through the customers' water softeners. An acceptable level of total hardness for most consumers is between 50 mg/L and 150 mg/L as $CaCO_3$ (AWWA, 1990). Using a maximum hardness goal of 100 mg/L in the distribution system, individual home water softeners may be eliminated. Additionally, residential water softeners use water for regeneration, and this will also be conserved.

The TDS and hardness reduction (as well as reduction of the other constituents) can be accomplished using reverse osmosis (RO) membrane technology. With any desalination treatment process (desalting), not all of the water treated ends up as "product" (potable) water. A portion of the water contains all of the minerals (salts) removed through the process, and this waste stream is called the "concentrate". The ratio of product water (potable) to the total feed water (supply) is termed the "recovery". For example, if 100 gallons of brackish water was processed to produce 75 gallons of potable water, then the recovery is 75%. In this example, the concentrate (waste) would be 25% or 25 gallons. The goal of any brackish water desalination process is to maximize the recovery, and minimize the concentrate disposal.

For the ALWC, desalination will be used to improve the quality of the water to 500 mg/L TDS. Computer simulations were developed for the desalination process, using a ground water feed quality of around 2,100 mg/L TDS. Approximately 75% desalinated water is blended with about 25% untreated well water, to achieve an overall system recovery of about 83% and produce a blended product water of about 500 mg/L TDS and total hardness of less than 100 mg/L. The concentrate stream will contain approximately 9,600 mg/L TDS, at a quantity of around 17% of the feed. Salts limiting the recovery include $CaCO_3$, $CaSO_4$ and some $BaSO_4$. Iron and manganese will be removed prior to the reverse osmosis process to control membrane fouling, and a scale inhibitor will be required to maximize the RO recovery. Refer to **Figure 9.14** for a schematic of the desalination process.

The concentrate stream may be disposed of at the WWTP, where blending back into the "desalted" wastewater stream will tend to make the water quality "whole" again, and close to the original 2,100 mg/L TDS. Otherwise, an evaporation pond may be used for disposal of the concentrate.

The treatment facility (RO-WTP) may be located at the water yard or a new site. The building housing the equipment will be approximately 30 ft. by 40 ft., and the evaporation pond will ultimately need to be approximately 4-acres in size, and use enhanced evaporation (spray) to minimize the area needed. The pond does not need to be located next to the RO-WTP, and if the concentrate is disposed of at the WWTP, may be located there. The wells (domestic supply only) will pump directly to the RO-WTP, and the treated-blended water will be pumped directly to the water tanks. Disinfection will take place at the RO-WTP, so a portion of the treated water can be pumped directly to new water storage tanks in lower zones.

Pre-treatment of this water is critical for the successful operation of the reverse osmosis system. Iron and manganese will foul (plug) the membranes at the high levels present in the ALWC wells, and these need to be removed prior to the reverse osmosis system. One treatment method for removal of iron (Fe) and manganese (Mn) is to convert these to oxides ("rust") and then they can be removed by filtration. Another method used to remove Fe and Mn is an ion-exchange process, or water softening. The advantage of using water softening is that not only is Fe and Mn removed, but so is the hardness, which is a water quality goal. With the Fe, Mn and hardness removed, the TDS reduction step using reverse osmosis is greatly improved. The overall recovery from the RO process is increased to more than 90%, with the waste stream reduced to less than 10%.

In this scenario, the ion-exchange (IX) media is regenerated using a sodium-chloride (salt) solution. This process "exchanges" sodium (from the salt) for hardness, iron and manganese (from the well water). Although more sodium is added to the water during the IX process, this is easily removed with the RO treatment step. However, overall this is a more expensive option.

9.6 Operational Recommendations

Because of the presence of soluble iron and manganese in the water, the distribution system will continue to experience red water problems until water treatment is accomplished. A routine hydrant-flushing program should be continued to minimize the accumulation of these particles.

To provide more efficient operation of the water system, and allow more economical use of labor, it is recommended that a SCADA control system be installed. Supervisory Control and Data Acquisition (SCADA) systems are computer based, and will monitor well on/off status, storage tank level, booster station status, pressures and other system data. The Master Control Panel (MCP) will be located at the water office, and all information is shown on the computer monitor. Wells and booster pumps can be controlled from the MCP, saving operator time from driving to each well site for operational status.

The power consumption for the water facilities was briefly reviewed, and included a report prepared by the Otero County Electric Cooperative (OCEC) in February of 2003, and recent electric consumption information for the latest 12-months.

The OCEC report compares power usage (pumping) for both 100% and 79% off-peak power, at current and proposed rates. The results of the study indicate that using 100% off-peak power results in an annual savings of more than

$27,000. Not enough information was available to determine actual pumping efficiencies (wire-to-water) of each of the wells and booster station, but it is recommended that such a study be performed to determine if any increase can be determined.

10.0 WASTEWATER SYSTEM EVALUATION AND RECOMMENDATIONS

10.1 Existing Wastewater Collection

10.1.1 Wastewater Flows

The ALWC currently provides sewer service to only the Alto Lakes Golf and Country Club clubhouse and the Alto Lakes condominiums. Approximately 12,000 gallons per day of sewage is generated from these two sources, and peaks during holiday weekends to as much as 28,000 gpd. The return flow to the sewer system is estimated at approximately 90% of the water usage (primarily because the condominiums and clubhouse have little outdoor usage). This number is estimated, as the wastewater treatment plant (WWTP) does not have an inflow meter. Typically, domestic sewage return amounts are 60% - 70% of total water usage.

10.1.2 Sewer Collection System

As-built drawings of the sewer system do not exist. Livingston Associates, P.C. personnel performed a field survey in February 2004 to determine manhole locations, inverts and rim elevations. Refer to the **Appendix** for detailed information. The sewer collection system consists of approximately 1,025 feet of 8-inch and 1,450 feet of 6-inch gravity flow PVC sewer pipe, and 21 concrete manholes. A map of the sewer system is shown on **Figure 10.1**.

The sewer collection system consists of three segments: 1) gravity flow west to the WWTP from the west end of the condominiums; 2) gravity flow north to the WWTP from the Alto Lakes Golf and Country Clubhouse and; 3) gravity flow from the central portion of the condominiums to the east into the Moss Lift Station, then pumped back west to the WWTP via force main piping.

The sewer line which serves the condominiums generally runs along Midiron Drive, from the WWTP east, across French Drive to the east end of the condos, terminating at the Moss Lift Station. The sewer line serving the clubhouse begins at the north side of the clubhouse and continues north to the WWTP. The minimum 8-inch estimated pipe slope is 2.5% and a maximum 6-inch slope of 7.2%, which provides a ½ full pipe flow capacity of 1.4 cfs to 1.0 cfs (>600,000 gpd). The current sewer system is adequate to carry the existing flows, at approximately 5% of maximum capacity at peak flow. Average sewer line flow depths are about 0.5-inch and velocities of 2.5 fps to 3.0 fps, which is adequate for self-cleaning. However, due to the various (and radical) changes in pipe slope and flow depth, sewer gasses (H_2S) are more readily generated. These are not deleterious to the pipes themselves because of the PVC material, but can be corrosive to the concrete manholes.

10.1.3 Lift Stations

The sewer system includes two lift stations, to pump sewage from the central and eastern portion of the condominiums to the WWTP: the Moss Lift Station and the Site C Lift Station. The Moss Lift Station consists of a 10-foot deep, 6-foot diameter concrete manhole with a duplex pump system. The pumps are belt-driven 25HP by Enpo Pump Co., Piqua, Ohio. A heated fiberglass enclosure covers the pumps and motors, which are mounted on a ¼-inch steel base plate covering the lift station. The control panel is a NEMA 4X externally mounted on the enclosure. Discussions with the operator indicated that the lift station functions reliably with daily maintenance. The lift station did not appear to generate objectionable odors.

The Site C Lift Station is similar to the Moss Station and consists of an 11-foot deep, 6-foot diameter concrete manhole with a duplex pump system. The pumps are belt-driven 10HP by Enpo Pump Co., Piqua, Ohio. A heated fiberglass enclosure covers the pumps and motors, which are mounted on a ¼-inch steel base plate covering the lift station. The control panel is a NEMA 4X externally mounted on the enclosure. Discussions with the operator indicated that the lift station functions reliably with daily maintenance. The lift station did not appear to generate objectionable odors.

10.1.4 Manhole Inspection

An inspection of the sewer system was performed in February 2004 by Livingston Associates personnel and ALWC staff. The system was inspected by opening manholes and the lift stations. The condition of the manholes appeared to be moderate to good, with all showing some degree of corrosion of the concrete from sewer gasses. Refer to the **Appendix** for photographs of the manholes. A common observation was that the base of the manholes were not adequately grouted (shelves) to slope to the pipe inverts. This causes sewage to settle and turn septic, generating odors and corrosive gas. Manhole rungs were generally missing or had been removed. Some of the manhole cones were cracked, and several began to lift off of the manhole when attempting to remove the lids. Many had grass growing through the horizontal joints between manhole sections. The manhole rings and covers were generally in acceptable condition, but 8 of 19 could not be removed. The following **Table 10.1** summarizes the condition assessment of the sewer manholes.

Table 10.1 – Summary of Sewer Manhole Condition Assessment

Manhole No.	Manhole Condition
1	Grass in horizontal joints; rim corroded; cone cracked
2	Clean, good condition
3	Old lift station; solids collect on bottom; corrosion of bottom
4	Could not open
5	Grass in horizontal joints; solids collect on bottom
6	Grass in horizontal joints; solids collect on bottom
7	Standing sewage in bottom
8	Could not open
9	Standing sewage in bottom; shelving gone; concrete corroded
10	Partially paved over; shelving gone
11	Could not open
12	Good condition; shelving needs reshaping
13	Good condition; shelving needs reshaping
14	Could not open
15	Could not open
16	WWTP inlet box; severe corrosion; sewage backed-up in pipe
17	Could not open
18	Could not open
19	Could not open

It was suspected that two manholes may exist between the WWTP and Midiron Road, because of a change in direction of the sewer line. These could not be located.

A video survey of the interior of the sewer lines was not performed, therefore it is unknown whether there are any pipe blockages, off-set joints, cracked pipes, protruding services, profile sags or if other piping deficiencies exist.

10.2 Existing Wastewater Treatment Plant

The existing ALWC wastewater treatment plant (WWTP) consists of a single sequencing batch reactor (SBR) manufactured by ABJ Sanitaire, rated at a treatment capacity of 30,000 gallons per day. In September of 2003, the WWTP was evaluated by a wastewater operations specialist. The findings of the evaluation are summarized herein, and the complete report by WaterOps is contained in the **Appendix**.

There is not a screening process upstream of the SBR to remove trash, rags, or other large solids, nor any grit removal process to remove sand, egg shells, coffee grounds, or other materials that settle quickly and are not readily biodegradable. Treated water, or effluent, from the plant is discharged to a small chamber where it passes through a V-notch weir to one of three leach fields below the surface of the driving range. A ground water monitoring well has been installed near the leach field. Waste sludge from the SBR is held in an aerated tank, which is periodically pumped out by a septic pumping service.

The SBR uses a suspended growth biological process called "activated sludge" in which aeration is used to produce an environment favorable to naturally occurring bacteria that feed on the biodegradable material in sewage. This converts the suspended and dissolved organics to solids that are easily separated from the water by a settling process. There are many types of activated sludge treatment plants. In most of them, aeration occurs constantly in one tank, while settling is performed in separate tanks known as clarifiers. In an SBR, both functions are performed in the same tank by sequencing the treatment processes to treat the wastewater in batches (hence the SBR). The wastewater is aerated while the tank filled until the wastewater reaches a certain level or a set period of time has passed, then aeration is turned off and the solids settle to the bottom of the tank, leaving a layer of treated water at the top of the tank, which is decanted off. The ABJ Sanitaire SBR goes through five 288-minute treatment cycles per day. Each cycle consists of three stages: 1) an aeration/mix stage of 168 minutes; 2) a settling stage of 60 minutes, and 3) a decant stage of 60 minutes.

The Alto Lakes SBR is also equipped to accomplish denitrification. The SBR is aerated for a set period of time, increasing the dissolved oxygen (DO) concentration to above 1.5 mg/L. In the high DO conditions the bacteria convert ammonia (NH_3) to nitrite (NO_2) and then to nitrate (NO_3) in the process known as nitrification. Then the aeration is turned off and mixers in the SBR start automatically. Because the bacteria are still coming into contact with food (organics) they will continue to use oxygen until the DO drops into the anoxic range of less than 0.5 mg/L. Without the presence of free oxygen, the bacteria enter the denitrification process by breaking down the NO_3 for the oxygen source and releasing the remaining nitrogen as a gas. This process reduces the nitrogen content of the effluent, to less than the NMED requirements, for subsurface disposal.

