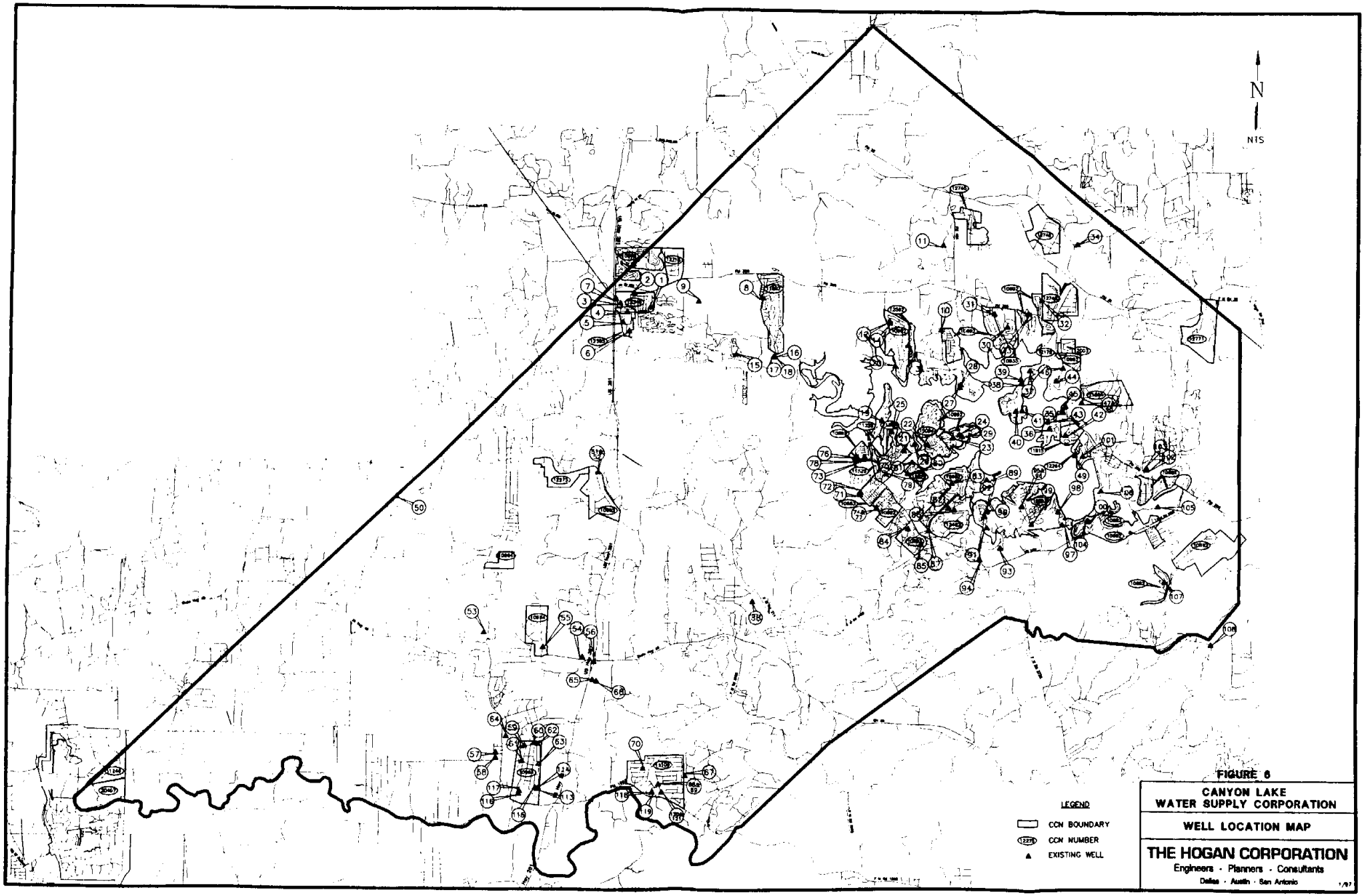


FIGURE 6

CANYON LAKE
WATER SUPPLY CORPORATION

WELL LOCATION MAP

THE HOGAN CORPORATION
Engineers · Planners · Consultants
Dallas · Austin · San Antonio

1/97

Table 7
WATER WELL DATA (a)

NUMBER	OWNER	DEPTH OF WELL (FEET)	CASING DIAMETER (INCHES)	CEMENTED FROM	CEMENTED TO	SCREENED FROM	SCREENED TO	OPEN FROM	OPEN TO	CAPACITY GPM	CAPACITY TEST DATE	DRAW-DOWN (FEET)	REMARKS	EXCEEDS TNRCC LIMITS (b) SULFATE	CHLORIDE	FLOURIDE	NITRATE	pH	IRON	MANGANESE
1	INDIAN HILLS PROPERTY OWNERS ASSOC.	230	7																	
2	INDIAN HILLS PROPERTY OWNERS ASSOC.	400	7																	
3	COMAL HILLS WSC WELL #1	345 *350*	7 4							11.5 *23*	1992 *1992*									
4	SPRING BRANCH INDIAN HILLS ESTATES	238	7							65								●		
5	SPRING BRANCH INDIAN HILLS ESTATES	300	7	0	112					50	1992									
6	SPRING BRANCH INDIAN HILLS ESTATES	300	7	0	230					48	1992									
7	COMAL HILLS WSC WELL #2	238 *325*	6							*14*	*1992*									
8	CYPRESS COVE MAINTENANCE ASSOC.	242 *165*	7	0	42					20	1966 *NOT*									
9	COMAL CO. FWSD NO.1	47	10	0	35					300	1985									
10	TANGLEWOOD SHORES	416														●				
11	ROCKY CREEK SUB.	400																		
12	CANYON LAKE SHORES	396								*75*	*1995*					●				
13	CANYON LAKE ESTATES	280															●			
14	CANYON LAKE SHORES STANDBY WELL	473 *396*								*20*	*1995*									
15	COMAL CO. FWSD NO.1	120	8							12	*1995*									
16	CYPRESS COVE MAINTENANCE ASSOC.	184	6							60	1992 *NOT*						●			
17	CYPRESS COVE MAINTENANCE ASSOC.	75	7 7	0	20					125 *100*	1982 *NOT*									
18	CYPRESS COVE MAINTENANCE ASSOC.	180	9 9	0	70					100	1988 *NOT*									
19	U.S. ARMY CORPS OF ENGS., CRANES MILL #1	241 *214*		0	208	218	228			17 *22*	*1994*	5							●	●
20	U.S. ARMY CORPS OF ENGS., POTTERS CREEK	218		0	208	208	218			17		8	PUMP SET AT 102 FEET							
21	CANYON SPRINGS RESORT WATER CO.	455 *500*								*160*	*1994*									
22	CANYON LAKE HILLS UNIT NO. 1	425								*145*	*1994*									
23	CANYON LAKE HILLS NO. 4,5 & 6	400 *480*								*90*	*1994*									
24	CANYON LAKE HILLS	396																		

THC #201-10.11
(a) TWDB Ground Water Data System - Recods of wells, springs and test holes for Comal County
(b) TWDB Ground Water Data System - Ground water quality samples for Comal County
- Shaded cells sampled by TWDB

Table 7
WATER WELL DATA (a)

NUMBER	OWNER	DEPTH OF WELL (FEET)	CASING DIAMETER (INCHES)	CEMENTED FROM	CEMENTED TO	SCREENED FROM	SCREENED TO	OPEN FROM	OPEN TO	CAPACITY GPM	CAPACITY TEST DATE	DRAW-DOWN (FEET)	REMARKS	EXCEEDS TNRCC LIMITS (b) SULFATE	CHLORIDE	FLOURIDE	NITRATE	pH	IRON	MANGANESE
25	CANYON SPRINGS WATER CO	400																		
26	ECO RESOURCES INC. ASTRO HILLS	390																		
27	LAKE POINT RESORT	160															●			
28	LAKE POINT RESORT	160															●			
29	LAKE POINT RESORT	125																		
30	HANCOCK OAKHILL EST.	395 *400*								*20*	*NOT INSPECTED*									
31	TAMARAK SHORES	425								*70*	*1996*									
32	CANYON LAKE ACRES	400								*46*	*1996*									
33	HANCOCK CANYON SUB.	250								50 *30*	*NOT INSPECTED*									
34	BUCKHORN RANCH	360																		
35	U.S. ARMY CORPS OF ENG., JACOBS CREEK	404		0	394	394	404			17		9					●		●	
36	U.S. ARMY CORPS OF ENG., JACOBS CREEK	440 *430*		0	430	430	440			14 *15*	*NOT TESTED*	59								
37	U.S. ARMY CORPS OF ENG., CANYON PARK #1	307		0	297	297	307			16 *12*	*1994*	16					●		●	●
38	U.S. ARMY CORPS OF ENG., CANYON PARK #2	270		0	260	260	270			17 *21*	*1994*	2								
39	U.S. ARMY CORPS OF ENG., CANYON PARK #3	274		0	264	264	274			15		28							●	●
40	U.S. ARMY CORPS OF ENG., CANYON PARK #4	267		0	256	256	266			16	*NOT TESTED*	7					●			●
41	U.S. ARMY CORPS OF ENG., CANYON PARK #5	260		0	250	250	260			17	*NOT TESTED*	5								
42	CANYON LAKE YACHT CLUB	315		0	96			96	315	15		75								
43	FT. SAM HOUSTON REC. AREA	350								*65*	*1994*								●	●
44	CANYON LAKE VILLAS	220								60	1987						●			
45	LOG CABINS OF JACOBS CREEK	290								*25*									●	
46	HILL COUNTRY RESORT	320 *330*	8							150	*NOT TESTED*	10				●				
47	CLEAR WATER ESTATES	220								*270*	*1994*									
48	CLEAR WATER ESTATES	220																		

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Table 7
WATER WELL DATA (a)

NUMBER	OWNER	DEPTH OF WELL (FEET)	CASING DIAMETER (INCHES)	CEMENTED FROM	CEMENTED TO	SCREENED FROM	SCREENED TO	OPEN FROM	OPEN TO	CAPACITY GPM	CAPACITY TEST DATE	DRAW-DOWN (FEET)	REMARKS	EXCEEDS TNRCC LIMITS (b) SULFATE	CHLORIDE	FLOURIDE	NITRATE	pH	IRON	MANGANESE
49	WATER COMPANY	650 *430*	6							*75* *35*	*NOT TESTED*									
50	TEXAS PARKS AND WILDLIFE DEPT.	520														●			●	
51	GUADALUPE RIVER EST. WATER CO., INC.	191 *200*	7								*NOT TESTED*									
52	GUADALUPE RIVER EST. WATER CO., INC. #2	186 *200*	7								*NOT TESTED*									
53	ELM RIDGE WATER CO.	580	7	0	260					30	1991	10								
54	TLC % MR. RON BIEKER	400		0	163															●
55	OAKLAND ESTATES	500	7	0	235					125	1985									
56	VAL SMITH PETROLEUM	400	7	0	84	84	467			13	1990									
57	COMAL I.S.D. BULVERDE MIDDLE SCHOOL	467								8										
58	COMAL COUNTY ISD	415																		
59	BULVERDE HILLS WELL #5	540 *580*		0	256	256	540			10 *9*	*1995*									
60	BULVERDE HILLS WELL #6	580		0	170	170	580			17 *4*	*1995*									
61	BULVERDE UTILITY CO. WELL #7	600		0	171	171	600			15 *8*	*1995*									
62	BULVERDE HILLS WELL #8	545 *450*		0	161	171	545			35 *4*	*1995*									
63	BULVERDE HILLS WELL #9	595								28 *9*	*1995*									
64	BULVERDE BAPTIST CHURCH	500								15										
65	281 N. RV PARK JACK HOGAN	425	7							20										
66	281 N. RV PARK	425	7							20	1991									
67	OAK VILLAGE NORTH WELL #4	815 *790*						205	816	*30*	*1994*		PUMP SET AT 490							
68	WATER SERVICES INC. OAK VILLAGE NORTH #3	550 *640*	7							*30*	*1994*								●	
69	WATER SERVICES INC. OAK VILLAGE NORTH #8	520 *640*	7							*75*	*1994*			●		●				
70	WATER SERVICES INC. OAK VILLAGE NORTH #9	555 *390*	6							*30*	*NOT TESTED*									
71	GROVES WATER SYSTEM WELL A	530		0	252	252	530			135										
72	GROVES WATER SYSTEM WELL B	460		0	82	82	460			20		0								

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Table 7
WATER WELL DATA (a)