The NMED ground water discharge permit does not require the two tests most widely used to gauge WWTP performance. These are biochemical oxygen demand (BOD) and total suspended solids (TSS). The BOD is the amount of oxygen that bacteria would use in converting pollutants in the wastewater to cell mass. Typical sewage influent to a WWTP has a BOD of about 200 mg/L. Most WWTP's will remove 90 to 98 percent of the BOD. Effluent discharged to rivers or streams generally must have a BOD below 15 mg/L to 30 mg/L. TSS are the solids that are suspended in the water; they do not float or settle. Generally, TSS concentration is similar to BOD in both influent and discharge requirements. However, the total-dissolved-solids (TDS) of the sewage are not reduced during wastewater treatment.

The BOD and TSS of the Alto Lakes WWTP influent samples taken 9/18/03 were higher than typical values, with a BOD of 494 mg/L and TSS of 380 mg/L. The results of the nitrogen analysis were high and unusual. Typical TKN values for residential sewage are 30 mg/L with about 65 percent as ammonia-nitrogen. The TKN of this sample was 70 mg/L (as N) with an ammonia concentration of 11.6 mg/L, which is only 15 percent of the total TKN. These values are more typical of restaurant sewage than residential sewage. The high TKN with the low ammonia value could indicate that clubhouse restaurant grease traps need to be installed or pumped more often.

The results of the effluent quality tests were very good with a BOD of less than 4 mg/L and TSS were not detectable (ND). The TKN was 0.8 mg/L with both ammonia and nitrite undetectable. The nitrate was 3.6 mg/l, bringing the total nitrogen to 4.4 mg/L, well within the permitted maximum 10.0 mg/L limit.

The following **Table 10.2** lists the results of recent WWTP sampling of the effluent and monitoring well:

Table 10.2 – ALWC Waste Water Treatment Plant Effluent and Monitoring Well NO3, TKN, TDS and Chloride.

Sample Date	Sample Location	NO3 mg/L (as N)	TKN mg/L	TDS mg/L	Chloride mg/L
5/7/2003	WWTP Effluent	3.1	ND	3,400	980
5/7/2003	Monitoring well	0.8	ND	3,300	1,100
7/15/2003	WWTP Effluent	6.7	2.0	3,600	100
7/15/2003	Monitoring well	1.3	ND	3,100	990
9/18/2003	WWTP Effluent	3.6	0.8	4,780	NR

10.3 Discharge Permit

The effluent is discharged to the driving range leach fields under a ground water discharge permit issued May 5, 2003 by the New Mexico Environment Department, Ground Water Quality Bureau (DP-600). The permit allows discharge of up to 30,000 gallons per day (gpd) with the following quality requirements: less than 10 milligrams per liter (mg/L) total nitrogen, which is the total of NO_2, NO_3, and total Kjedahl nitrogen (TKN), or organic nitrogen; less than 250 mg/L of chloride; and less than 1,000 mg/L total dissolved solids (TDS).

Samples taken from the WWTP effluent and from the monitoring well must be taken and tested for the parameters above on a quarterly basis. In addition to these parameters the monitoring well depth-to-water at the time of sampling must be reported.

In addition to the monitoring requirements, the permit requires submittal of a corrective action plan to identify the source(s) of high chloride and dissolved solids found in the WWTP effluent and monitoring well samples. The plan is to include characterization of TDS background levels in the community's water supply.

The permit also requires that the facility be fenced within 90 days of the issuance of the permit to prevent access by children and dogs. There is another requirement that the monthly volume of treated wastewater discharged from the WWTP be measured by a V-notch weir totalizing device.

A Corrective Action Plan (CAP) was submitted to the NMED on December 18, 2003. The CAP requests modification of the Discharge Permit to allow reclaimed water use on the golf course, instead of subsurface discharge through the absorption fields. The CAP requests a 270-day compliance schedule (after NMED approval), to construct the reclaimed water facilities at the WWTP, install a V-notch effluent flow meter and recorder and the safety fencing.

The Draft New Mexico Environment Department (NMED) Policy for the Above Ground Use of Reclaimed Domestic Wastewater, March 2003 outlines the requirements for reclaimed water use. For the ALWC, Class 1A reclaimed wastewater will be produced. This is the highest level of treatment required for reclaimed water, and allows unrestricted public access to irrigated areas. The treatment parameters for Class 1A reclaimed water include a 5-day BOD of 10 mg/L; average turbidity of 3 NTU and a fecal coliform count of 5 per 100 ml. There is no requirement for maximum total dissolved solids (TDS) levels in the Policy.

10.4 Wastewater System Improvements

To increase the life of the existing sewer collection system, the following recommendations are made:

1. Coat the existing 19 manholes with a spray applied epoxy coating, such as "Raven", to minimize concrete corrosion due to sewer gas.
2. Repair or add grout shelving in all manholes and coat with epoxy.
3. Replace manhole ring and cover on manhole no. 1, and repair cone.
4. Clean horizontal joints and add ram-neck joint filler in manhole nos. 1, 5 and 6.
5. Clean and paint the lift station pump and piping components with epoxy paint, and provide a carbon-filter vent to release sewer gases and inhibit corrosion.
6. Perform a visual internal inspection on the sewer collection system using CCTV equipment, to check for piping defects, profile sags and obstructions.

To increase the life and capacity of the wastewater treatment plant, the following recommendations are made:

1. Convert the wastewater effluent to reclaimed water, as described in Section 7.0, and curtail use of the existing absorption fields.
2. Install an ultrasonic flow meter on the existing V-notch weir, including flow totalizer and chart recorder.
3. Install manual cleaning or self-cleaning bar screen upstream of WWTP and reconstruct inlet box.
4. Install 6-foot high chain-link safety fencing and netting cover around the WWTP and future reclaimed water facilities to minimize golf ball injury hazard.

10.5 Operational Recommendations

1. The WWTP produces very high quality effluent under current operation. To enhance operation and ensure that total effluent nitrogen is maintained at less than 10 mg/L, the dissolved oxygen (DO) should be monitored weekly during the aeration and anoxic stages. During the aeration stage, DO should be above 1.5 mg/L and during the anoxic stage DO should be less than 0.5 mg/L. The aeration should be adjusted accordingly.
2. Monitor the sludge blanket depth closely to maintain at around 5-feet deep, and adjust waste pump run-times accordingly.
3. Repair control arm adjusting controls for proper decant operation.
4. Add BOD and TSS to the quarterly effluent sampling and sample influent BOD, TSS and TKN quarterly, to assist in future WWTP evaluation should problems occur.
5. The sewer collection system should be flushed with water at least twice annually, at a flow-rate of about 1,500 gpm for 30-minutes to maintain a clear flow path and minimize sewer gas development and odor generation. This can be accomplished in conjunction with a fire hydrant flushing program.
6. The grease trap at the clubhouse should be maintained regularly to eliminate grease from entering the WWTP.
7. The lift station should be inspected monthly, and areas of corrosion cleaned and painted. Pumps should be checked for blockages annually and a spare pump should be provided as stand-by (stored in yard).
8. Manholes should be inspected annually, and areas of corrosion cleaned and re-grouted if needed and coated with epoxy. Shelving should be re-grouted as needed.

10.6 Expanded Wastewater Collection and Treatment

The benefits to expanding the wastewater collection and treatment system were discussed conceptually in Section 6.0, and will be expanded upon in this Section. Approximately 260 afy of treated reclaimed wastewater can be utilized to offset the entire irrigation needs of the golf course. Currently only the Alto

Lakes Golf and Country Club clubhouse and Alto Lakes condominiums are sewered and treated at the WWTP, averaging about 15,000 gallons per day (15 afy). To collect the wastewater from the entire subdivision and treat it to reclaimed water standards, a collection piping system will be installed throughout the Alto Lakes community. Areas for expansion of the system were prioritized based on current residents and potential for immediate reclaimed water production. The following Table 10.1 identifies the areas and associated developed and undeveloped lots in each.

Table 10.1 – Expanded Reclaimed Water System Priority Area Phasing

Area Name	Phase	Total No. Lots	No. Developed	No. Undeveloped
Alto Lakes CC	I	455	309	146
Lakeside Estates	II	447	234	213
Deer Park Woods	III	306	204	102
High Mesa Estates	IV	555	228	327
Deer Park Valley	V	243	17	226
Stable Rd. Area	VI	120	6	114
Totals		**2126**	**998**	**1128**

Refer to **Figure 10.1** for the future wastewater collection system and general location for the new WWTP and effluent storage pond.

Sewage collection would be via small-diameter, low-pressure pumped system (or vacuum system), utilizing grinder pumps (or vacuum station) at each residence. Existing septic tank systems can be retrofitted with grinders (or vacuum stations). The shallow force-mains are less expensive to install compared with a gravity collection system, and can be phased with development or by service area. Some lift stations are required along the main-line, to pump to the WWTP.

A new WWTP with an ultimate average capacity of 0.25 MGD would be needed to treat the increased flows. Operational costs are low, as the grinder pumps are small horsepower and only actuate for brief periods, and require minor maintenance. Logically, locating the new WWTP downhill would be ideal from a sewage collection standpoint. About 2 to 5 acres (depending on storage amounts) would be needed. This may be located in an isolated area around Deer Valley, which provides an ideal location for collection, and allows the potential use of the existing well collector/booster system to pump back reclaimed water to the golf course lakes.

11.0 CAPITAL IMPROVEMENTS PLAN

11.1 Introduction

This Section outlines the recommended improvements to the water and wastewater utilities for implementation of the water supply development alternatives as previously discussed in earlier sections of this Plan. Additionally, operational improvement projects are also identified and made a part of the overall infrastructure needs. The result is a Capital Improvements Plan (CIP) for both the water and wastewater systems, from the current year to 2024. Each set of CIP recommended projects (water and wastewater) is described in adequate detail for planning purposes. The CIP is divided into year-segments, with each year costs shown for years 2004 to 2008, and grouped in four-year increments thereafter (2009 – 2012, etc.).

As discussed in Section 8.2, the long-term water supply recommendations include expansion of the wastewater collection and reclaimed water treatment system; the development of a San Andres well field and participation in a regional water supply. Although any combination of these alternatives may be implemented, the water system Capital Improvements Plan includes development costs for only the San Andres well field. These costs may alternatively be used for participation in a regional water supply.

11.2 Water System CIP Recommendations

Table 11.1 – Summary of Water CIP

No.	Project Description	Year/Capital Cost (in thousands of dollars)								
		2004	**2005**	**2006**	**2007**	**2008**	**2009-2012**	**2013-2016**	**2017-2020**	**2021-2024**
1	Deepen Well E-2	$300								
2	Water Treatment System									
	a. Engineering/design	$50	$50							
	b. Water Treatment Plant			$300			$100		$100	
	c. Waterlines			$100						
	d. Land Acquisition			$100						
	e. Evaporation Pond			$50			$50		$50	
3	Deepen Well E-4		$300							
4	Deepen Other Wells									
	a. Well E-1		$200							
	b. Well 9			$200						
	c. Wells 12, 13 and 16					$300	$300			
5	Distribution System Improvements									
	a. Waterline replacements		$500	$500	$500	$500	$2,000	$1,500		
	b. 180,000 Gallon Storage							$150		
6	Regional Water Project									
	a. Organization		$5							
	b. ISC Study				$25					
	c. Regional Plan						$100			
7	San Andres Well Field									
	a. Hydrologic Study					$100				
	b. Water Rights			$600			$600			
	c. Engineering/Design									
	d. Well Drilling/Infrastructure									$3,000
	Totals	**$350**	**$1,055**	**$1,850**	**$525**	**$900**	**$3,150**	**$1,650**	**$150**	**$3,000**

11.3 Wastewater System CIP Recommendations

Table 11.2 – Summary of Wastewater CIP

No.	Project Description	Year/Capital Cost (in thousands of dollars) 2004	2005	2006	2007	2008	2009-2012	2013-2016	2017-2020	2021-2024
1	Reclaim Existing Wastewater									
	a. Tertiary Treatment	$200								
	b. Piping/Lift Station	$25								
	c. Equalizing Basin		$75							
2	Expanded Reclaimed Water System									
	a. Study/Design						$2,000	$6,000	$1,000	$1,000
	b. Main Collection System							$1,000	$750	$750
	c. New WWTP							$150		
	d. Storage Pond									
3	Wastewater System									
	Improvements	$10								
	a. Rehabilitate manholes	$5								
	b. Televise sewer lines	$5								
	c. Paint Lift Stations	$5								
	d. Fencing around WWTP									
	Totals	**$250**	**$75**	**$0**	**$0**	**$0**	**$2,000**	**$7,150**	**$1,750**	**$1,750**

12.0 OWNERSHIP/FUNDING SOURCES

12.1 General

In this section, alternative ownership scenarios will be reviewed with the intent of minimizing the costs to the Alto Lakes Water Corporation (ALWC) customers. A major portion of future water and sewer costs will be those costs related to funding the capital investments needed to insure adequate water supplies, improved water quality and proper wastewater treatment. Since capital funding resources of the privately owned ALWC are limited in comparison to governmental owned organizations such as a water and sanitation district or an incorporated municipality, studies have been made to determine if a change in structure of ALWC would be of benefit to the customers.

12.2 Funding Requirements

The funding requirements to implement the capital improvements described in this master plan are on the order of $1,000,000 per year for the next 20 years as shown on the Capital Improvement Plan presented in previous sections.

12.3 Current Private Ownership and Funding Capability

ALWC is currently owned by the Alto Lakes Golf and Country Club and is operated as a private corporation. Since ALWC is operated as a privately owned utility it is closely regulated by the New Mexico Public Regulation Commission (NMPRC). Many aspects of the operation of the utility including rate increases and borrowing must be approved by the NMPRC in a lengthy costly process.

Currently the ALWC has a line of credit of $1,800,000 at State National Bank in Ruidoso at prime (currently about 4.25% April 2004) plus 1% to be amortized over 20 years with renegotiations each 5 years (first period is 2008). Currently ALWC has borrowed about $1,200,000 and has plans to borrow the remainder for capital projects in 2004. Current payments for the $1,800,000 loan are $12,200 per month or $146,400 per year. In addition, a NMPRC approved rate increase in 2004 has allowed ALWC to budget an additional $20,000 per month ($240,000 a year) for capital expenditures. The current 20 year funding capability, at current interest rates, is therefore, $600,000 from the existing line of credit plus the $2,900,000 additional loan that can be amortized (at $240,000 per year) for a total of about $3,500,000. It is likely that the interest rate will increase over time which will lower the funding available or increase the required debt retirement. For example, a 1% increase in the interest rate would lower the funding capability to $3,100,000. There are no other immediate sources of funding that are likely to be available to the ALWC. In the longer term, income should increase due to growth of the customer base and rates could increase to fund additional capital expenditures. Overall, capital investment would be funded in the private market at prevailing rates which would result in significant cost increases to the customer base.

12.4 Alternative Ownership Scenarios and Funding Capabilities

An option for the ALWC is to convert to a government owned utility. These types of utilities offer significant financial advantages over a privately owned company since they are not regulated by the NMPRC and have access to government subsidized loans, grants and direct appropriations. The ALWC and the Long Range Planning Committee of the Alto Lakes Golf and Country Club studied many types of alternative structures for the ALWC to gain the financial advantages of a public entity. Alternatives include:

- The formation of a Mutual Domestic Water Association
- The formation of a Water and Sanitation District (W&SD)
- Municipal incorporation of Alto Lakes
- Annexation of Alto Lakes by Ruidoso

Of these, it was determined that the W&SD provided many more financial benefits than the Mutual Domestic, provided equal financial benefits to incorporation or annexation and could be implemented in a reasonable time frame.

A W&SD is governed by a board of directors elected by the registered voters residing within the district and has the ability to sell general obligation bonds, funded by ad Valorem taxes, and revenue bonds, funded by system revenues. The total of all bonds sold by the W&SD is limited by statute to 5% of the total assessed property value in the district. In the case of an Alto Lakes W&SD, this would limit bonding to about $12,500,000 at the current assessed value of approximately $250,000,000.

The funding sources potentially available to a W&SD are listed below by type and administering agency:

- <u>Borrowing</u> via low interest rate bonds (approximately 3% for 20 years)
    - New Mexico Finance Authority
        -Public Project Revolving Loan Fund
        -Drinking Water revolving Loan Fund
    - New Mexico Environment Department
        - Wastewater Treatment Construction Loans

- Grant funds, no repayment required
  - New Mexico Finance Authority
    -Water & Wastewater Grant Fund
    -Water & Wastewater Planning Grant Fund
- Direct Appropriation,
  - State of New Mexico Legislature
  - U.S. Congress

The savings by lowering the interest rate by 2% will amount to over $13,000 per year per $1,000,000 borrowed. With the annual payments equal to those currently paid or budgeted by ALWC, the current funding capability of the W&SD would be over $4,400,000 with a 3.25% loan at 20 years.

All grants or direct appropriations obtained by the W&SD will increase funding significantly. Direct appropriations will be more likely for a planning or regional project.

12.5 Recommended Ownership Structure

The Water and Sanitation District will result in the lowest cost to the customer primarily due to lower financing costs. Other benefits include management by a Board of Directors that is responsible to the Alto Lakes voters and elimination of regulation by the NMPRC. It is therefore recommended that the Alto Lakes Water Corporation be converted to a Water and Sanitation District. The conversion process is rather complex and is expected to take up to 18 months. The Long Range Planning Committee of the Alto Lakes Golf and Country Club has developed an initiative to start this conversion process in tandem with the formation of a zoning district for the Alto Lakes area. The steps of the conversion process and their sequence are shown on **Table 12.1**.

Table 12.1

Conversion Process - Create Districts

AL Water Company	AL Water & Sanitation District	AL Zoning District
	ALGCC Board approves formation of districts	
Board approves WSD		
	Presentations to club boards & members, media, and local governments within LC	
	Create petitions for WSD & ZD	
	Statute sets forth standardized form	
	Statement of purpose	
	Draft approval by County Attorney	
	Obtain petition signatures	
	Water & Sanitation District - signed by 25% of registered voters	
	Zoning District - signed by 51% of registered voters	
	File proposal with Lincoln County Clerk	
	Petitions for both WSD and ZD	
	Plat with Metes and Bounds Description	
	County forms or activates Special Districts Commission (SDC)	
	SDC notifies governmental entities within Lincoln County	
	Each municipality within 20 miles	
	Each special district adjacent to Alto Lakes	
	Board of County Commissioners	
	Schedules hearing within 20-40 days	
	Publishes notice	
	SDC holds hearing	
	Address Factors to be considered per NM 4-53-8	
	SDC presents decision within 30 days	
	District court notifications	County holds election within 60 days
	County Commission	Elect 5 tax paying electors
	State Attorney General	District drafts Master Land Use Ordinance
	Health & Social Services	District drafts Planning & Zoning Ordinance
	State Engineer	District Adopts Ordinances
	Environmental Division	District assumes responsibility for P&Z
	District court hearing	**(elapsed time estimated 6-9 months)**
	Petitions valid	
	Protests for exclusion from District	

	Letter from State Engineer	
	Letter from Environmental Division	
	Satisfy court on criteria	
Master Plan	Proposed improvements are needed	
Master Plan	Improvements conform to state regulations	
Master Plan	Improvements can be implemented within reasonable time	
Master Plan	Land has current or future need for improvements	
	Court approves formation - final	
	No appeal except AG within 30 days	
	Court orders election within 20 days	
	Elect 3 tax paying electors (request 5)	
	Court sends decree to County Clerk	
	District now a legal entity	
	(elapsed time estimated 12 months)	
	Treasurer files fidelity bond with district court	
Appraisal of ALWC	Budget to NM Finance Authority for property tax	
	Appraisal of ALWC	
	Proposal to issue General Obligation bonds	
	Election to approve General Obligation bonds	
>>>>>>>>>>>>>>>	WSD acquires ALWC	
	District assumes water operations	

Figures

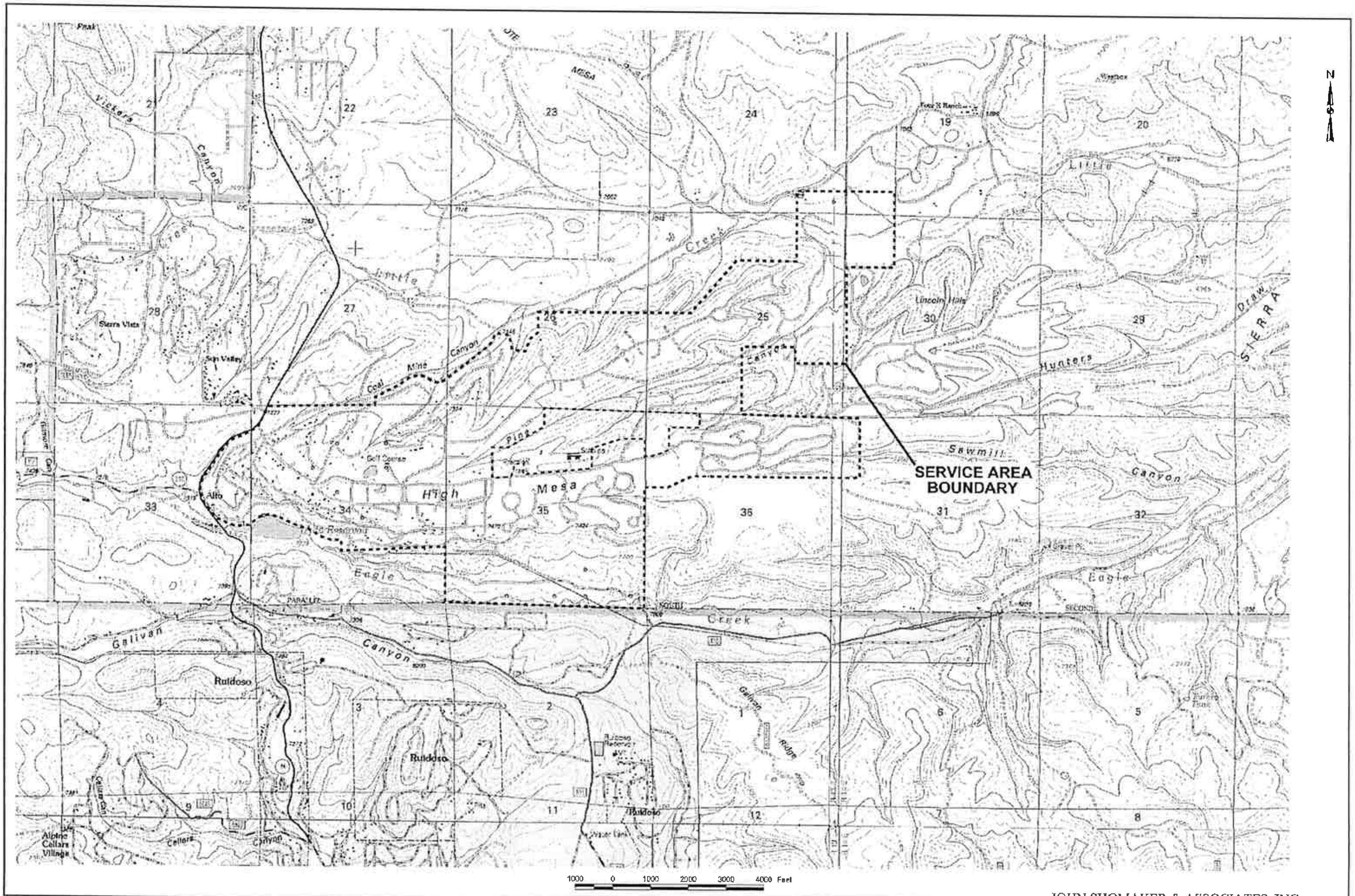

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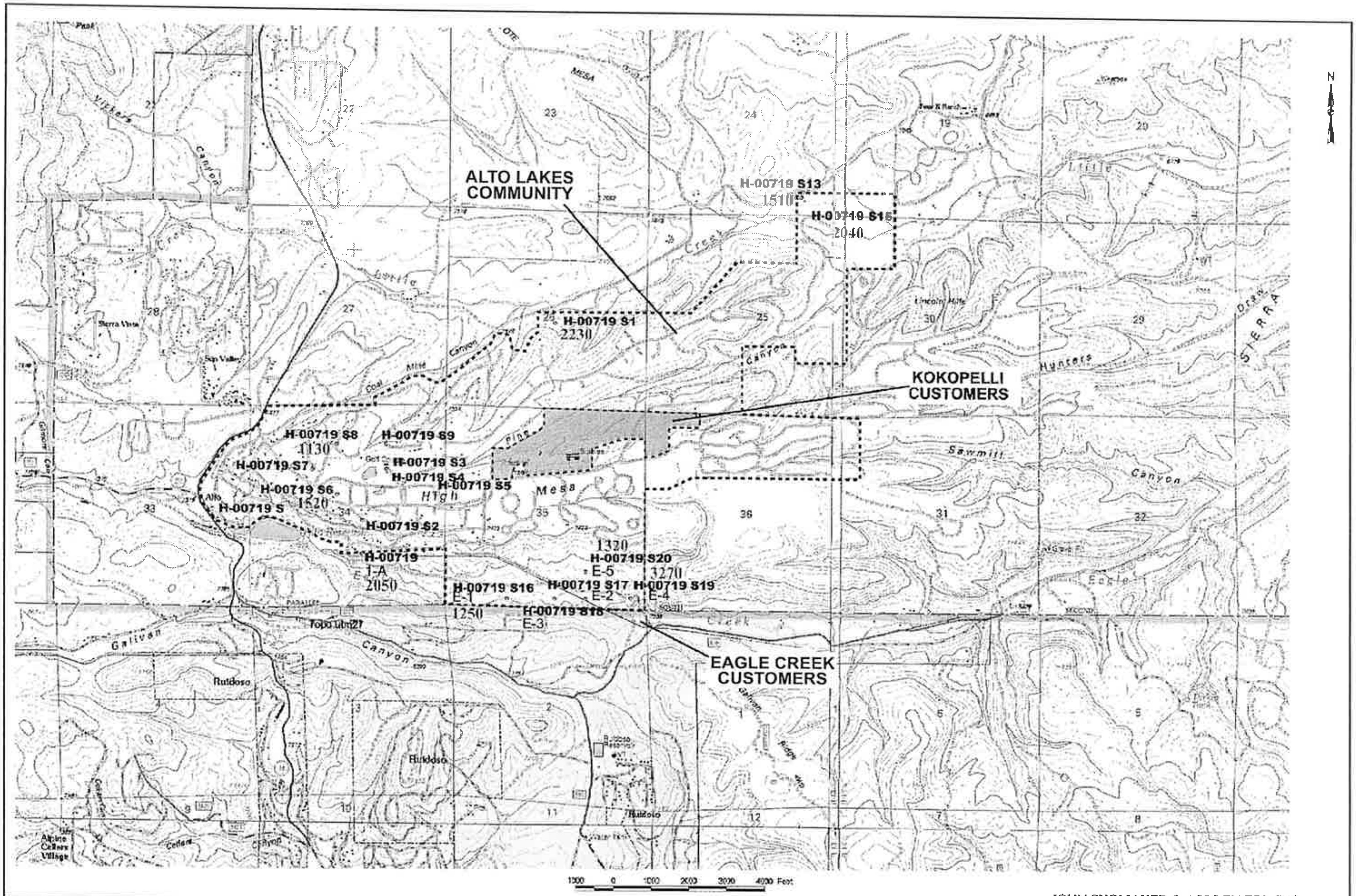
FIGURE 1.1 - ALTO LAKES WATER CORPORATION GENERAL SERVICE AREA



JOHN SHOMAKER & ASSOCIATES, INC.