NUMBER	OWNER	DEPTH OF WELL (FEET)	CASING DIAMETER (INCHES)	CEMENTED FROM	CEMENTED TO	SCREENED FROM	SCREENED TO	OPEN FROM	OPEN TO	CAPACITY GPM	CAPACITY TEST DATE	DRAW-DOWN (FEET)	REMARKS	EXCEEDS TNRCC LIMITS (b) SULFATE	CHLORIDE	FLOURIDE	NITRATE	pH	IRON	MANGANESE
73	LAKESIDE UTILITIES WATER SYSTEM	350								*27*	*1994*								●	
74	CANYON LAKE HILLS ROLLING HILLS	475		0	48	48	475			25 *50*	 *1996*									
75	CANYON LAKE HILLS LAKEVIEW PARK #2	330 *340*						90	330	*140*	*1994*									
76	CANYON LAKE HILLS LAKEVIEW PARK	335 *340*						96	335	*40*	*1994*									
77	ROLLING HILLS ESTATES	450 *475*	6							 *145*	 *1996*									
78	LAKESIDE UTILITIES	328 *325*								 *80*	 *1994*									
79	CANYON SPRINGS WATER CO. WELL #1	235 *480*								 *90*	 *1994*									
80	WESTHAVEN DEVELOPMENT WELL #1	400 *405*								 *185*	*NOT TESTED*								●	
81	WESTHAVEN DEVELOPMENT WELL #2	320 *300*								 *300*	 *1994*									
82	CANYON LAKE HILLS WATER FRONT PARK	450						40	540	25 *145*	*NOT TESTED*	0								
83	CANYON LAKE FOREST	476								*200*	*1995*									
84	CANYON LAKE HILLS SCENIC HEIGHTS	530		0	175			175	530	25										
85	CANYON LAKE HILLS SCENIC HEIGHTS	785						110	785											
86	WOODLAND AT CANYON LAKE	410 *465*	8							 *150*	*NOT TESTED*									
87	CANYON LAKE FOREST WELL #2	520																		
88	COMAL I.S.D., SMITHSON VALLEY H.S. WELL #2	600		0	153			153	600											
89	U.S.A. CORPS OF ENGINEERS	390		0	377	377	387			12		96							●	
90	CANYON LAKE VILLAGE - WEST	470 *350*		0	240			240	470	50 *100*	*NOT TESTED*	200		●						
91	CANYON ENTERPRISES THE OAKS WELL #9	225		0	48			48	225	35		8								
92	CANYON LAKE VILLAGE - WEST	345								*60*	*1995*									
93	TOM SHERIDAN PROPERTIES	460 *700*						441	460	 *130*	 *1993*									
94	CHURCH IN THE WILDWOOD	240																		
95	CANYON LAKE VILLAGE WEST	180								*100*	*1995*									
96	CANYON LAKE VILLAGE WEST	180								*75*	*1995*									

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Table 7
WATER WELL DATA (a)

NUMBER	OWNER	DEPTH OF WELL (FEET)	CASING DIAMETER (INCHES)	CEMENTED FROM	CEMENTED TO	SCREENED FROM	SCREENED TO	OPEN FROM	OPEN TO	CAPACITY GPM	CAPACITY TEST DATE	DRAW-DOWN (FEET)	REMARKS	EXCEEDS TNRCC LIMITS (b) SULFATE	CHLORIDE	FLOURIDE	NITRATE	pH	IRON	MANGANESE
97	TRIPLE CREEK RANCH ESTATES	655								52 *60*	1984 *1994*			●		●				
98	TRIPLE CREEK RANCH ESTATES #2	480								50	1976			●		●				
99	CANYON LAKE VILLAGE - WEST WELL #4	700	6																	
100	TOM SHERIDAN PROPERTIES	530 *700*		0	40			40	530	20	*NOT TESTED*	0								
101	U.S. ARMY CORPS OF ENGINEERS	549 *519*		0	539	539	549			12	*NOT TESTED*	129							●	●
102	S.D. DAVID, JR.	502		0	80			80	502											
103	S.D. DAVID, JR. HORSESHOE FALLS	460 *350*		0	180			180	460	60	*NOT TESTED*									
104	PEYTON ENTERPRISES CANYON LAKE VILLAGE	520 *700*								*30*	*1993*			●						
105	ECO RESOURCES INC. NETHERHILL WELL	555	9																	
106	U.S. ARMY CORPS OF ENGINEERS	400								*17*	*NOT TESTED*					●			●	
107	TOM SHERIDAN PROPERTIES, INC.	460	7	0	40					10	1974				●					●
108	CEDAR BLUFF CAMP	200								*15*	*NOT TESTED*									
113	BULVERDE HILLS WELL #1	635		0	152			152	635	*20*	*1995*		ACIDIZED							
114	BULVERDE HILLS WELL #3	580		0	200			200	580	65 *10*	*1995*		ACIDIZED							
115	BULVERDE HILLS WELL #4	630		0	255			255	630	30 *45*	*1995*		ACIDIZED							
116	BULVERDE HILLS WELL #10	498 *450*								*10*	*1995*									
117	BULVERDE HILLS WELL #11	500	6							*16*	*1995*									
118	OAK VILLAGE NORTH WELL #1	480 *650*		0	200			200	480	*76*	*1994*									
119	OAK VILLAGE NORTH WELL #2	523 *650*		0	200			200	523	*95*	*1994*									
120	OAK VILLAGE NORTH WELL #5	565 *650*								*150*	*1994*									
121	OAK VILLAGE NORTH WELL #6	565 *650*								*30*	*1994*									

SUMMARY INFORMATION

			MIN	MAX	AVERAGE
TOTAL NUMBER OF WELLS	121	DEPTH	47	785	381
NUMBER OF WELLS WHICH EXCEEDED AN ALLOWABLE CHEMICAL LEVEL	30	TESTED CAPACITY	8	300	58

THC #201-10.11
(a) TWDB Ground Water Data System - Recods of wells, springs and test holes for Comal County
(b) TWDB Ground Water Data System - Ground water quality samples for Comal County

3.0 Future Water Supply Requirements

3.0 FUTURE WATER SUPPLY REQUIREMENTS

3.1 General

Future water supply needs for the study area are derived from future population projections and established water consumption planning values. Population and water projection information is provided at each decade from 2000 through 2050. Given the magnitude of the planning area, the configuration of the recommended system, and in consideration of implementation, and jurisdictional issues, the overall study area was divided into three service areas. These service areas, which are shown in Figure 7, are designated North, South, and Southwest. The North service area is essentially all portions of the planning area north of the Guadalupe River. The South service area extends from the Guadalupe south to SH 46, which approximates the southerly river basin divide. The Southwest service area encompasses all remaining area south of SH 46. Population and water use projection data have been summarized by Service area, and cost projections have been organized in a similar fashion.

3.2 Population Projections

The overall future population for the study area has been projected using the existing (1996) population established in Section 2, then escalating by the effective growth factors extracted from the TWDB "1996 Consensus Texas Water Plan" as presented in Table 2. The distribution of the future population throughout the study area assumes continued, but limited growth within existing subdivisions, as well as new land development in currently undeveloped areas. To account for the differing styles of existing subdivisions and their varying development rates, future population growth has been distributed to these areas up to the point that 80% of the existing lots are occupied. The remaining future population growth has been assigned as " New Development". Initial growth has been allocated to match current growth dynamics, with more emphasis given to the southwesterly portion of the study area, particularly in the US 281 corridor. A detailed breakdown of the future population projections within each planning area is presented in Table A2 in the appendices, and is summarized by planning area in Table 8, and graphically, by Service area, in Figure 8. These projections indicate a total population in the study area of 52,823 at year 2020, increasing to 86,656 at year 2040.

Table 8 - Population Projection Summary

Area	Population Projections (Year/Projected Annual Growth Rate*)					
	2000	2010	2020	2030	2040	2050
	5.28%	3.22%	3.50%	2.73%	2.26%	1.90%
AREA A TOTAL	11,090	15,094	22,166	30,678	40,094	51,152
AREA B TOTAL	6,268	8,738	12,478	16,437	20,253	24,107
AREA C TOTAL	9,393	12,887	17,255	20,988	24,896	27,677
AREA D TOTAL	488	679	924	1,155	1,413	1,717
PROJECT AREA TOTAL	***27,239***	***37,398***	***52,823***	***69,248***	***86,656***	***104,653***
NORTH	6,569	9,223	13,381	17,878	22,296	26,861
SOUTH	13,247	18,148	24,878	31,356	38,265	44,541
SOUTHWEST	7,423	10,027	14,564	20,014	26,095	33,251

** Derived From TWDB "1996 Consensus Texas Water Plan"*

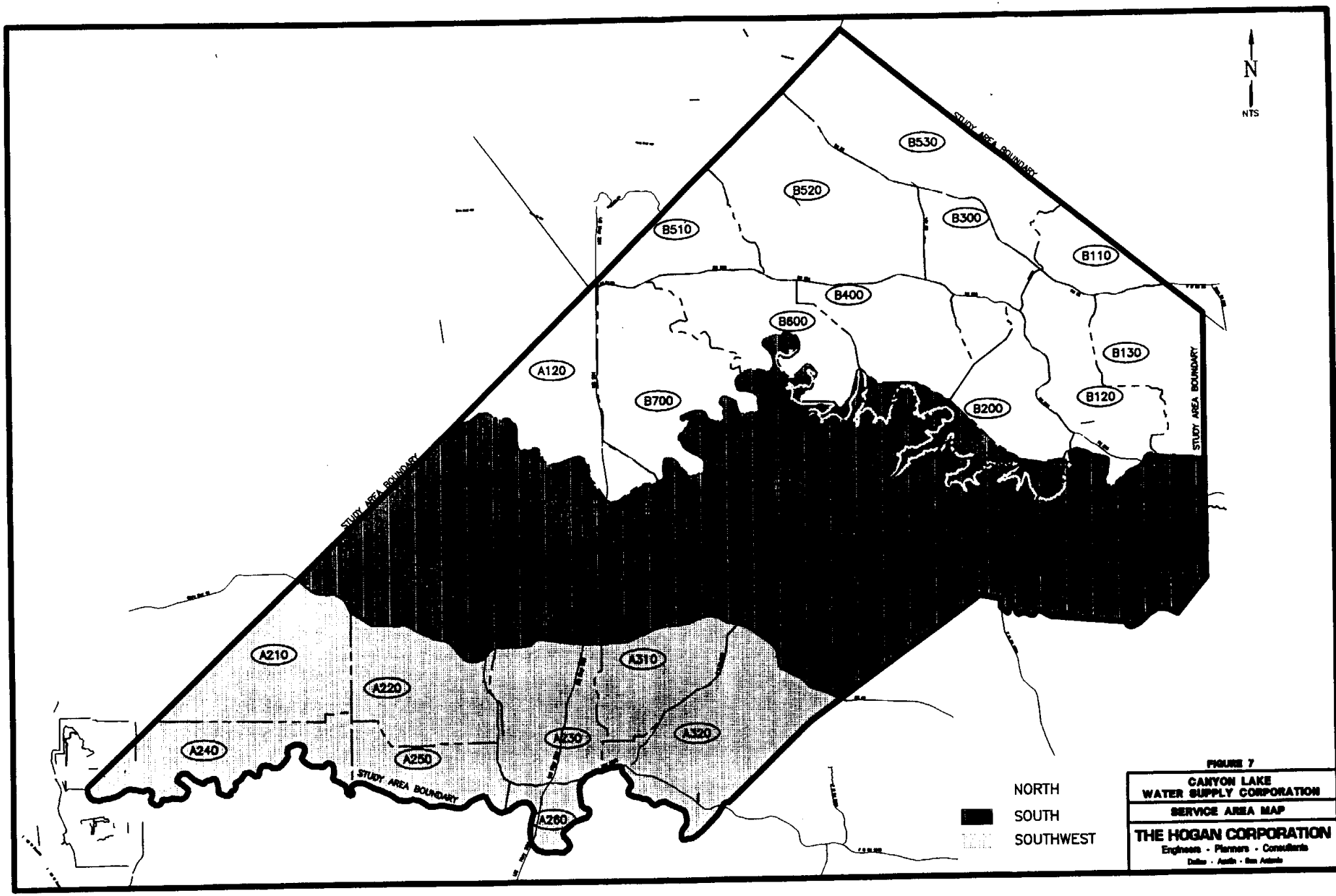

FIGURE 7

CANYON LAKE
WATER SUPPLY CORPORATION

SERVICE AREA MAP

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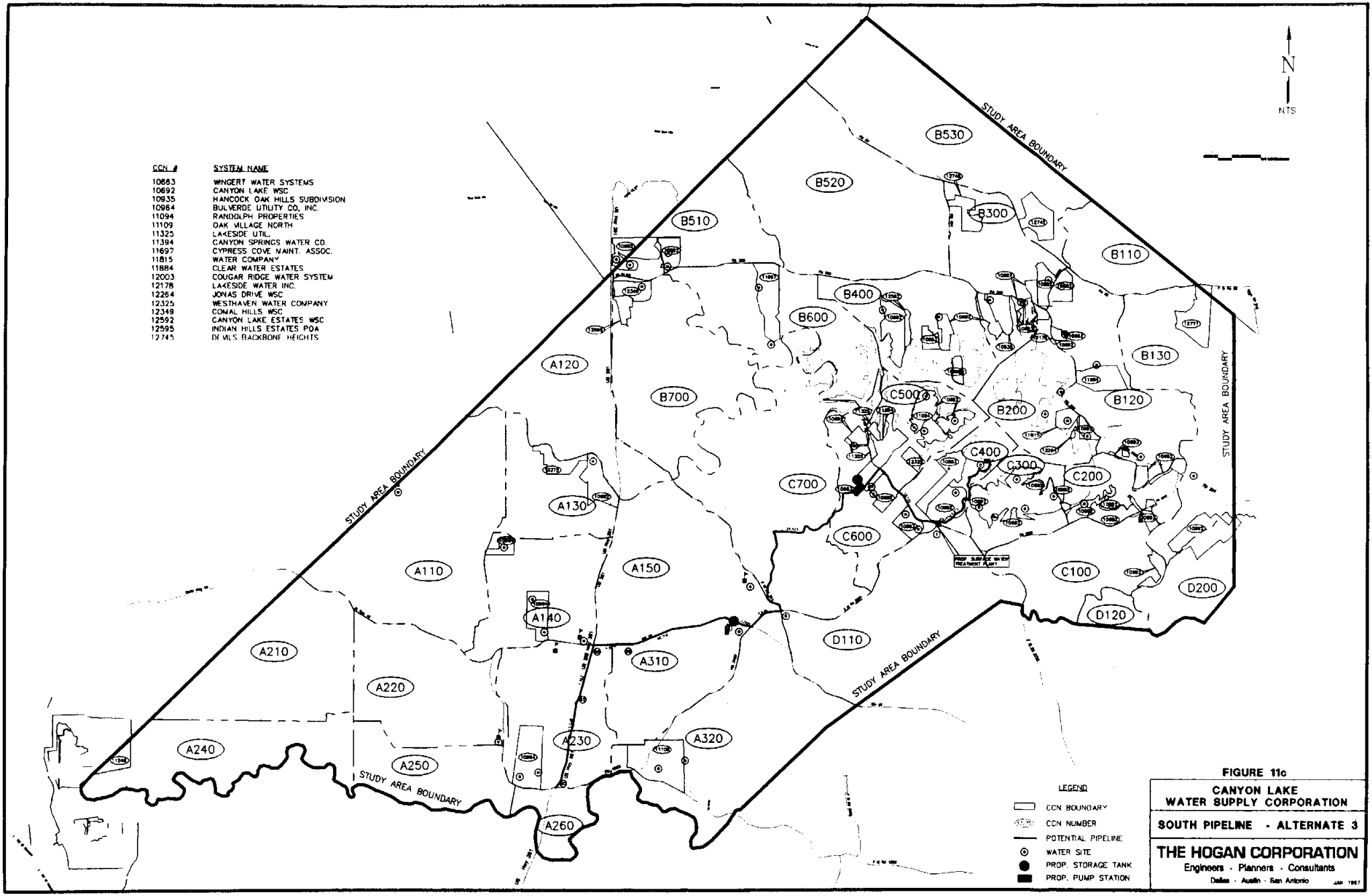

FIGURE 11c

CANYON LAKE
WATER SUPPLY CORPORATION

SOUTH PIPELINE - ALTERNATE 3

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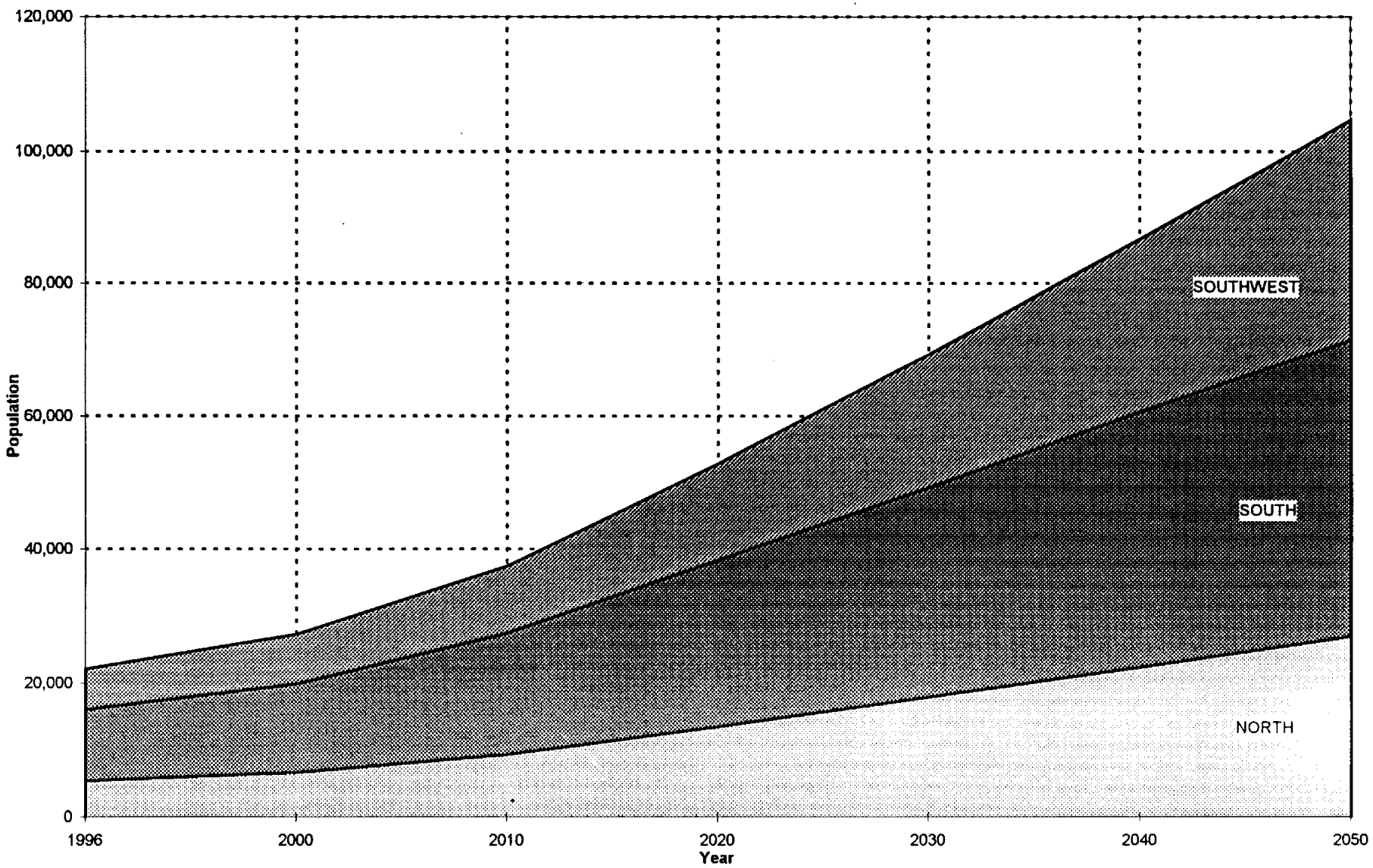
Figure 8 - Future Population Projections



3.3 Water Use Projections

Future water use has been projected by multiplying the future population by the future per capita demand rates extracted from the TWDB "1996 Consensus Texas Water Plan" for the unincorporated areas of Comal County, as presented in Table 4. Unit demand rates are based on the "below normal precipitation with expected conservation" scenario. This somewhat conservative approach was taken for several reasons, including: (1) the need to achieve the minimum TNRCC supply requirement of 0.60 gpm per connection; (2) to mitigate the uncertainties introduced by crediting the existing, somewhat unreliable groundwater supplies against the overall supply requirement; and (3) to ensure an adequate level of supply is available in drought conditions, as were experienced in 1996. A detailed breakdown of future water requirements within each planning area is presented in Table A3 in the appendices. The projections are summarized by planning area in Table 9, and graphically, by Service area, in Figure 9. These projections indicate a total projected water use for the study are at year 2020 of 8.50 mgd (9,525 acre-feet/year), increasing to 13.52 mgd (15,141 acre-feet/year) at the year 2040.

Table 9 - Projected Water Use Summary

Area	Water Use Projections (gal/day) (Year/*Per Capita Consumption**)						
	1996 *147*	2000 *183*	2010 *170*	2020 *161*	2030 *158*	2040 *156*	2050 *155*
AREA A TOTAL	1,331,379	2,029,470	2,565,980	3,568,726	4,845,544	6,254,664	7,928,560
AREA B TOTAL	750,729	1,147,044	1,485,460	2,008,958	2,597,046	3,159,468	3,736,585
AREA C TOTAL	1,119,258	1,718,919	2,190,790	2,778,055	3,316,104	3,883,776	4,289,935
AREA D TOTAL	57,477	89,304	115,430	148,764	182,490	220,428	266,135
PROJECT AREA TOTAL	***3,258,843***	***4,984,737***	***6,357,660***	***8,504,503***	***10,941,184***	***13,518,336***	***16,221,215***
NORTH (Ac. Ft./Yr.)	880	1,346	1,756	2,413	3,164	3,896	4,663
SOUTH (Ac. Ft./Yr.)	1,775	2,715	3,455	4,486	5,549	6,686	7,732
SOUTHWEST (Ac. Ft./Yr.)	995	1,521	1,909	2,626	3,542	4,559	5,772
TOTALS	***3,650***	***5,583***	***7,121***	***9,525***	***12,254***	***15,141***	***18,168***

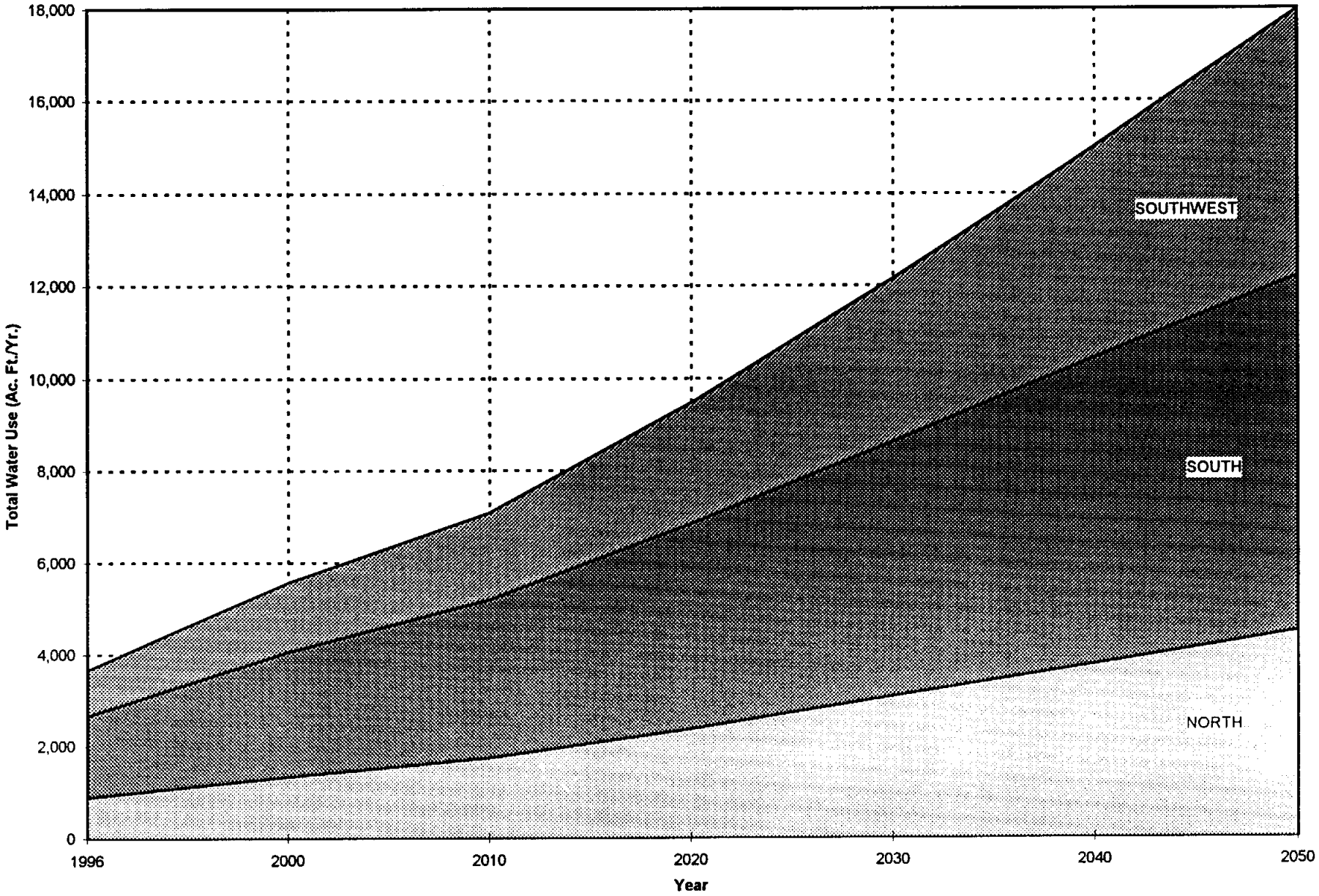
** From TWDB "1996 Consensus Texas Water Plan" - Below Normal Precipitation with Expected Conservation*

3.4 Water Supply Requirements

As previously described, existing public water supply in the planning area is almost entirely from groundwater wells. It is assumed that most of the existing wells which do not exhibit water quality problems would continue to be utilized for supply after a regional surface water supply system is implemented. The reliable yield will, of course, vary with each well, depending on site specific conditions and operation and maintenance variables. For the existing CLWSC systems, recent operating history has helped to clarify the status and dependability of its wells. For purposes of this study, future supply requirements for the CLWSC systems assume the continued use of 75% of the existing, firm well supply. For all other existing water systems in the study area, future supply needs within each system were reduced by 50% of the reported existing well supply.