FIGURE 2.1 - ALTO LAKES WATER CORPORATION WATER SERVICE AREAS

Alto Lakes Water Corporation
Existing Water Demands by Month, 2003

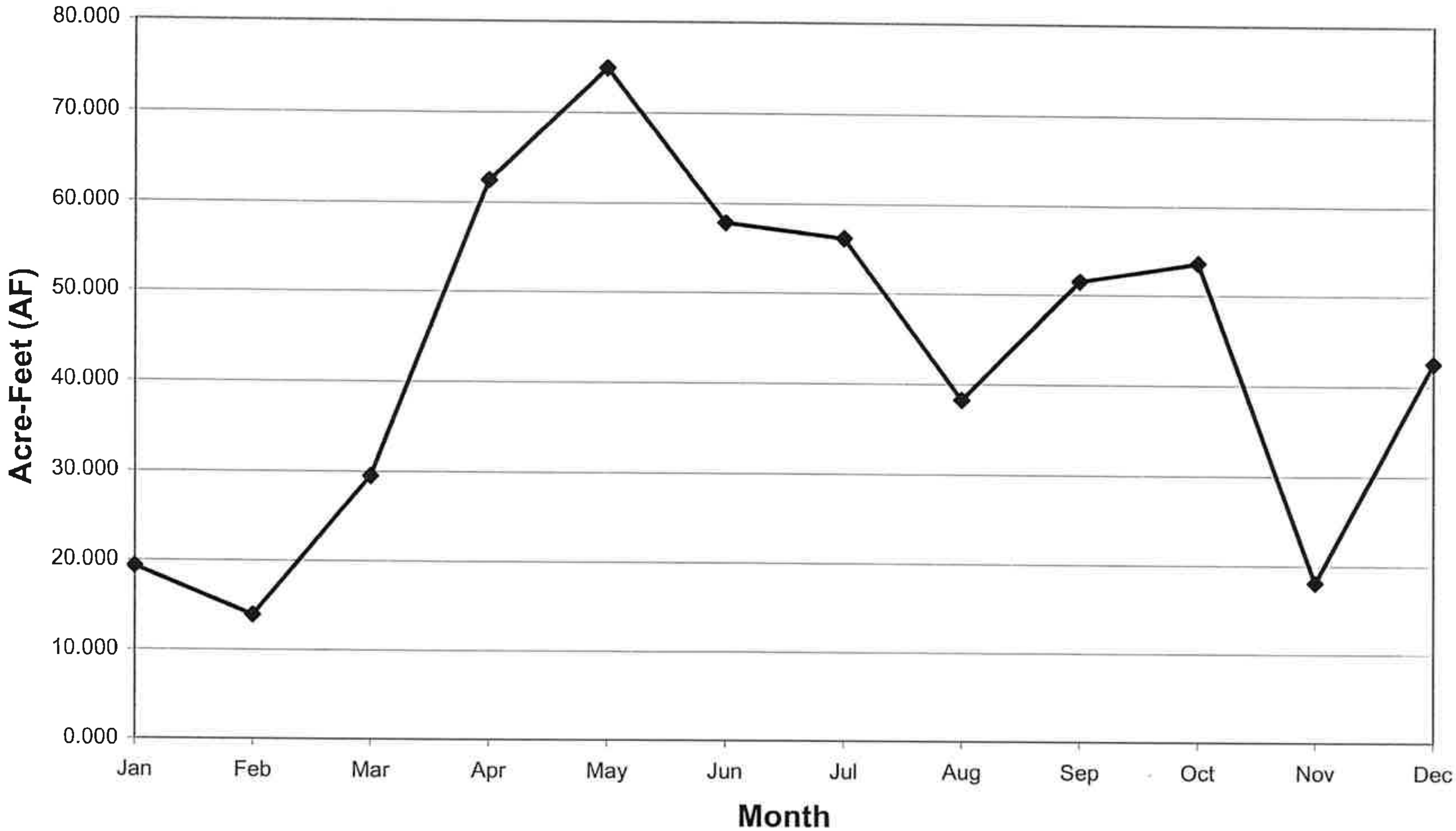


FIGURE 2.2

Alto Lakes Water Corporation
Wastewater Treatment by Month - 2003

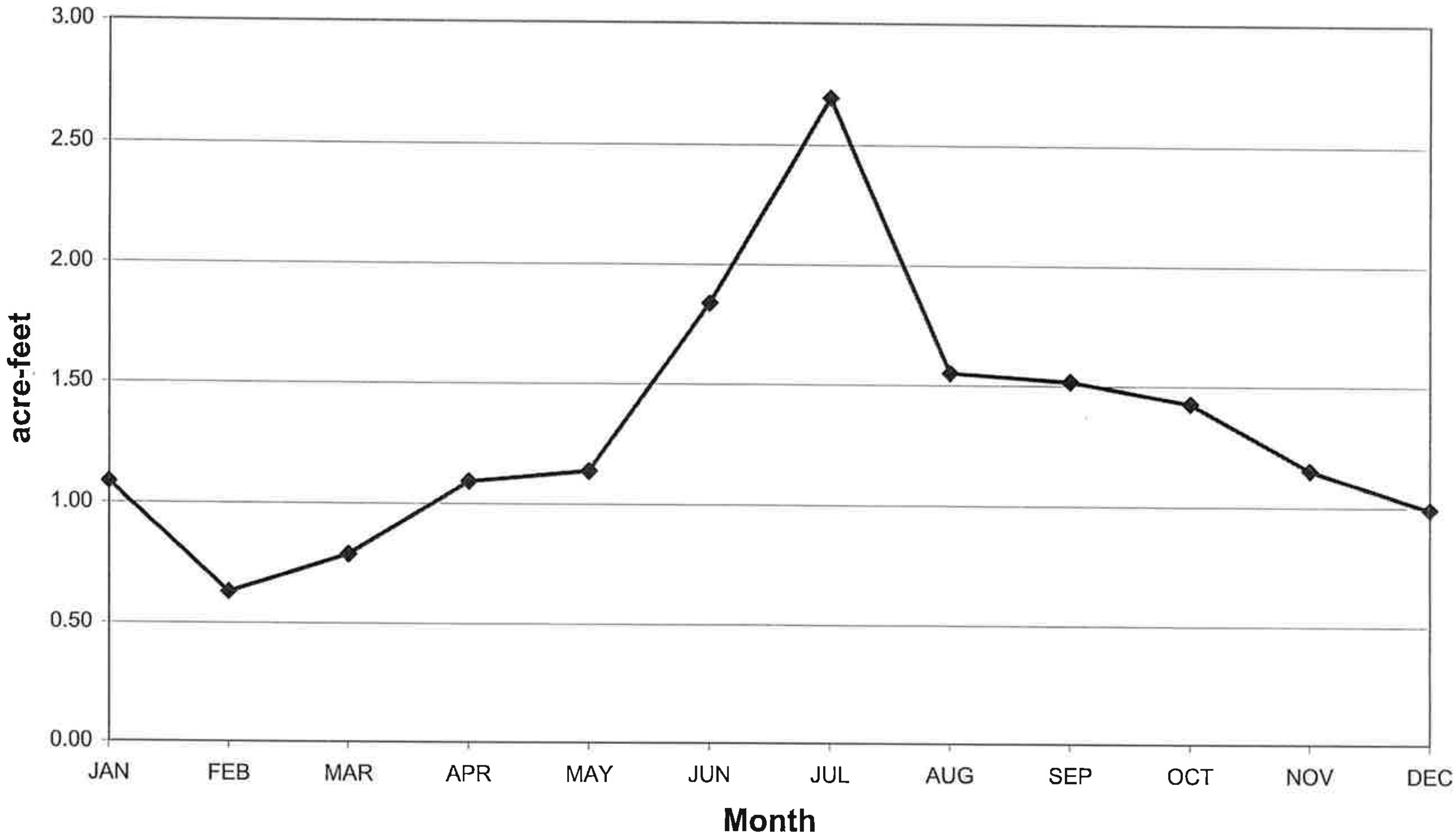
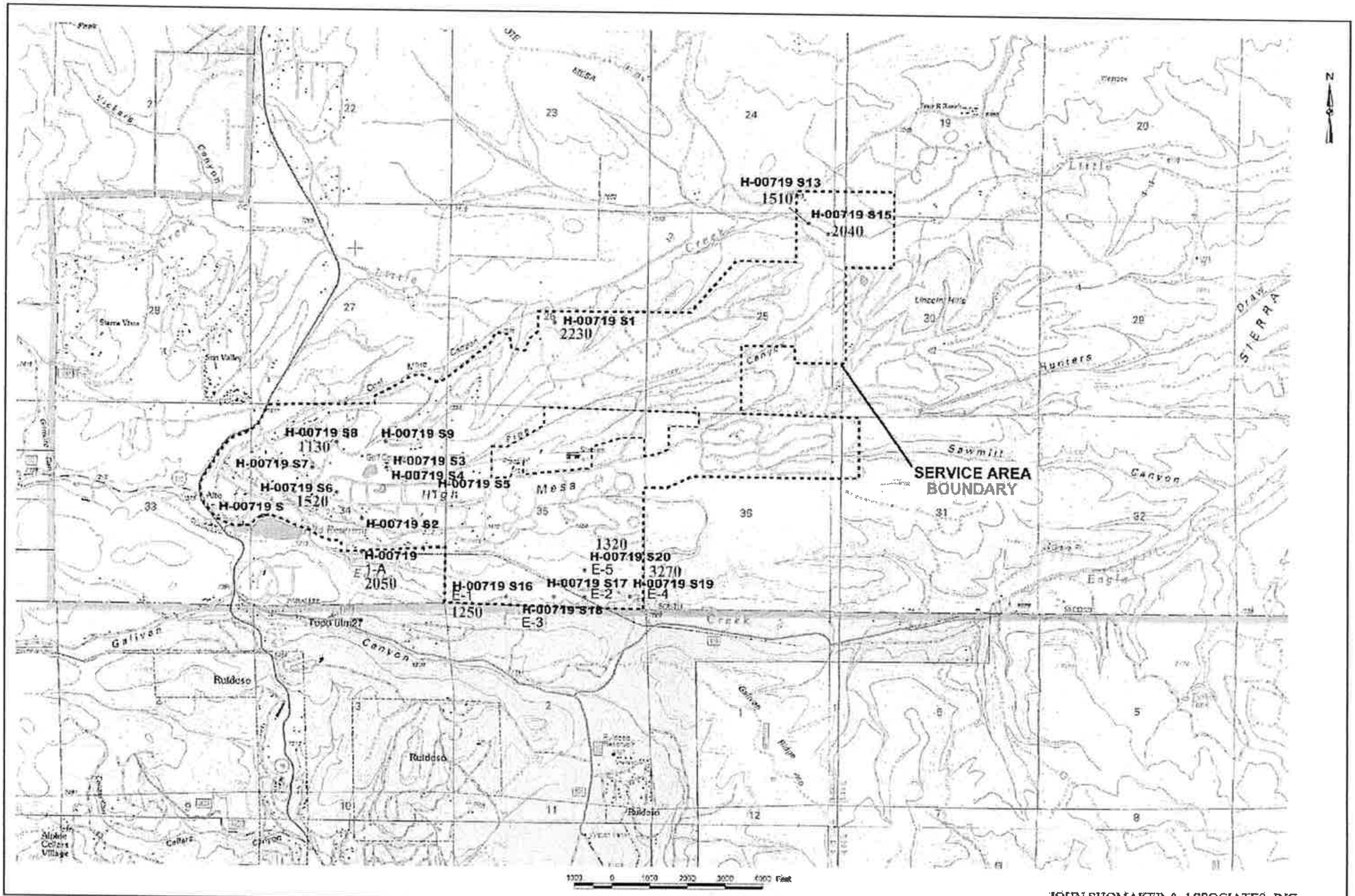


FIGURE 2.3



JOHN SHOMAKER & ASSOCIATES, INC.