Future water supply requirements are taken as the total projected water demand less the existing supply (adjusted as described above), credited on an individual system basis. A detailed breakdown of future, net water supply requirements within each planning area is

Figure 9 - Future Water Use Projections



presented in Table A4 in the appendices. These projections are summarized by planning area and Service area in Table 10, and are presented graphically in Figure 10. The projections indicate a net total water supply requirement for the study area at the year 2020 of 6.54 mgd, increasing to 11.40 mgd at the year 2040. Depending on the operational strategies employed by individual systems in the use of existing water wells, the average annual supply requirement may vary between the aforementioned projection, and the total water use projection presented in Section 3.3. Specifically, the average annual net water supply for the study area is projected to range between 7,327 acre-feet/year and 9,525 acre-feet/year at the year 2020, and in year 2040, may range between 12,763 acre-feet/year and 15,141 acre-feet/year.

Table 10 - Future Net Supply Requirements

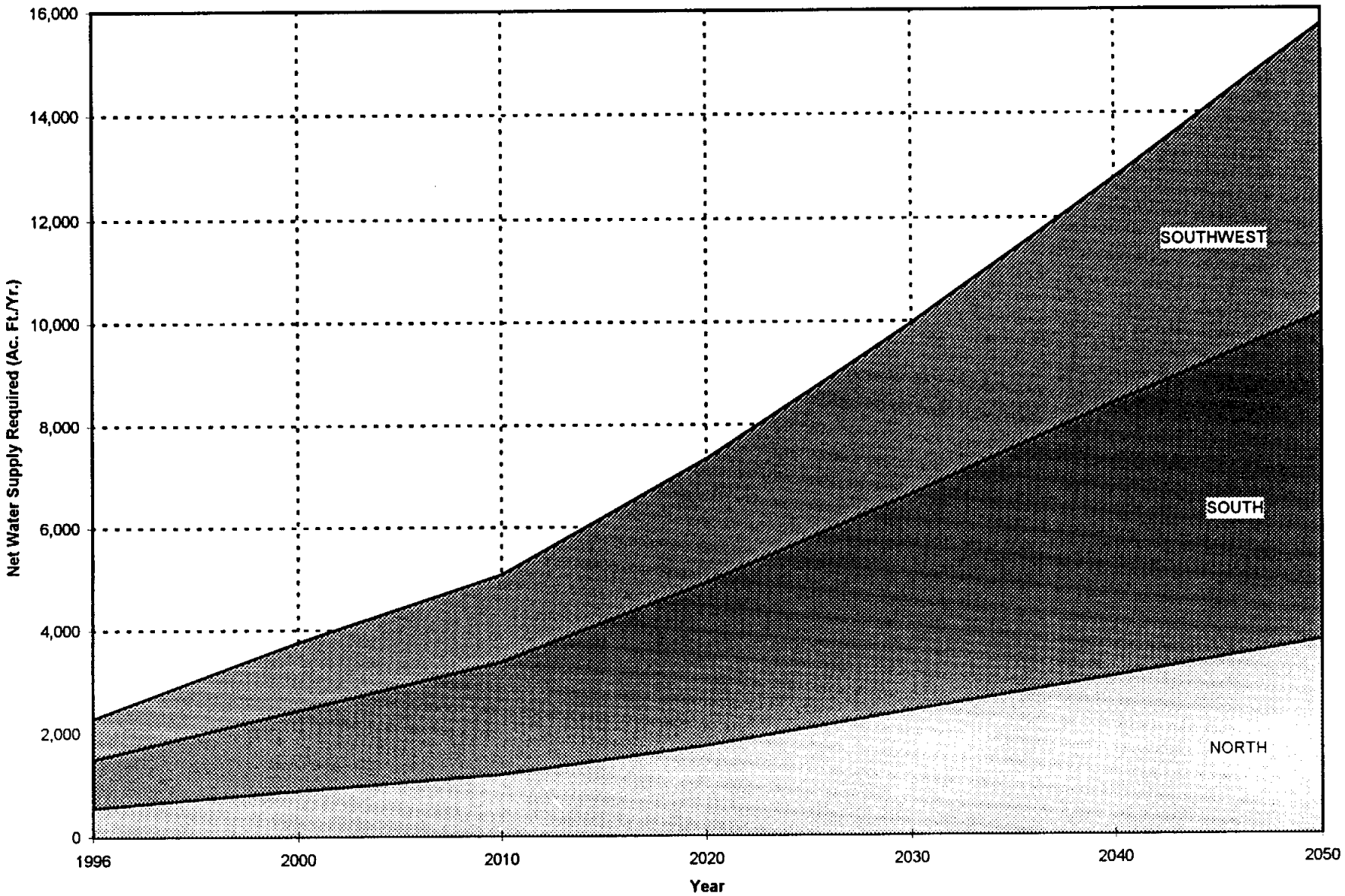
Area	Current * Well Capacity	Net Supply Requirements (gal/day) Average Daily Flowrate 1996	2000	2010	2020	2030	2040	2050
AREA A TOTAL	247,774	1,108,271	1,792,778	2,318,470	3,321,769	4,599,508	6,009,242	7,683,445
AREA B TOTAL	1,023,965	450,499	724,880	967,707	1,396,044	1,908,789	2,404,591	2,912,716
AREA C TOTAL	1,337,478	420,831	746,045	1,131,154	1,675,253	2,203,981	2,760,883	3,154,580
AREA D TOTAL	0	57,477	89,304	115,430	148,764	182,490	220,428	266,135
PROJECT AREA TOTAL	**2,609,217**	**2,037,077**	**3,353,006**	**4,532,760**	**6,541,829**	**8,894,767**	**11,395,144**	**14,016,876**
NORTH (Ac. Ft./Yr.)	1,147	543	874	1,176	1,726	2,393	3,050	3,740
SOUTH (Ac. Ft./Yr.)	1,576	942	1,560	2,191	3,173	4,227	5,352	6,385
SOUTHWEST (Ac. Ft./Yr.)	199	796	1,322	1,710	2,427	3,343	4,360	5,573
TOTALS	**2,922**	**2,282**	**3,755**	**5,077**	**7,327**	**9,962**	**12,763**	**15,699**

* Based on 1996 reported well capacity. Assume: (1) well supply utilized only by parent system; (2) no new well supply provided; (3) capacities taken as 50% of current capacities for non-CLWSC systems, and 75% of current capacities for CLWSC system.

3.5 Regional Water Supply System

In the context of this study, a future water system for the planning area would emanate from surface water treatment facilities located adjacent to Canyon Lake. Treated water would then be conveyed via transmission pipelines to designated delivery points in the area. Regional supply alternatives have been formulated and analyzed as treatment and transmission systems only, with distribution to individual customers accomplished through secondary, independent distribution networks. Transmission system layouts were configured to deliver water to existing population centers, public school sites, and most existing certificated water systems (CCN areas), and were also generally arranged to provide at least one delivery point in each planning area. Transmission pipelines were generally aligned with existing highways, roads, or similar features to minimize environmental impacts, unless indirect routing appeared to result in excessive line lengths, or where higher ground elevations required additional pumping facilities.

Figure 10 - Future Net Water Supply Requirements



Public facilities for water supply are typically designed for a maximum day demand, which is taken in this study as 2.3 times the average daily rate. To avoid over-sizing of future facilities, the TWDB "Normal Precipitation" series (Table 4), was utilized to establish average water demand, then the aforementioned peaking factor was applied to arrive at the maximum day flow rate. Table 10A summarizes the maximum day flow rates used for sizing of facilities by planning area and service area.

Table 10A - Facility Capacity Requirements

Area	Current * Well Capacity	Net Supply Requirements (gal/day) *Maximum Day Flowrate, Based on 2.3 x Average Day* 1996 147	2000 146	2010 135	2020 127	2030 124	2040 122	2050 121
AREA A TOTAL	247,774	2,549,022	3,197,841	4,141,080	5,930,694	8,204,637	10,709,912	13,695,844
AREA B TOTAL	1,023,965	1,036,147	1,286,826	1,723,010	2,387,746	3,264,792	4,131,883	5,022,528
AREA C TOTAL	1,337,478	967,911	1,238,166	1,754,213	2,619,367	3,556,934	4,543,570	5,240,918
AREA D TOTAL	0	132,197	163,870	210,830	269,900	329,406	396,488	477,841
PROJECT AREA TOTAL	**2,609,217**	**4,685,277**	**5,886,703**	**7,829,132**	**11,207,707**	**15,355,769**	**19,781,852**	**24,437,130**
		Equivalent Average Annual Volume						
NORTH (Ac. Ft./Yr.)	1,147	543	676	912	1,291	1,790	2,291	2,819
SOUTH (Ac. Ft./Yr.)	1,576	942	1,176	1,583	2,294	3,107	3,975	4,774
SOUTHWEST (Ac. Ft./Yr.)	199	796	1,015	1,317	1,872	2,580	3,366	4,307
TOTALS	**2,922**	**2,282**	**2,867**	**3,812**	**5,458**	**7,478**	**9,633**	**11,900**

* Based on 1996 reported well capacity. Assume: (1) well supply utilized only by parent system; (2) no new well supply provided; (3) capacities taken as 50% of current capacities for non-CLWSC systems, and 75% of current capacities for CLWSC system.

Proposed transmission facilities are designed to accommodate the projected 20-year (2020) water supply requirement. Pipelines have been sized to convey the net required maximum day flowrates at year 2020 with a target velocity of 3 feet per second (fps). Pipeline capacities using a 5 fps velocity were then compared to the year 2040 maximum day flows, with the consideration that future flow demands should be satisfied using the same pipeline system with the addition and/or upgrading of booster pumps. Existing ground profiles were prepared for each transmission system alignment and hydraulic gradients were developed using the aforementioned capacity/velocity criteria. Booster pump stations were interjected as needed to deliver the required flow to designated delivery points. Storage tanks were located at critical control locations, to facilitate delivery to adjacent service areas and to provide an operating reserve for booster stations.

3.5.1 Proposed Water Treatment Plants

Given the relative location of the Lake and the physical characteristics of the study area, it is recommended that future water supply requirements be met through the provision of two water treatment plant sites, one on the south (South WTP) and the other on the north (North WTP) sides of the Lake. Proposed sites were selected based on lake depth and shoreline topography characteristics that appeared to provide suitable intake arrangements, and overall, centralized locations with respect to transmission line routing. The North WTP site is located at the southerly end of the Canyon Lake Shores subdivision adjoining the Lake adjacent to the old riverbed. The South WTP is located in the Startzville community on Old Sattler Road immediately northwest of the intersection of Farm-To-Market Road (FM) 2673 and FM 3159. The recommended intake point for this facility is northeast of the site in Comal Park, situated on the southerly cutbank of the old riverbed. This location will require approximately 15,000 feet of raw water pipeline to connect the intake to the plant site.

Based on CLWSC's experience with this existing water treatment plant, the superior raw water quality in Canyon Lake can be economically treated to comply with current drinking water standards. It is anticipated that the proposed North and South WTP's will employ a treatment process similar to CLWSC's existing 0.50 mgd plant, utilizing solids-contact type clarification followed by multi-media filtration and disinfection, with chemical addition consisting of coagulant and coagulant aid. The required capacity of the North and South WTP's will be a function of actual supply needs, which, as presented in Section 3.4, will depend on the operation of existing water wells. Based on the projections previously presented, it is anticipated that the South WTP will reach a design capacity of at least 8 mgd by year 2020, and may be as large as 12 mgd. For the North WTP, it appears that a minimum 2 mgd capacity will be needed by year 2020, up to a maximum capacity of 4 mgd. Capital and O & M cost projections are based on an 8 mgd South plant capacity, and a 2 mgd North plant capacity. As with any facility of this type, the plants should be designed in a modular fashion to allow incremental expansion. For the South WTP, it is assumed that the expansion increment will be 2 mgd, and for the North WTP, 1 mgd.

3.5.2 South Transmission System Alternatives Analysis

Given the significant distances from the lake to the southwesterly limits of the study area, selection of the most cost-effective transmission system arrangement to serve the South and Southwest service areas was considered critical. Three alignment options, depicted in Figures 11a, 11b, and 11c, were analyzed with respect to capital and operating cost, environmental impacts, and adequacy of service. The northernmost route, designated Alternate #1 (Figure 11a), departs from the South WTP northwesterly along FM 2673, then extends westerly from the southwesterly corner of the Canyon Lake Mobile Home Estates subdivision, following an existing Guadalupe Valley Telephone Cooperative (GVTC) easement to the intersection of Demi John Road. The pipeline continues westerly across generally undeveloped areas to its intersection with US 281, then follows US 281 south to FM 1863. A lateral pipeline extending east along SH 46 is required to serve the Smithson Valley area. The southern route (Alternate #2, Figure 11b) follows FM 3159 south to FM 1863 and continues S.W. to US 281, with a lateral pipeline extending west from the intersection of FM 3159 and SH 46 to serve the SH 46/US 281 area. The middle route, identified as Alternate #3 (Figure 11c), follows the same path initially as Alternate #1, extending northwesterly along FM 2673, and through Canyon Lake Mobile Home Estates. From that point the route would briefly follow the aforementioned GVTC easement, then intercept and align with Bendel Ranch Road, traversing south and west

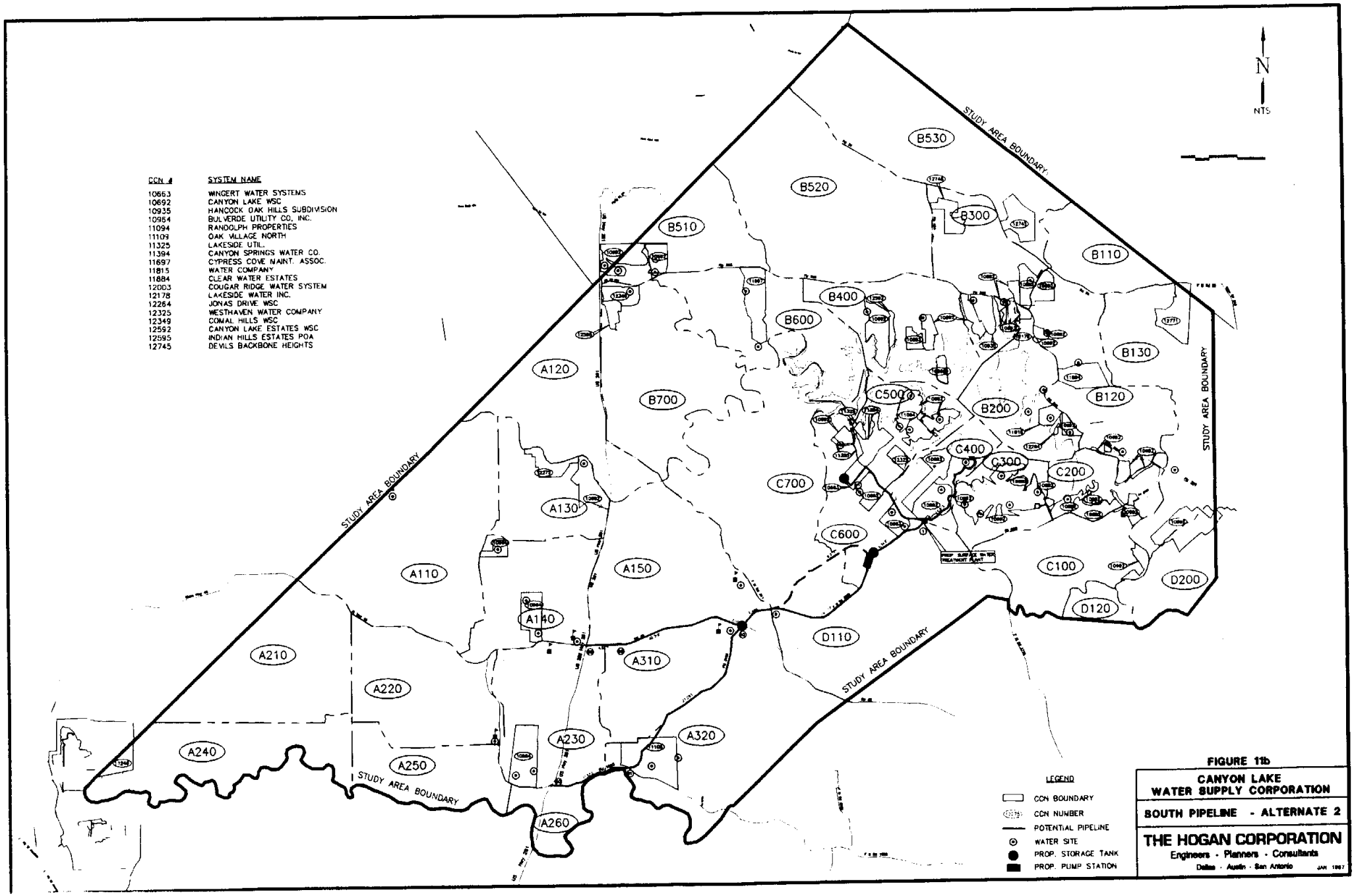


FIGURE 11b

CANYON LAKE
WATER SUPPLY CORPORATION

SOUTH PIPELINE - ALTERNATE 2

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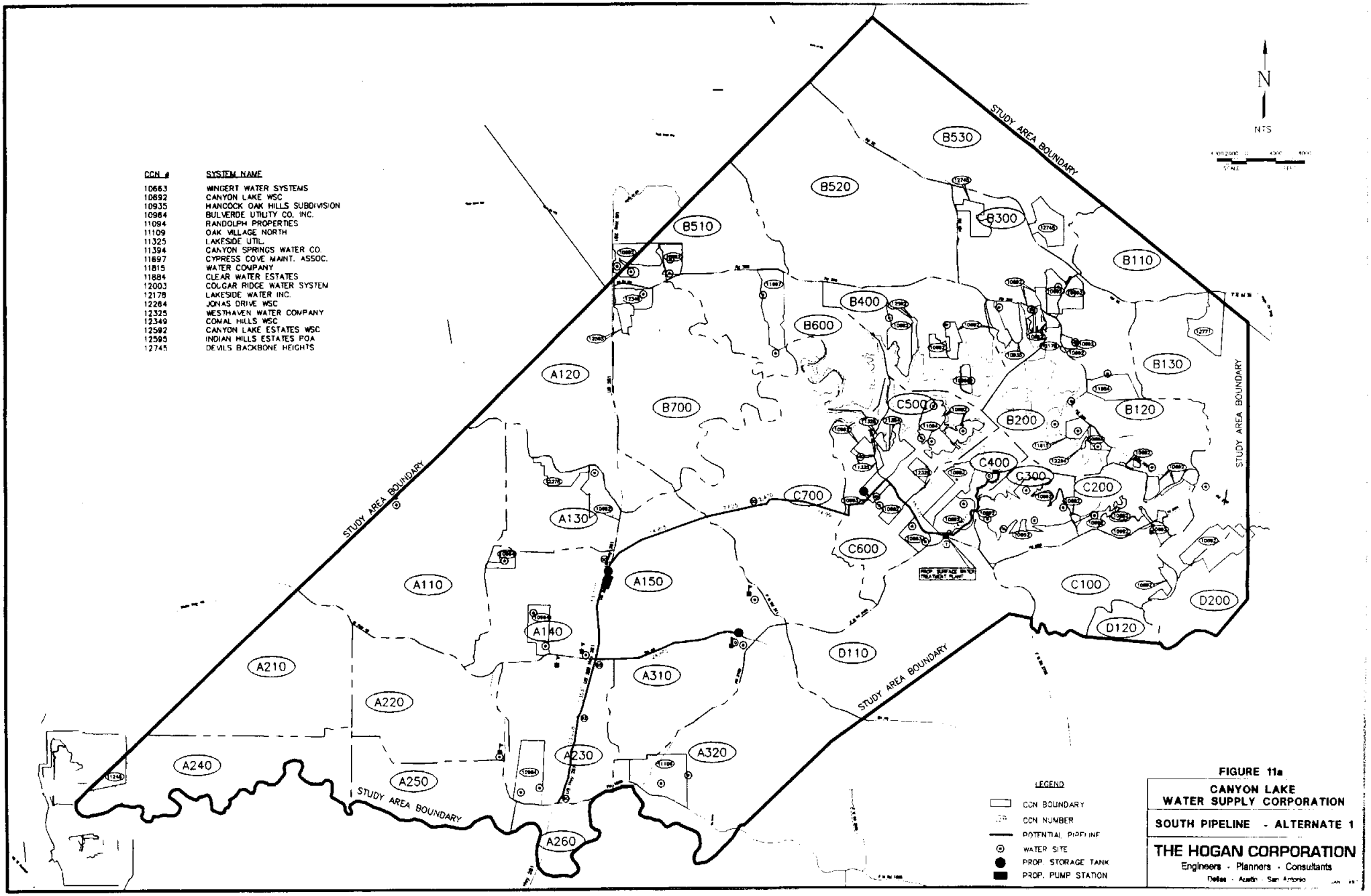

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to its intersection with Rebecca Creek Road. The line would then follow Rebecca Creek Road south to FM 3159, then southwest to SH 46, then west to US 281. The last segment of Alternate #3 would be identical to Alternate #1, following US 281 south to FM 1863.

The projected capital costs and operations and maintenance (O & M) costs for each of these three options are presented in Tables 11, 12, and 13. Cost projections are based on a uniform system delivery of 8 mgd. Alternative #1 appears to have superior hydraulic characteristics in that the alignment is closer to the river and bypasses higher ground elevations further south near FM 3159 and SH 46. A significant portion of the segment between Canyon Lake and US 281 crosses undeveloped areas. While no significant environmental issues for this segment were noted, there are general concerns typical of any cross-country utility line, including stream crossings and easement requirements. Alternative #2 follows existing highways throughout, and provides a direct path from the plant southwest, but crosses the highest elevation point in the area. A modification of the route along FM 3159 between the plant and SH 46 was investigated, which would entail a parallel, off-road diversion to miss Startz Hill, but the environmental review identified the area as potential endangered species habitat, and this option was therefore disregarded. Alternative #3 follows existing easements, roads, and highways for most of its length, and therefore, does not appear to present any environmental concerns. While the alignment of Alternate #3 seems to be somewhat circuitous, its route passes directly through or adjacent to critical service locations, thereby eliminating the need for lateral pipeline that are required for Alternatives #1 and #2.

Capital and O & M costs for the three alternatives are summarized for comparison in Table 14. Given the degree of accuracy in estimating and the overall magnitude, the projected costs for the three alternatives are quite similar. Alternative #3 is recommended to be incorporated into the regional plan, in that it appears to provide superior service to schools, existing developed areas, and future development.

Table 14
Southwest Transmission System

	Alternate #1	Alternate #2	Alternate #3
Plant:	$8,800,000	$8,800,000	$8,800,000
Transmission System:	$14,413,525	$13,586,210	$14,603,710
Total:	***$23,213,525***	***$22,386,210***	***$23,403,710***
Capital Cost per Connection:	$2,119	$2,043	$2,136
*Total Water Cost ($/1,000 gal's):	$1.29	$1.28	$1.30

** Based on 8 mgd uniform delivery.*

Node	Q Total mgd	Q mxdy mgd	Q mxdy gpm	Hydraulic Analysis V max = 3 fps Pipe Size, In Calc	Pipe Size, In Select	Pipe Length, ft incr	Pipe Length, ft Cum	Future Cap. @ V=5 fps	Cost Projection Pipeline Cost Unit	Pipeline Cost Total	Additional Facilities	Land, Easements	12% Technical Services	15% Contingency	Total
North Along US 281;Crossing East to FM 2673, South to Plant															
60							89,226								
	2.60	2.60	1,807	15.69	16	13,028		4.51 mgd	$60	$781,680	$0	$0	$93,800	$131,300	$1,006,780
62							76,198								
	0.65	3.26	2,262	17.55	18	7,353		5.71 mgd	$75	$551,475	$0	$0	$66,200	$92,700	$1,717,155
65							68,845								
	1.33	5.17	3,589	22.11	24	13,770		10.15 mgd	$95	$1,308,150	$240,000	$50,000	$185,800	$267,600	$3,768,705
50							55,075								
	0.77	5.94	4,123	23.69	24	22,440		10.15 mgd	$95	$2,131,800	$0	$112,200	$255,800	$375,000	$6,643,505
55							32,635								
	0.26	6.20	4,303	24.21	24	17,460		10.15 mgd	$95	$1,658,700	$0	$34,920	$199,000	$283,900	$8,820,025
41							15,175								
	1.10	7.30	5,069	26.27	30	15,175		15.86 mgd	$110	$1,669,250	$150,000	$25,000	$218,300	$309,400	$11,191,975
1							0								
East Along SH 46 to Smithson Valley															
65							24,865								
	0.58	0.58	404	7.42	8	24,865		1.13 mgd	$25	$621,625	$150,000	$25,000	$92,600	$133,400	$1,022,625
10															
From Lake to Treatment Site															
0							14,915								
	1.26	8.56	5,942	28.44	30	14,915		15.86 mgd	$110	$1,640,650	$0	$74,575	$196,900	$286,800	$2,198,925
1							0								
													TOTAL TRANSMISSION COST		**$14,413,525**

Table 11B
Operation and Maintenance Costs

Flow & Connection Data		
Maximum Plant Flow	**8,000,000**	gpd
System Base Flow	8,000,000	gpd
Equivalent Connections	10,955	