FIGURE 3.1 - ALTO LAKES WATER CORPORATION EXISTING WELLS

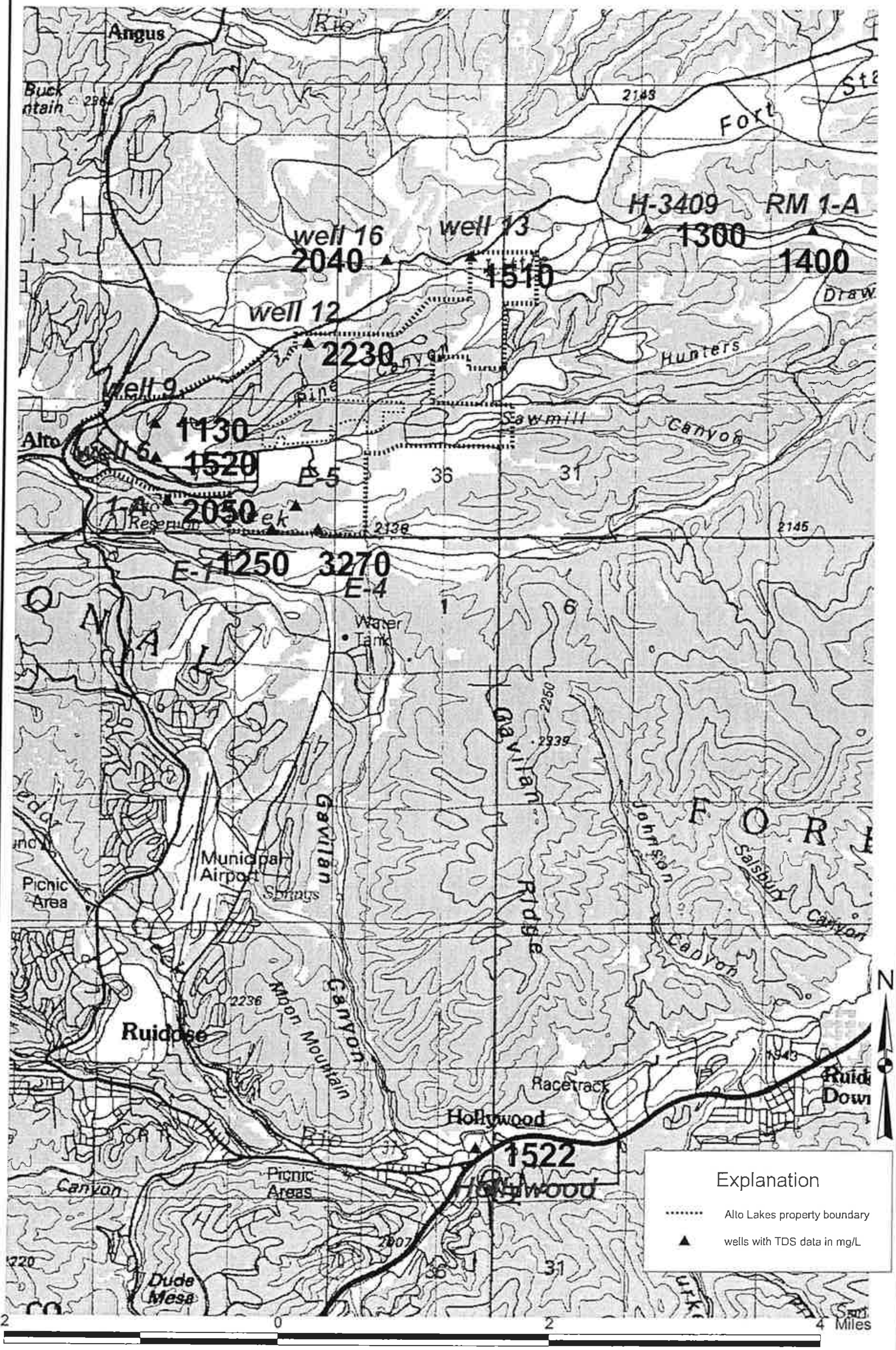
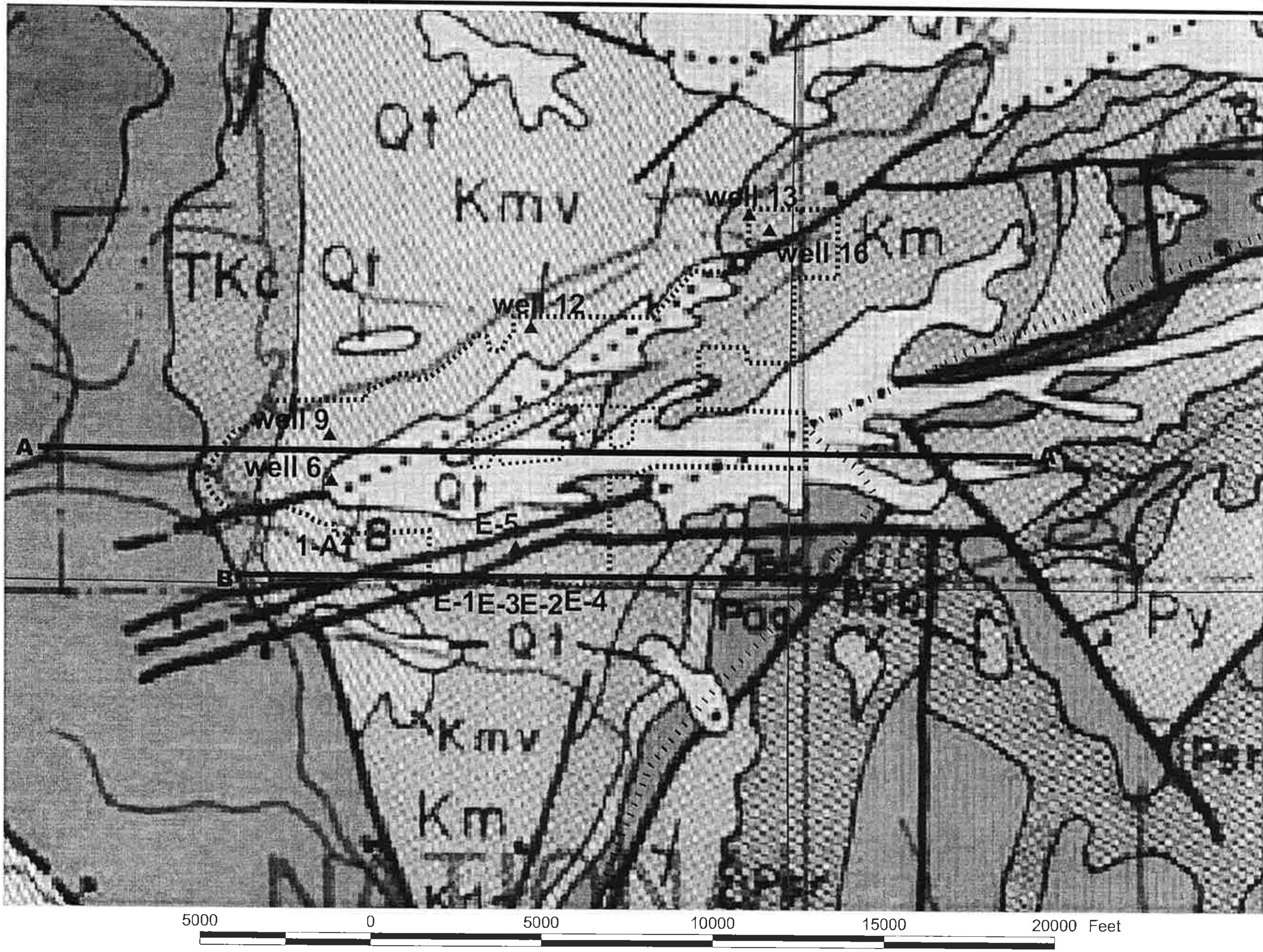


FIGURE 3.2 ALTO/RUIDOSO AREA SHOWING LOCATIONS OF WELLS WITH TDS DATA



Lines of section for figures 3.4
line indicating main fault zone (dotted), and Alto Lakes property boundary and wells are shown.
Geology is from Kelley (1971) and explanations of units are in text.

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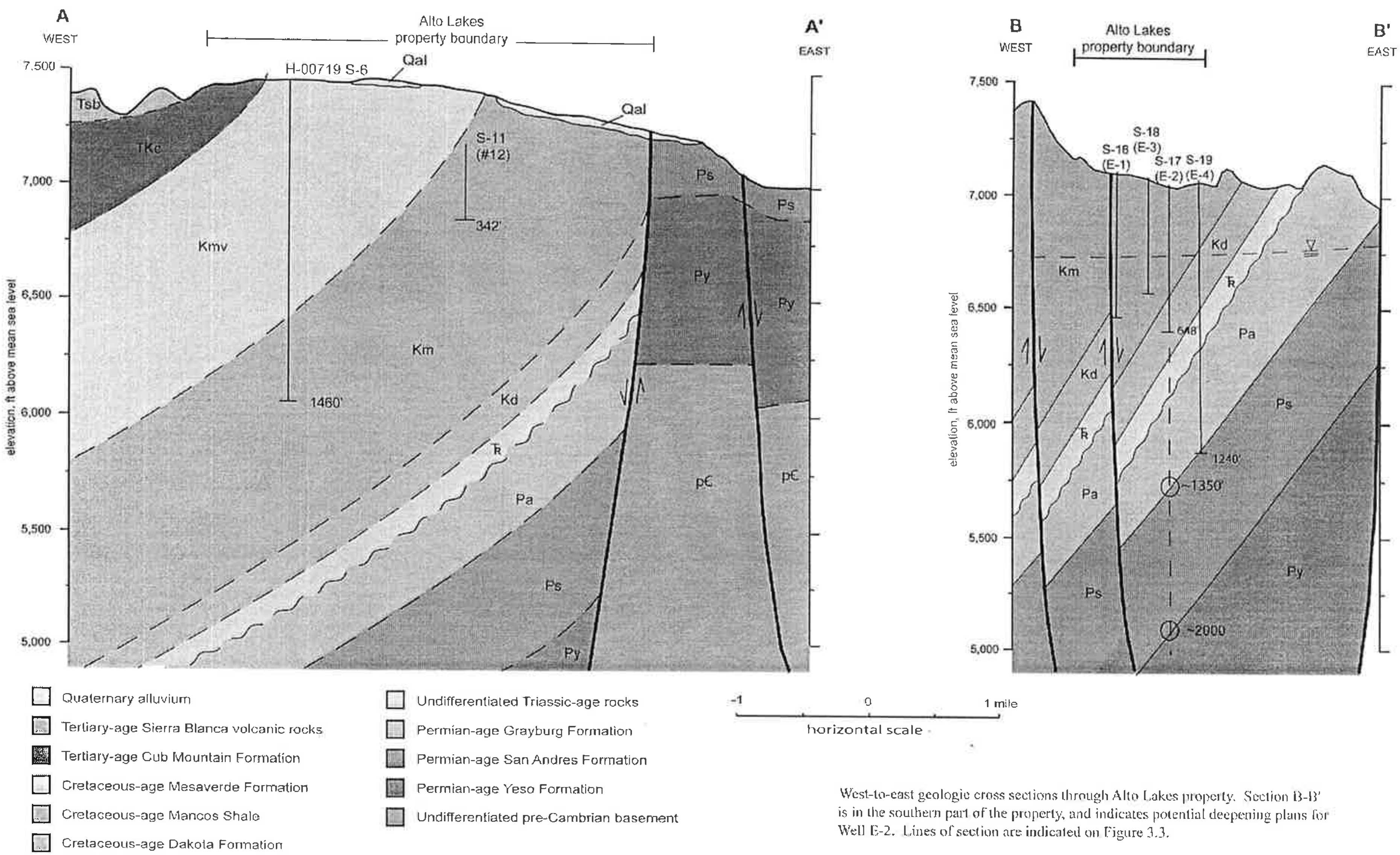
FIGURE 3.3



West-to-east geologic cross sections through Alto Lakes property. Section B-B' is in the southern part of the property, and indicates potential deepening plans for Well E-2. Lines of section are indicated on Figure 3.3.

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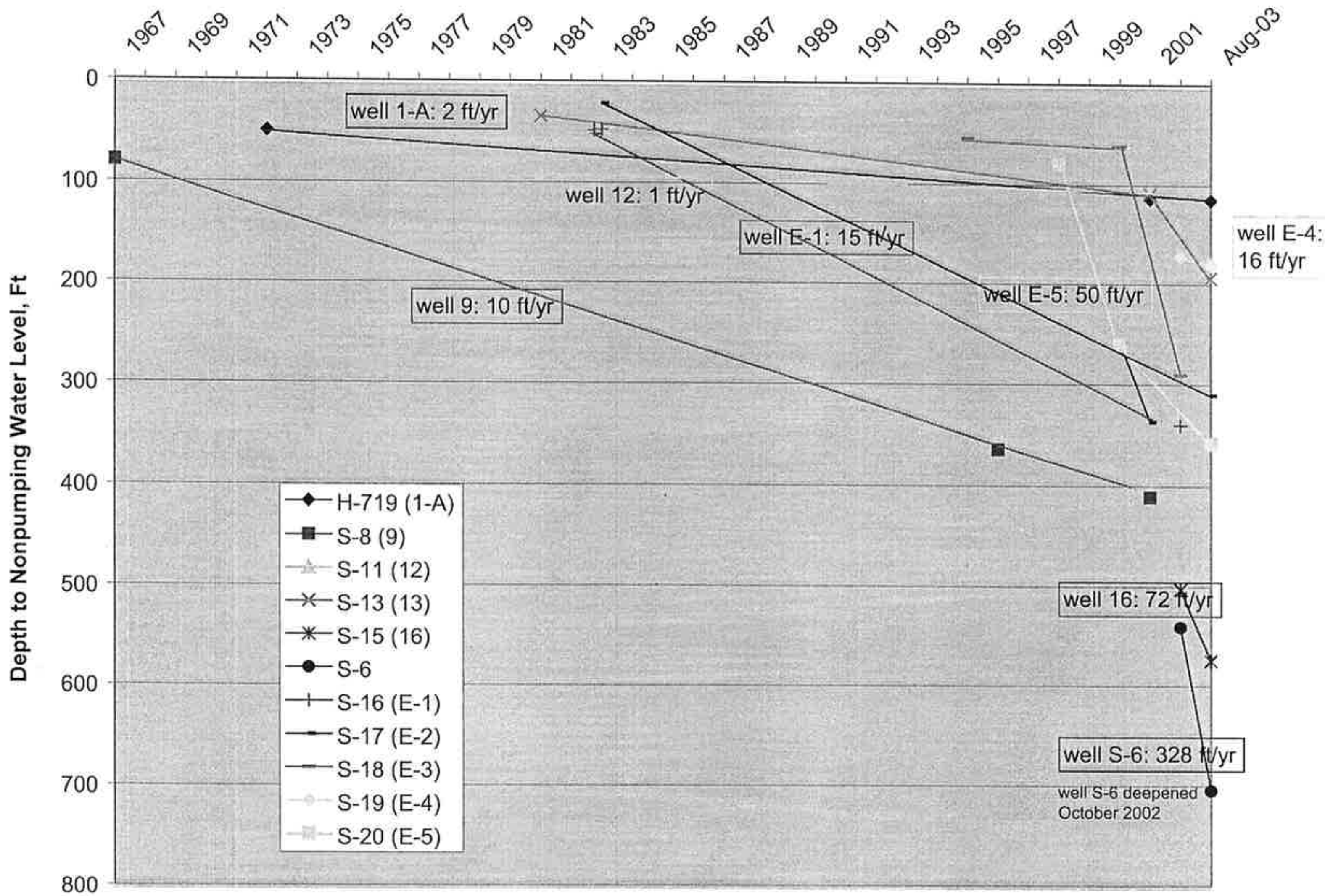
FIGURE 3.4 GEOLOGIC CROSS-SECTIONS



Decline in ft/yr is calculated and shown for the primary wells.

FIGURE 3.5 - HISTORIC WATER-LEVEL DECLINE BY WELL, ALTO LAKES WATER CORPORATION

Alto Lakes Water Corporation
Existing Well Field Capacity
2004 to 2044

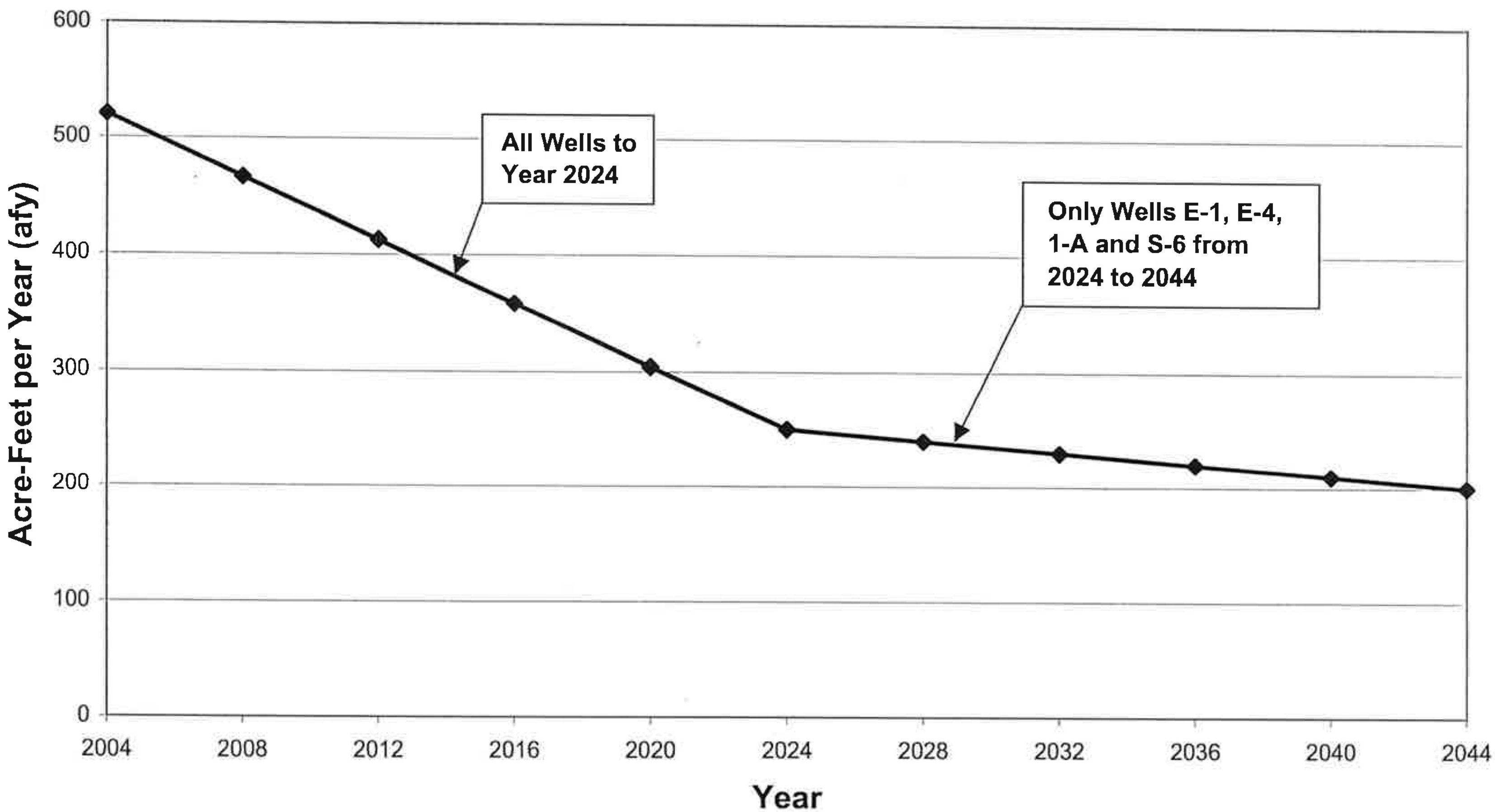


FIGURE 3.6

Alto Lakes Water Corporation
Projected Time Residents Will Spend at Alto Lakes, 2000 - 2044