Project Cost		Cost/Connection Actual
Plant:	$8,800,000	$803
Transmission System:	$14,413,525	$1,316
Total:	$23,213,525	$2,119

Budget Item	*Surface Water Treatment Plant* Qty	Units	Rate	Mult	Total	*Transmission System* Qty	Units	Rate	Mult	Total	*Combined*
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,125	HP	$1.60	12	$21,600	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$14,420,000	20 years		8%	$1,468,709	
Administration				1.50%	$132,000				0.50%	$72,100	
Subtotal, Fixed Costs					$1,516,823					$1,562,409	$3,079,232
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	4,072,551	kwh	$0.07	1	$285,079	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	25	miles	$250	1	$6,250	
Subtotal, Variable Costs					$375,395					$291,329	$666,723
Total Annual O&M Cost					$1,892,218					$1,853,737	$3,745,956

Treated water cost ($ per 1,000 gallons)

Plant					Transmission					Combined
Variable:				$0.13	***Variable:***				$0.10	$0.23
Fixed:					***Fixed:***					
8,000,000	gpd	Conn's 10,955	$11.54	$0.52	8,000,000	gpd	Conn's 10,955	$11.89	$0.54	$1.06
										$1.29

Table 12A
Southwest Comal County
Water Supply System

Node	Q Total mgd	Q mxdy mgd	Q mxdy gpm	Pipe Size, in Calc (V max = 3 fps)	Pipe Size, in Select	Pipe Length, ft Incr	Pipe Length, ft Cum	Future Cap. @ V = 5 fps	Pipeline Cost Unit	Pipeline Cost Total	Additional Facilities	Land, Easements	Technical Services (12%)	Contingency (15%)	Total
From US 281 East Along FM 1863, North Along FM 3159															
60							43,927								
	1.81	1.81	1,255	13.07	14	11,652		3.45 mgd	$45	$524,340	$0	$0	$62,900	$88,100	$675,340
61							32,275								
	0.80	2.60	1,807	15.69	16	32,275		4.51 mgd	$60	$1,936,500	$0	$0	$232,400	$325,300	$3,169,540
9							0								
From US 281 along SH 46 to FM 3159 to Plant															
65							63,002								
	2.16	2.16	1,503	14.31	16	27,887		4.51 mgd	$60	$1,673,220	$0	$0	$200,800	$281,100	$2,155,120
10							35,115								
	0.90	3.06	2,128	17.02	18	6,495		5.71 mgd	$75	$487,125	$150,000	$25,000	$76,500	$110,800	$3,004,545
9							28,620								
	0.53	6.20	4,303	24.21	30	28,620		15.86 mgd	$110	$3,148,200	$270,000	$25,000	$410,200	$578,000	$7,435,945
1							0								
Along FM 2673 West of FM 3159															
41							15,175								
	1.10	1.10	766	10.21	12	15,175		2.54 mgd	$40	$607,000	$0	$0	$72,800	$102,000	$781,800
1							0								
Intake to Treatment Plant															
0							14,915								
	1.26	8.56	5,942	28.44	30	14,915		15.86 mgd	$110	$1,640,650	$0	$74,575	$196,900	$286,800	$2,198,925
1							0								
													TOTAL TRANSMISSION COST		$13,586,210

Table 12B
Operation and Maintenance Costs

Flow & Connection Data		
Maximum Plant Flow	**8,000,000**	gpd
System Base Flow	8,000,000	gpd
Equivalent Connections	10,955	

Project Cost		Cost/Connection Actual
Plant:	$8,800,000	$803
Transmission System:	$13,586,210	$1,240
Total:	$22,386,210	$2,043

Budget Item	*Surface Water Treatment Plant* Qty	Units	Rate	Mult	Total	*Transmission System* Qty	Units	Rate	Mult	Total	*Combined*
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,275	HP	$1.60	12	$24,480	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$13,590,000	20 years		8%	$1,384,172	
Administration				1.50%	$132,000				0.50%	$67,950	
Subtotal, Fixed Costs					$1,516,823					$1,476,602	$2,993,425
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	4,714,117	kwh	$0.07	1	$329,988	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	26	miles	$250	1	$6,488	
Subtotal, Variable Costs					$375,395					$336,476	$711,871
Total Annual O&M Cost					$1,892,218					$1,813,077	$3,705,295

Treated water cost ($ per 1,000 gallons)

Plant					Transmission				Combined
Variable:				$0.13	***Variable:***			$0.12	$0.25
Fixed:					***Fixed:***				
8,000,000	gpd	Conn's 10,955	$11.54	$0.52	8,000,000	gpd	Conn's 10,955	$11.23	$0.51	$1.03
										$1.28

Table 13A
Southwest Transmission System

				Hydraulic Analysis						Cost Projection						
				V max =	*3 fps*				40 Yr.					12%	15%	
	Q Total	Q mxdy		Pipe Size, in		Pipe Length, ft		Future Cap.	Q Total	Pipeline Cost		Additional	Land,	Technical		
Node	mgd	mgd	gpm	Calc	Select	Incr	Cum	@ V = 5 fps	mgd	Unit	Total	Facilities	Easements	Services	Contingency	Total
North Along US 281, East along SH 46; FM 3159, FM 311, Crossing Northeast to FM 2673, South to Plant																
60							97,924									
	2.60	2.60	1,807	15.69	18	13,028		5.71 mgd	4.65	$75	$977,100	$0	$0	$117,300	$164,200	$1,258,600
62							84,896									
	0.65	3.26	2,262	17.55	18	7,353		5.71 mgd	5.55	$75	$551,475	$0	$0	$66,200	$92,700	$1,968,975
65							77,543									
	1.51	4.77	3,310	21.23	24	24,865		10.15 mgd	8.27	$95	$2,362,175	$0	$0	$283,500	$396,900	$5,011,550
10							52,678									
	0.90	5.67	3,935	23.15	24	7,978		10.15 mgd	10.14	$95	$757,910	$150,000	$25,000	$108,900	$156,300	$6,209,660
9							44,700									
	0.53	6.20	4,303	24.21	24	29,525		10.15 mgd	10.92	$95	$2,804,875	$150,000	$15,000	$354,600	$498,700	$10,032,835
41							15,175									
	1.38	7.58	5,263	26.77	30	15,175		15.86 mgd	12.93	$110	$1,669,250	$150,000	$25,000	$218,300	$309,400	$12,404,785
1																
From Intake to Treatment Plant																
0							14,915									
	0.98	8.56	5,942	28.44	30	14,915		15.86 mgd	15.08	$110	$1,640,650	$0	$74,575	$196,900	$286,800	$2,198,925
1							0									
														TOTAL TRANSMISSION COST		**$14,603,710**

Table 13B
Operation and Maintenance Costs

Flow & Connection Data		
Maximum Plant Flow	**8,000,000**	gpd
System Base Flow	8,000,000	gpd
Equivalent Connections	10,955	

Project Cost		Cost/Connection Actual
Plant:	$8,800,000	$803
Transmission System:	$14,603,710	$1,333
Total:	$23,403,710	$2,136

	Surface Water Treatment Plant					***Transmission System***					***Combined***
Budget Item	**Qty**	**Units**	**Rate**	**Mult**	**Total**	**Qty**	**Units**	**Rate**	**Mult**	**Total**	
FIXED COSTS											
Electrical Power - base	700	HP	$1.60	12	$13,440	1,200	HP	$1.60	12	$23,040	
Raw water	8,000	Kgal	$0.16	365	$475,084						
Annual Debt Service	$8,800,000	20 years		8%	$896,299	$14,610,000	20 years		8%	$1,488,061	
Administration				1.50%	$132,000				0.50%	$73,050	
Subtotal, Fixed Costs					$1,516,823					$1,584,151	$3,100,974
VARIABLE COSTS											
Electrical Power - useage	2,111,166	kwh	$0.07	1	$147,782	4,393,334	kwh	$0.07	1	$307,533	
Chemicals	8,000	Kgal	$0.06	365	$175,200						
TNRCC Inspection Fees	1	annual	$4,413	1	$4,413						
Repairs	8.00	mgd	$500	12	$48,000	22	miles	$250	1	$5,500	
Subtotal, Variable Costs					$375,395					$313,033	$688,428
Total Annual O&M Cost					$1,892,218					$1,897,184	$3,789,402

Treated water cost ($ per 1,000 gallons)

	Plant					**Transmission**					**Combined**
Variable:					$0.13	***Variable:***				$0.11	$0.24
Fixed:						***Fixed:***					
			Conn's					Conn's			
	8,000,000	gpd	10,955	$11.54	$0.52	8,000,000	gpd	10,955	$12.05	$0.54	$1.06
											$1.30

3.5.3 Recommended System

The proposed regional supply system, incorporating the facility locations and transmission pipeline routes previously described, is presented in Figure 12. Figure 13 displays ground profiles and system hydraulic gradients along proposed transmission routes. Phasing of the transmission system has been organized to address various priorities and implementation issues within the North, South, and Southwest Service areas.

In the North service area, the primary transmission line would follow FM 306 both easterly and westerly from the North WTP, as this appears to provide the most direct route to delivery points. Lateral transmission lines would branch from the main line at FM 484 and FM 3424 to feed the northerly and northeasterly periphery of the study area. The phase 1 system would consist of the North WTP, and a transmission pipeline from the plant north to FM 306, then east to FM 3424. Phase 2 would comprise a transmission line westerly along FM 306 to the existing developments in the vicinity of US 281 and SH 306. Lateral pipelines extending north of FM 306 to serve the areas north of FM 32, and south along US 281 from FM 306 are designated as future.

For the South and Southwest service areas, the primary facilities are considered to be the South WTP and main transmission pipeline previously described as Alternative #3, terminating at the intersection of SH 46 and US 281. Transmission segments identified as Phase 1 would also include a pipeline extending east along FM 2673 through the Sattler community, terminating at FM 306 and the Guadalupe River. Phase 2 improvements consist of lateral extensions from the primary system terminus at SH 46/US 281, north along US 281 to the Guadalupe River, and west along SH 46 to a point near the new Comal ISD school campus. The Phase 3 transmission system includes all proposed facilities in the Southwest service area, beginning with a pipeline connected to the primary system at the intersection of SH 46 and US 281, then extending south along US 281 to FM 1863. A lateral line would continue from that point east along FM 1863 to serve the Oak Village North area. To serve the southern portion of the Bulverde area and the westerly part of the Southwest service area, a second lateral pipeline would be routed west along Bulverde Road and up to Amman Road. At this location, a storage tank and booster station is recommended to convey the flow further west along Amman Road, as well as to act as a delivery and transfer point to serve the Bulverde area. Future system extensions in the South service area may occur west along SH 46 from the phase 2 terminus and north from SH 46 along old Bulverde Road. In the Southwest service area, future transmission lines could be extended along FM 1863 east of Oak Village North, as well as north and south of Amman Road to serve new development in those areas.

Capital costs have been projected for all of the proposed transmission system segments, and are presented in detail in Table 13a (South primary system), Table 16a (North Primary/phase 1 system), and 15 (lateral transmission systems). The projected capital costs are summarized in Table 18.