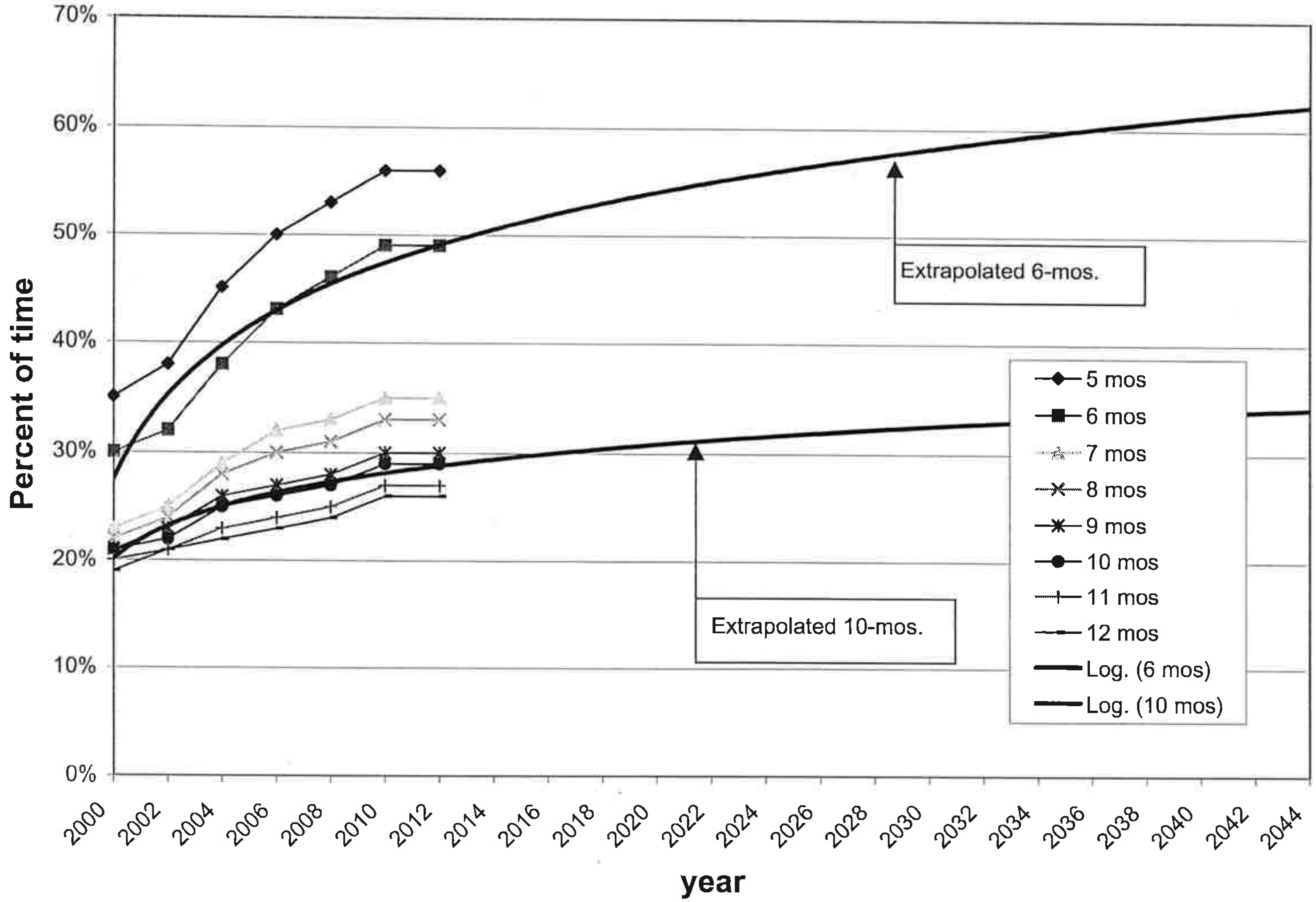


FIGURE 4.1

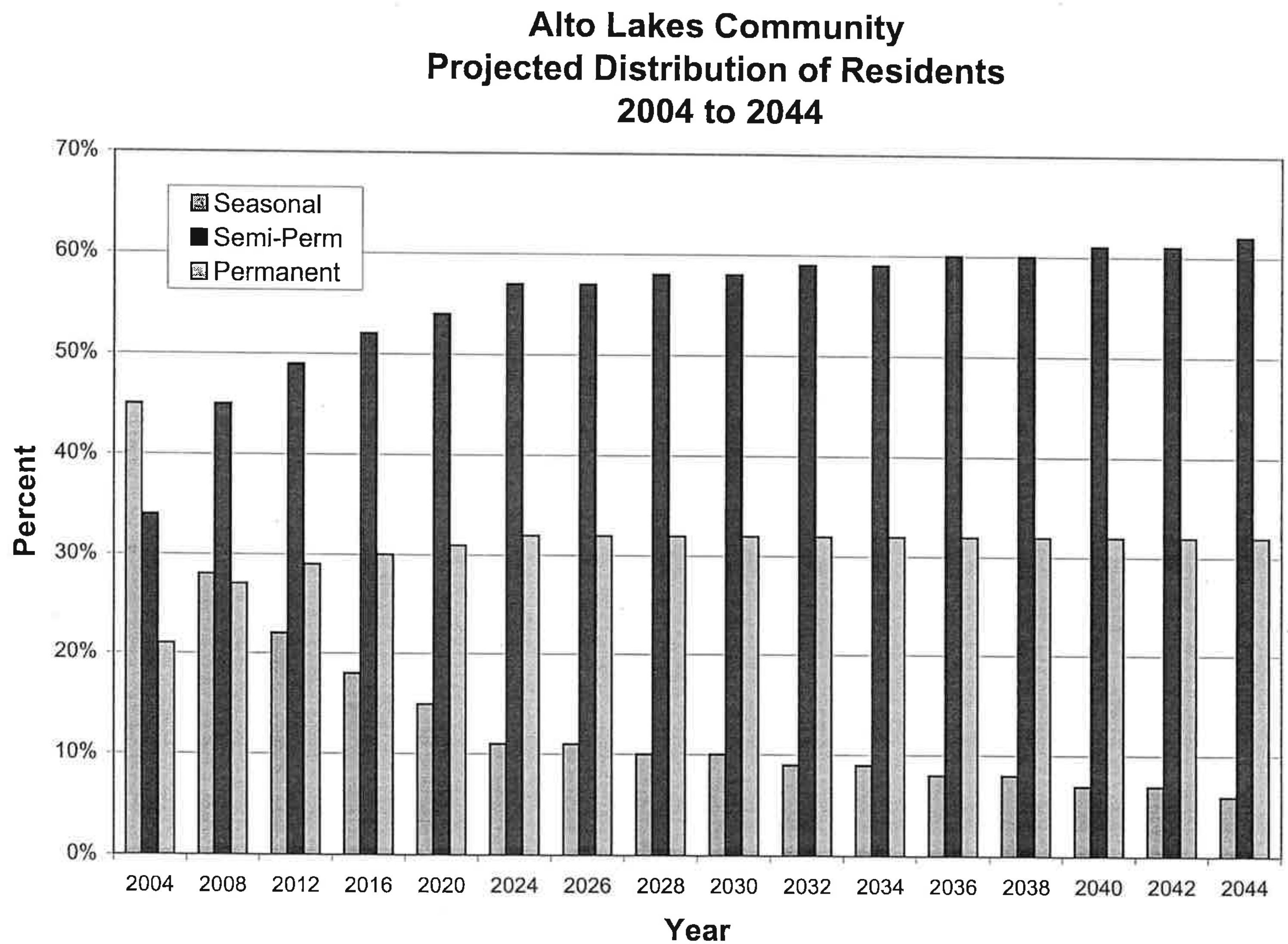

Alto Lakes Community
Projected Distribution of Residents
2004 to 2044
Seasonal
Semi-Perm
Permanent
Percent
70%
60%
50%
40%
30%
20%
10%
0%
2004
2008
2012
2016
2020
2024
2026
2028
2030
2032
2034
2036
2038
2040
2042
2044
Year

FIGURE 4.2

Alto Lakes Water Corporation
Future Water Demands by Month, 2044

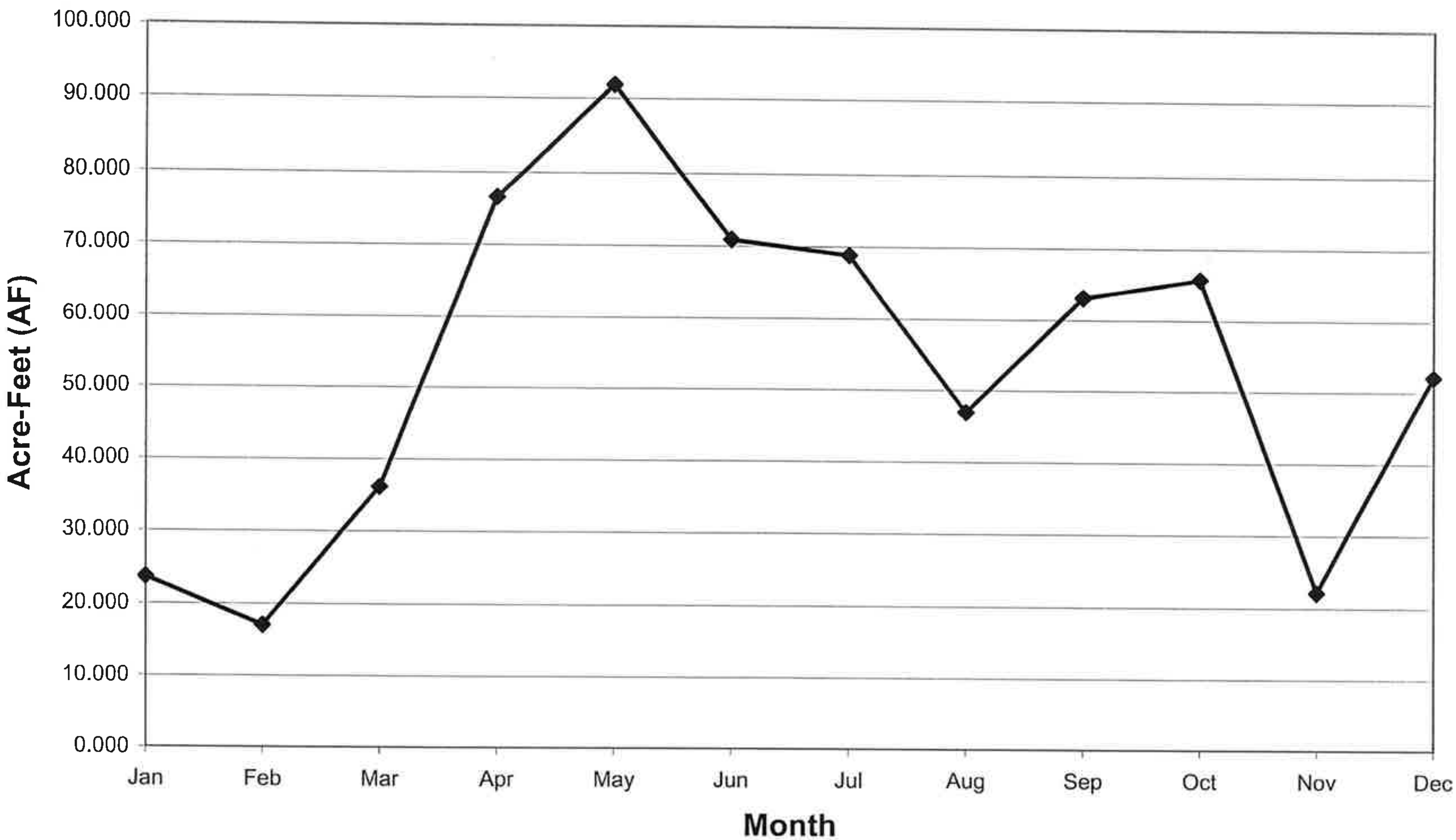


FIGURE 4.3

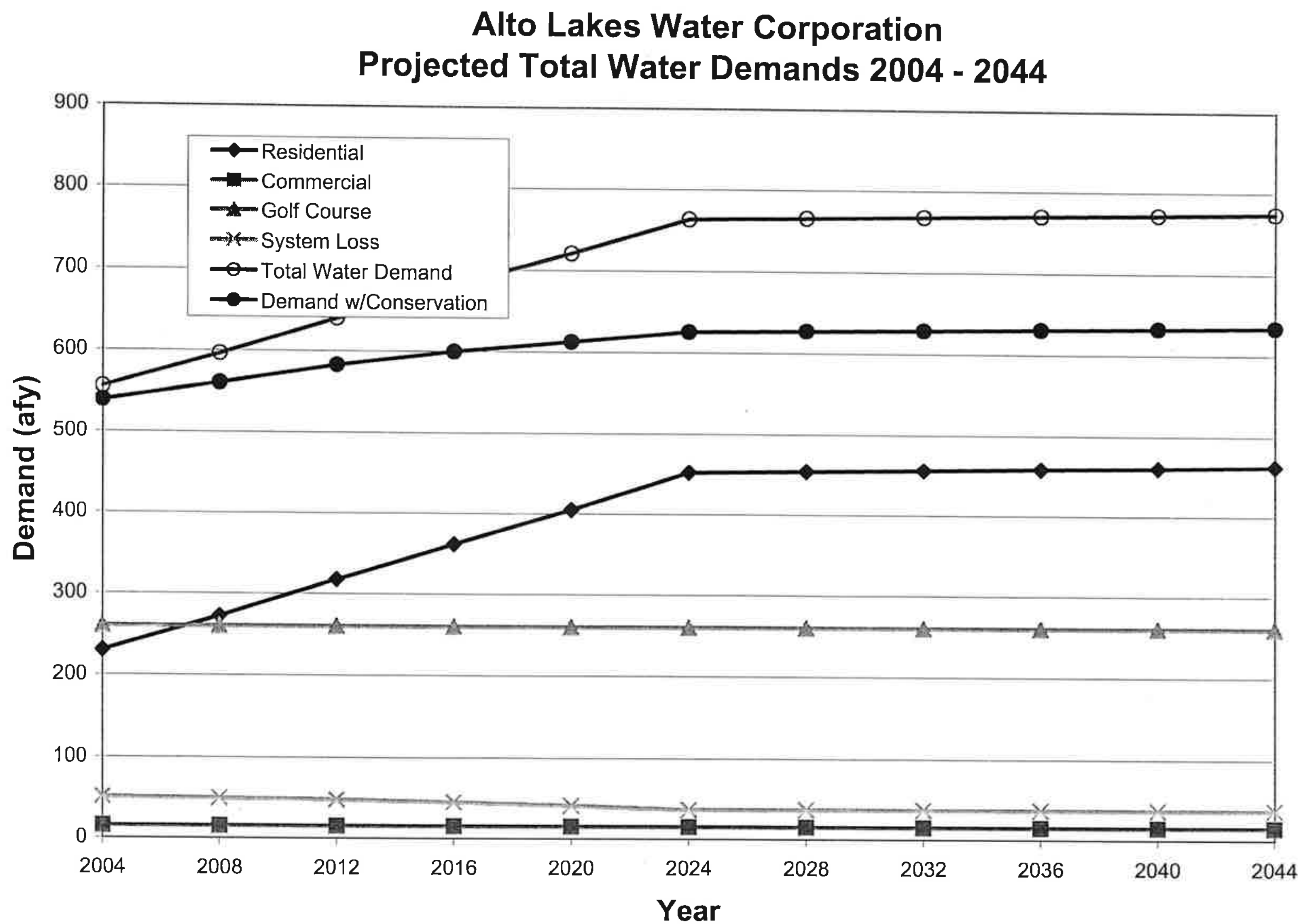

Alto Lakes Water Corporation
Projected Total Water Demands 2004 - 2044
Residential
Commercial
Golf Course
System Loss
Total Water Demand
Demand w/Conservation
Demand (afy)
900
800
700
600
500
400
300
200
100
0
2004
2008
2012
2016
2020
2024
2028
2032
2036
2040
2044
Year