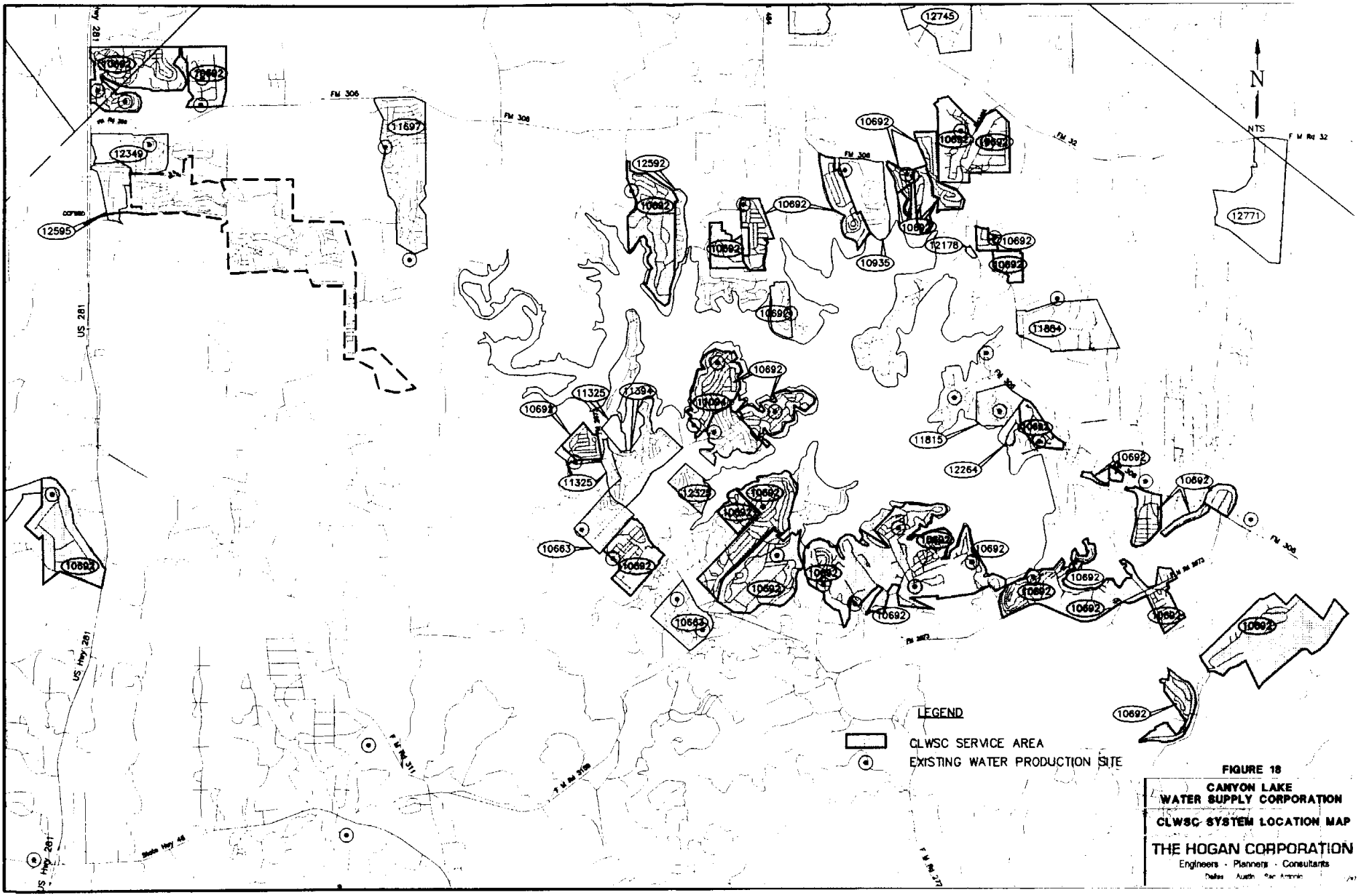

FIGURE 18

CANYON LAKE WATER SUPPLY CORPORATION

CLWSC SYSTEM LOCATION MAP

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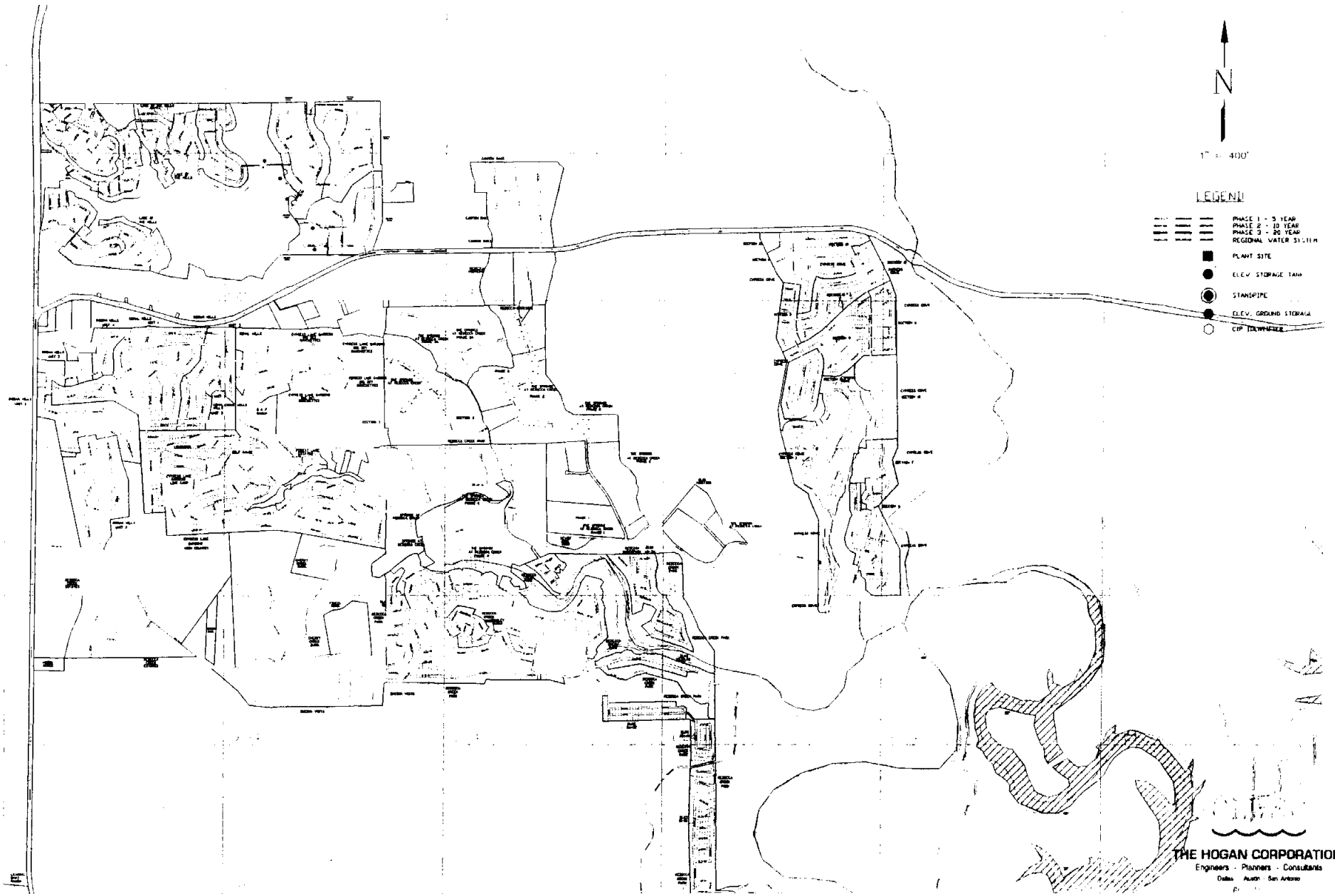

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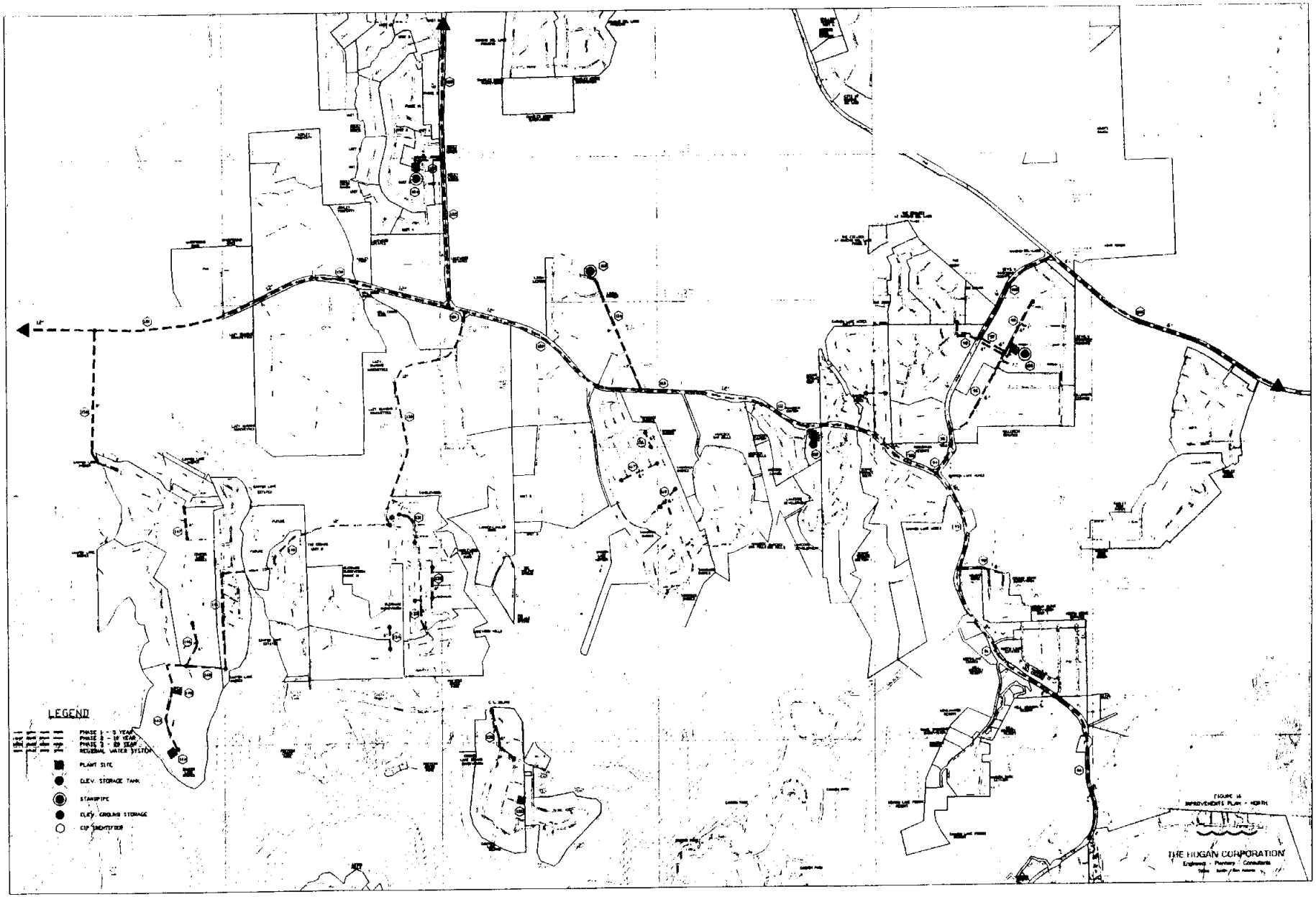

LEGEND
PLANT SITE
ELEV. STORAGE TANK
STANDPIPE
ELEV. GROUND STORAGE
BOOSTER STATION
THE HOGAN CORPORATION

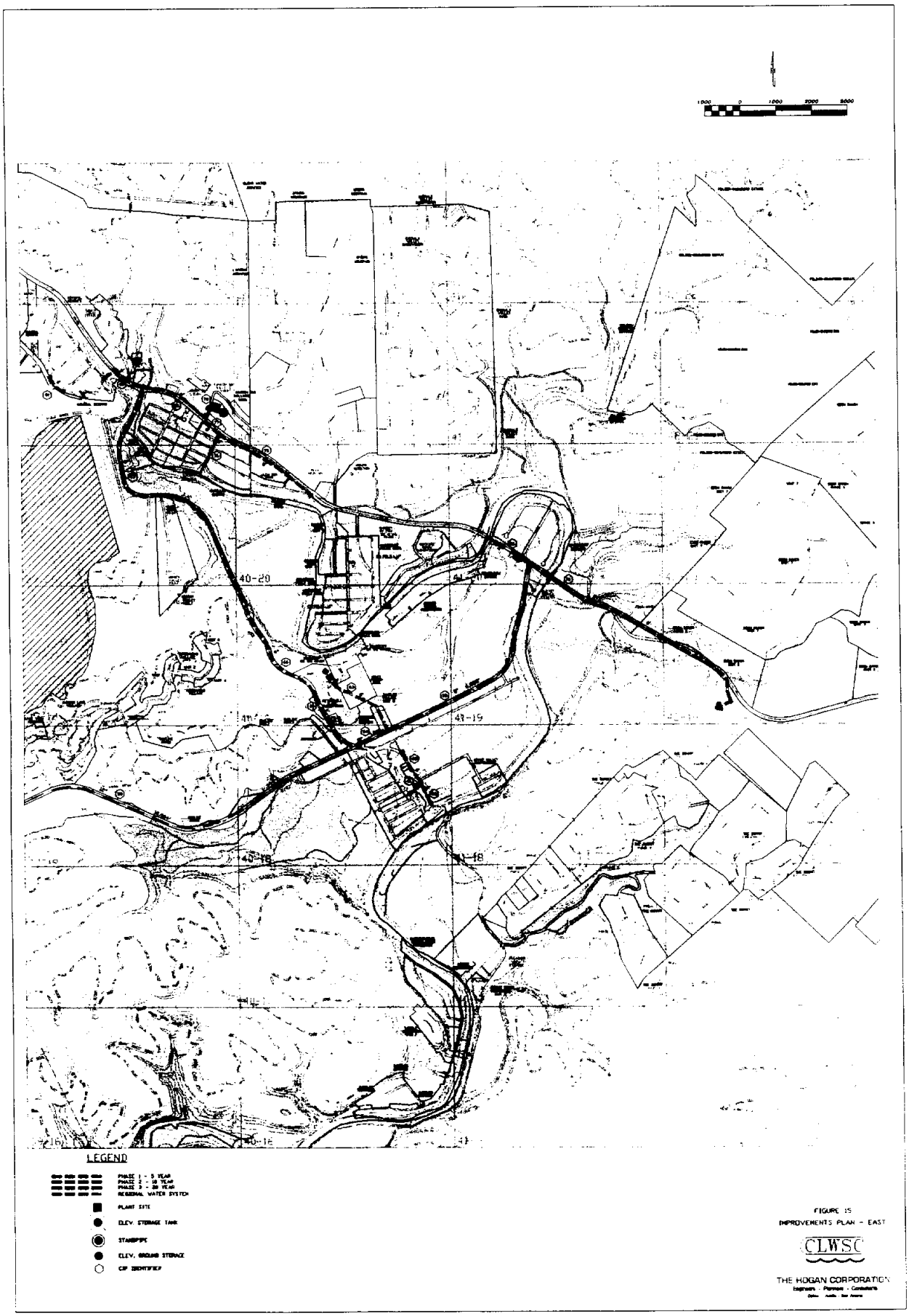
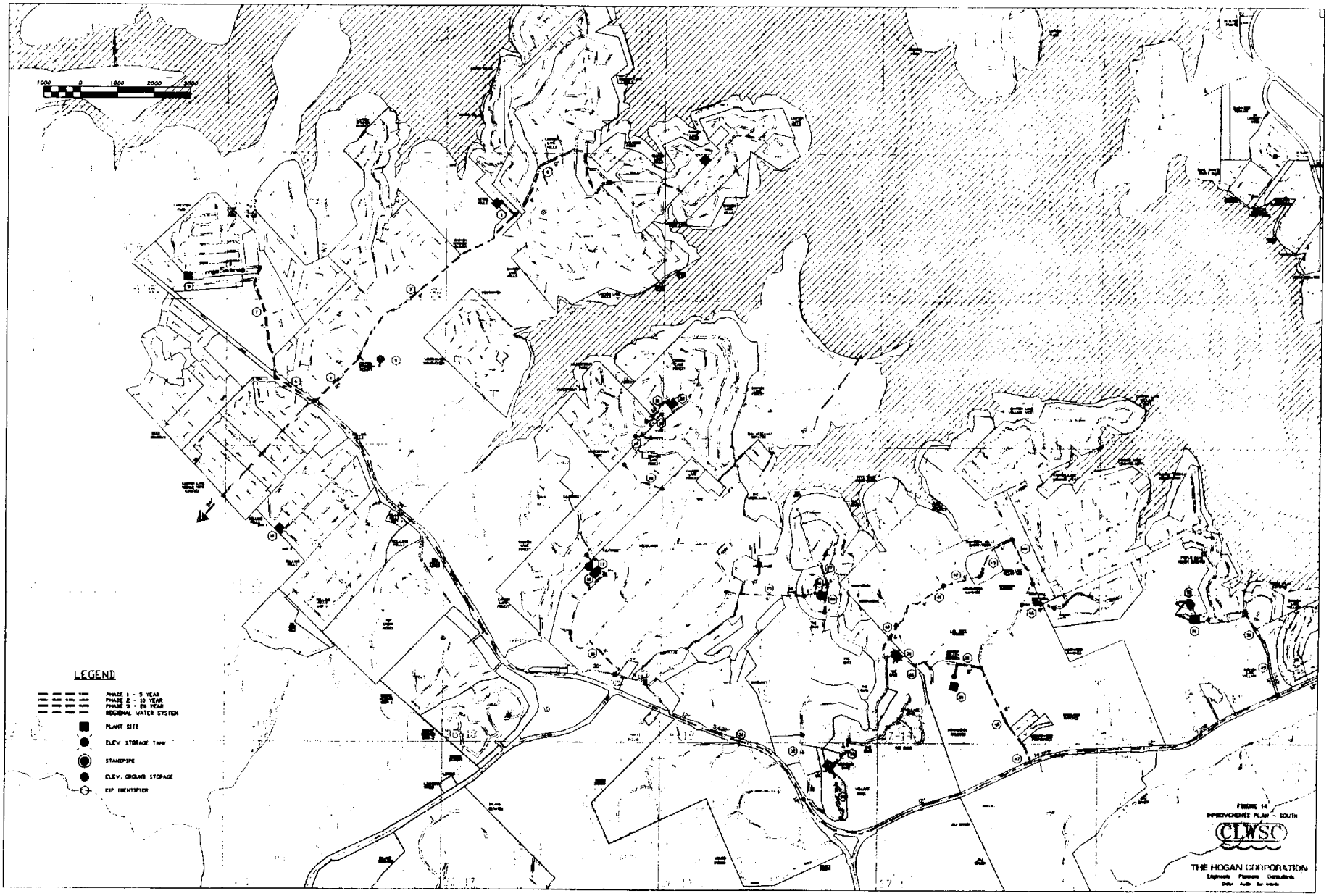


FIGURE 15
IMPROVEMENTS PLAN - EAST

CLWSC

THE HOGAN CORPORATION


1000 0 1000 2000 3000
LEGEND
PHASE 1 - 5 YEAR
PHASE 2 - 10 YEAR
PHASE 3 - 20 YEAR
REGIONAL WATER SYSTEM
PLANT SITE
ELEV. STORAGE TANK
STANDPIPE
ELEV. GROUND STORAGE
CIP IDENTIFIER
CLWSC
THE HOGAN CORPORATION

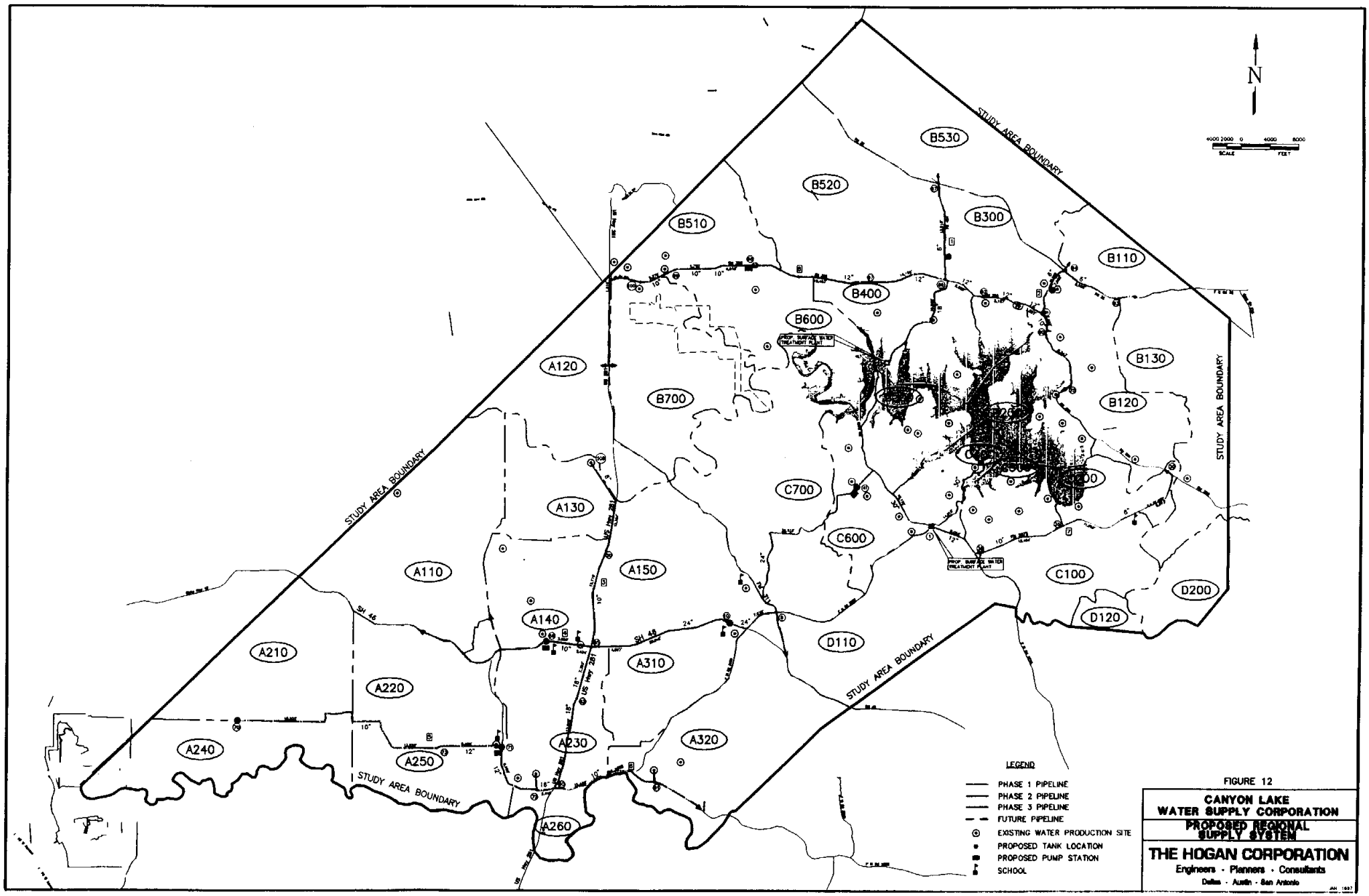


FIGURE 12

CANYON LAKE WATER SUPPLY CORPORATION

PROPOSED REGIONAL SUPPLY SYSTEM

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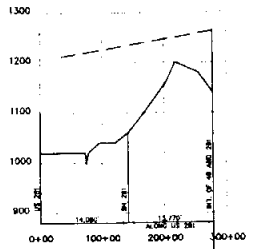
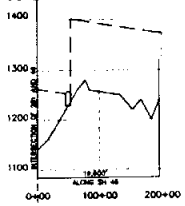
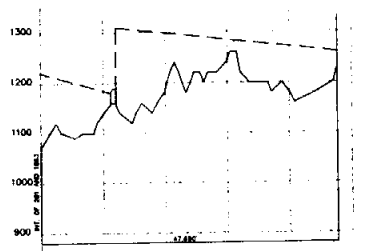


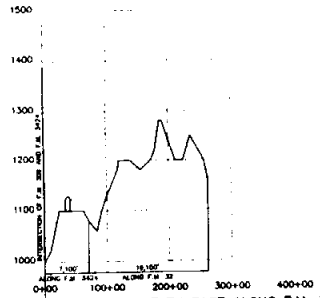
BRANCH 3 – ALONG US 281



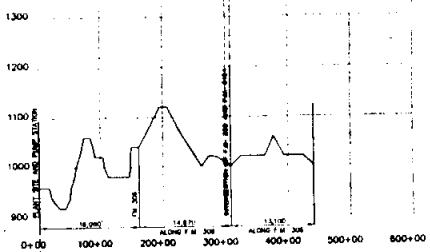
BRANCH 4 – ALONG SH 46 WEST OF US 281

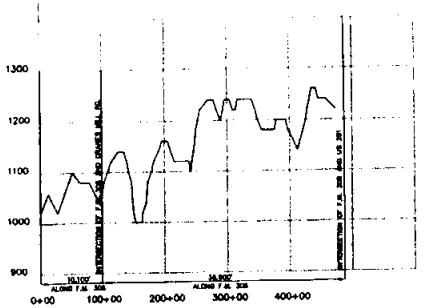


BRANCH 5 – ALONG AMMANN ROAD

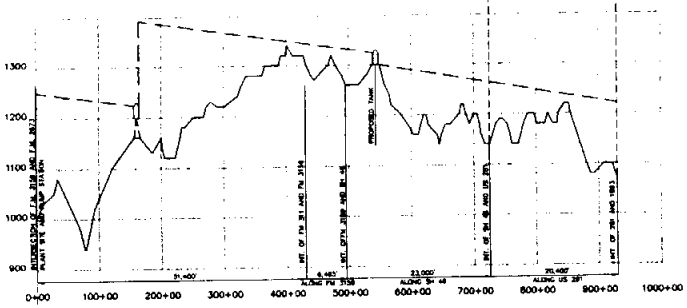


NORTH ALONG F.M. 3424 THEN EAST ALONG F.M. 32

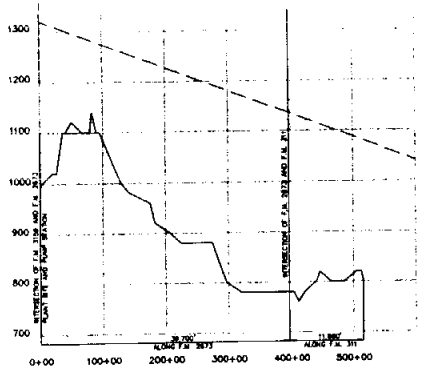




BRANCH 8 – WEST ALONG FM 306



SOUTH PIPELINE ALTERNATE 3



BRANCH 7 – FROM PLANT EAST ALONG FM 2673

SOUTH SIDE

NORTH SIDE

FIGURE 13

CANYON LAKE WATER SUPPLY CORPORATION

REGIONAL WATER PLAN

SUPPLY SYSTEM PROFILES

THE HOGAN CORPORATION

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CANYON LAKE WATER
SUPPLY CORPORATION

REGIONAL WATER PLAN
DECEMBER 1997

HOGAN CORPORATION

Contract 96-483-155

The following maps are not attached to this report. Due to their size, they could not be copied. They are located in the official file and may be copied upon request.

Regional Water Plan Key Maps

Key Maps - 27 - 42

Please contact Research and Planning Fund Grants Management Division at (512) 463-7926 for copies.