FIGURE 4.4

Alto Lakes Water Corporation
Projected Water Budget 2004 - 2044

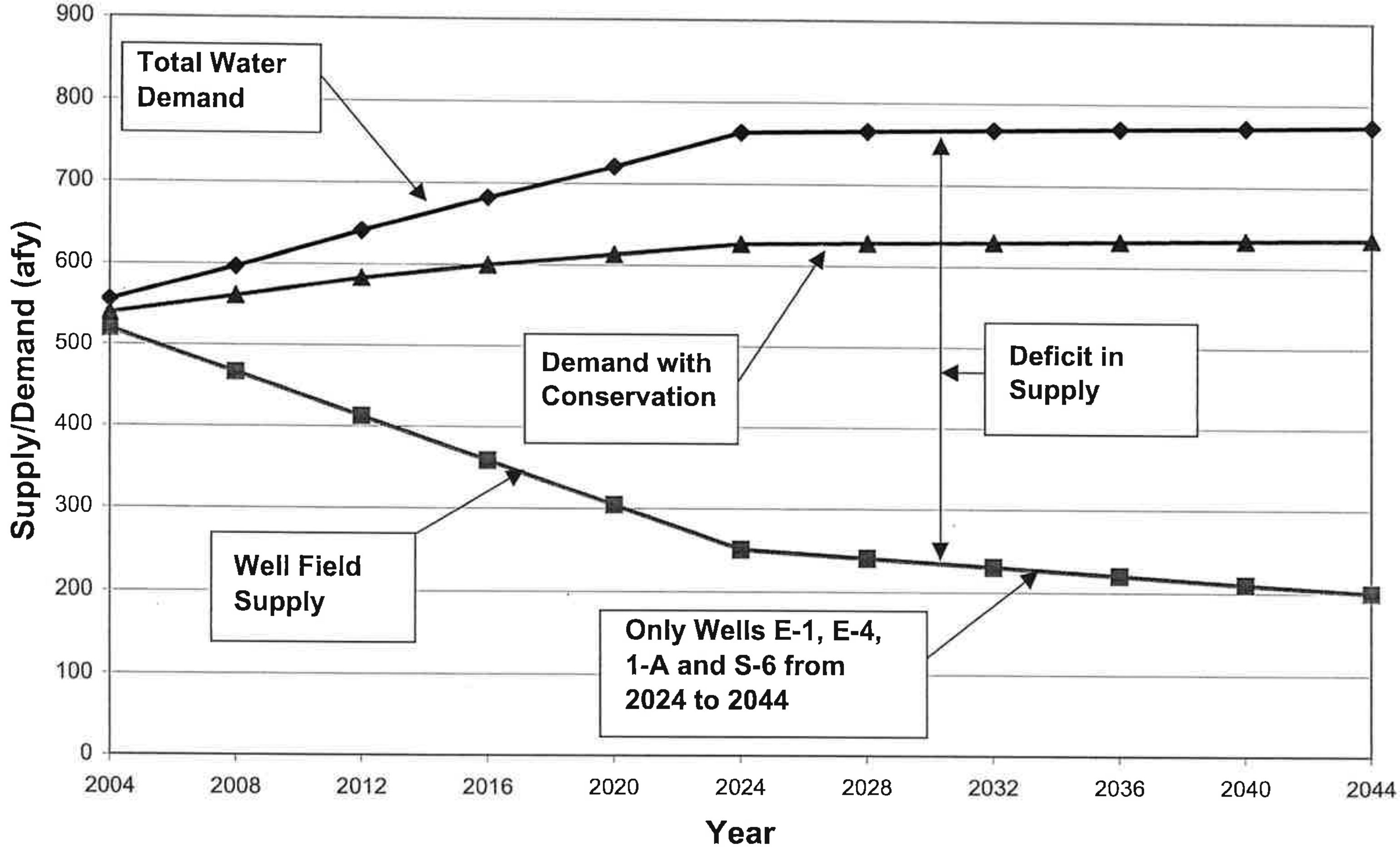


FIGURE 4.5

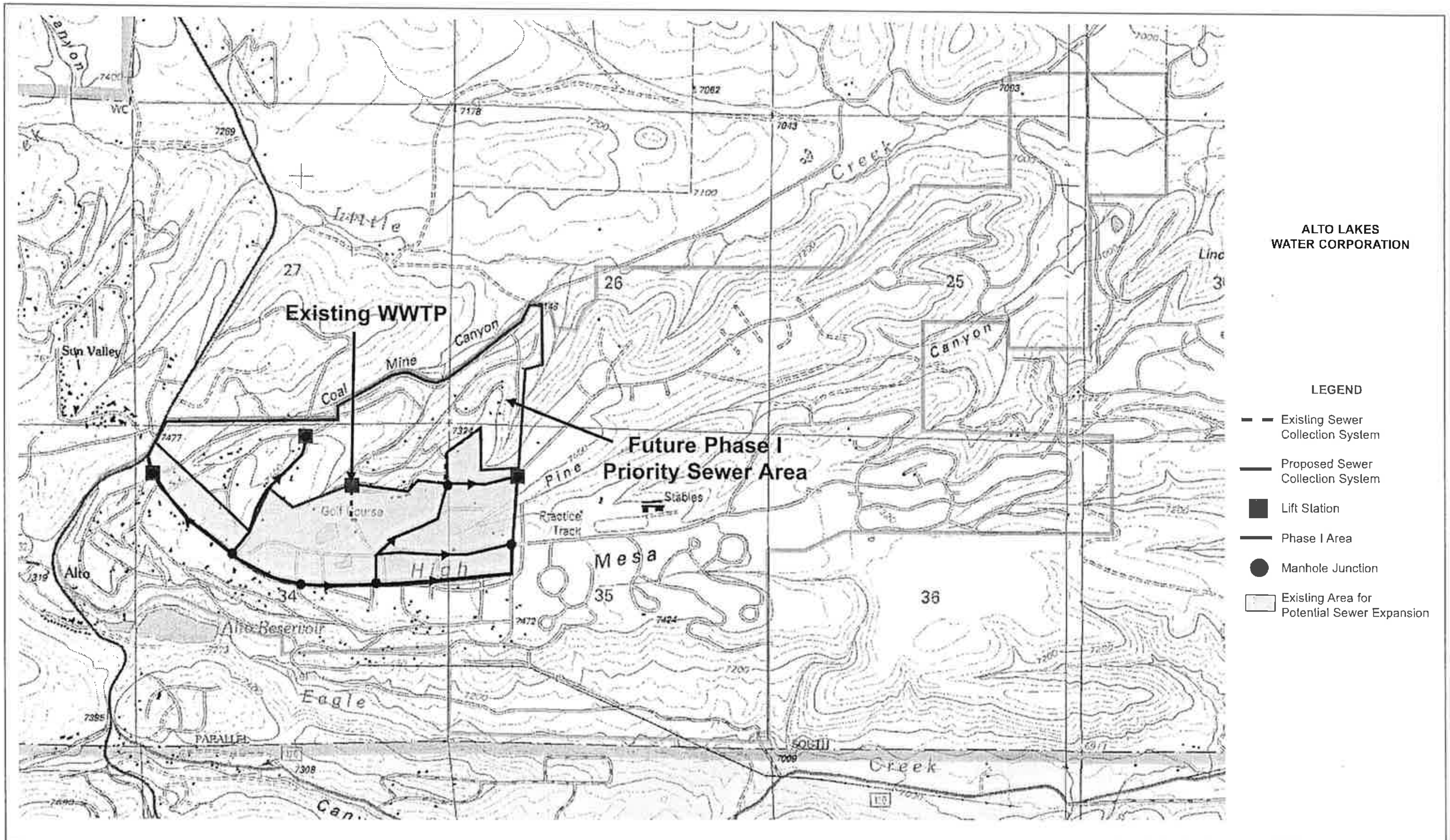


Figure 5.1: POTENTIAL SEWER SYSTEM EXPANSION AREA

Alto Lakes Water Corporation
Total Projected Deepened Well Field Capacity
2004 to 2044

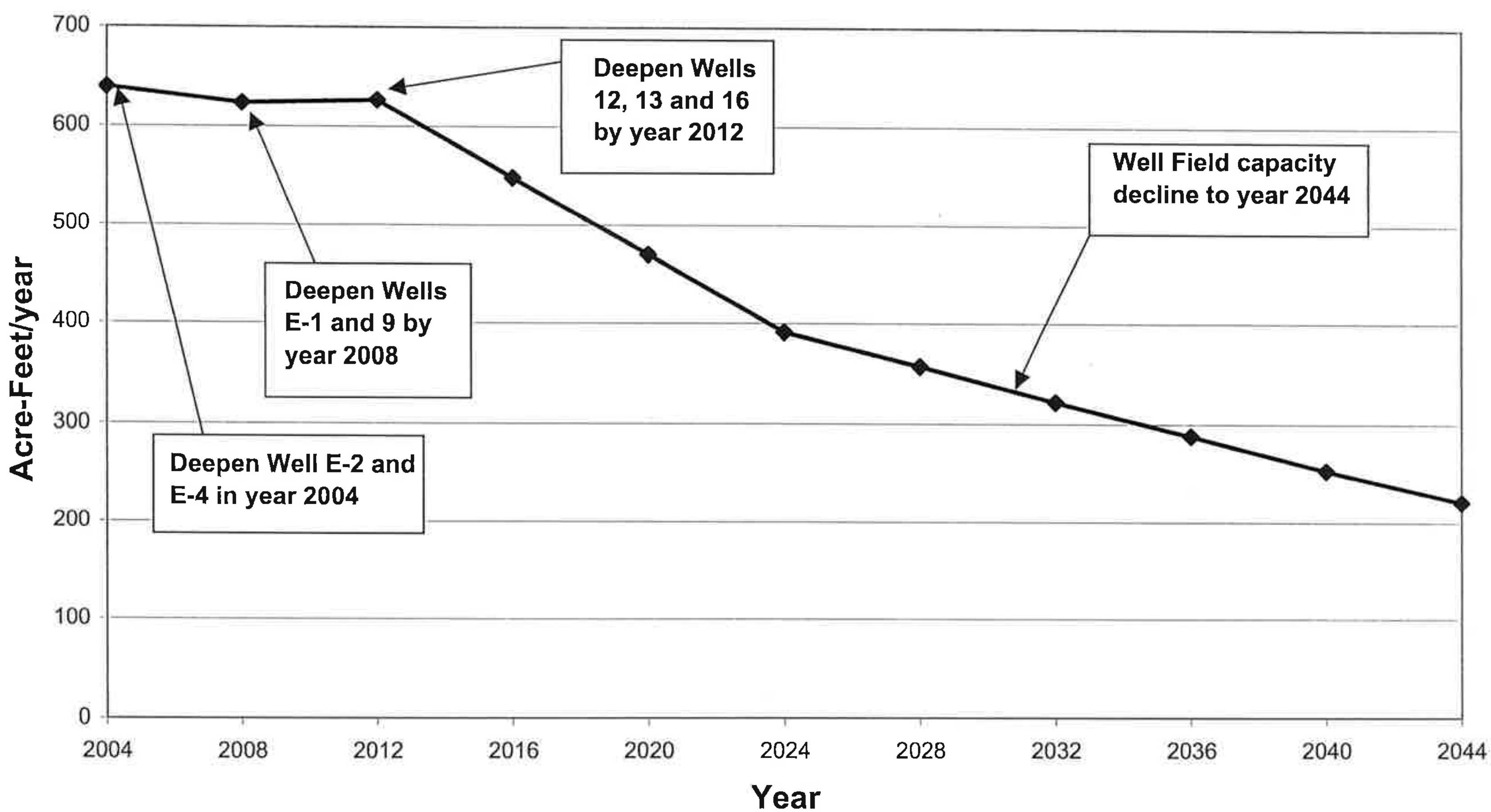


FIGURE 5.2

Alto Lakes Water Corporation
Future Reclaimed Water for Golf Course Irrigation

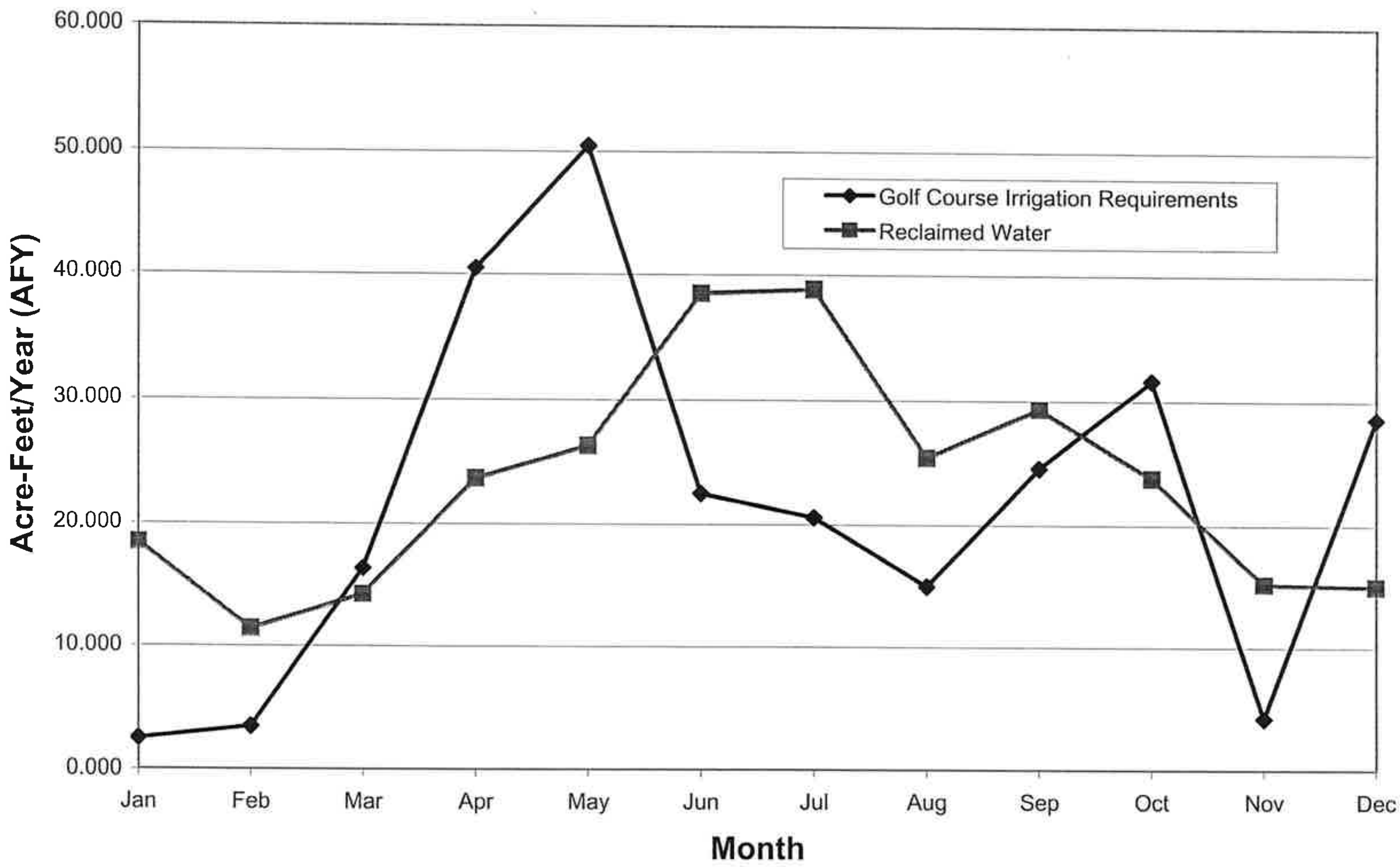


FIGURE 6.1

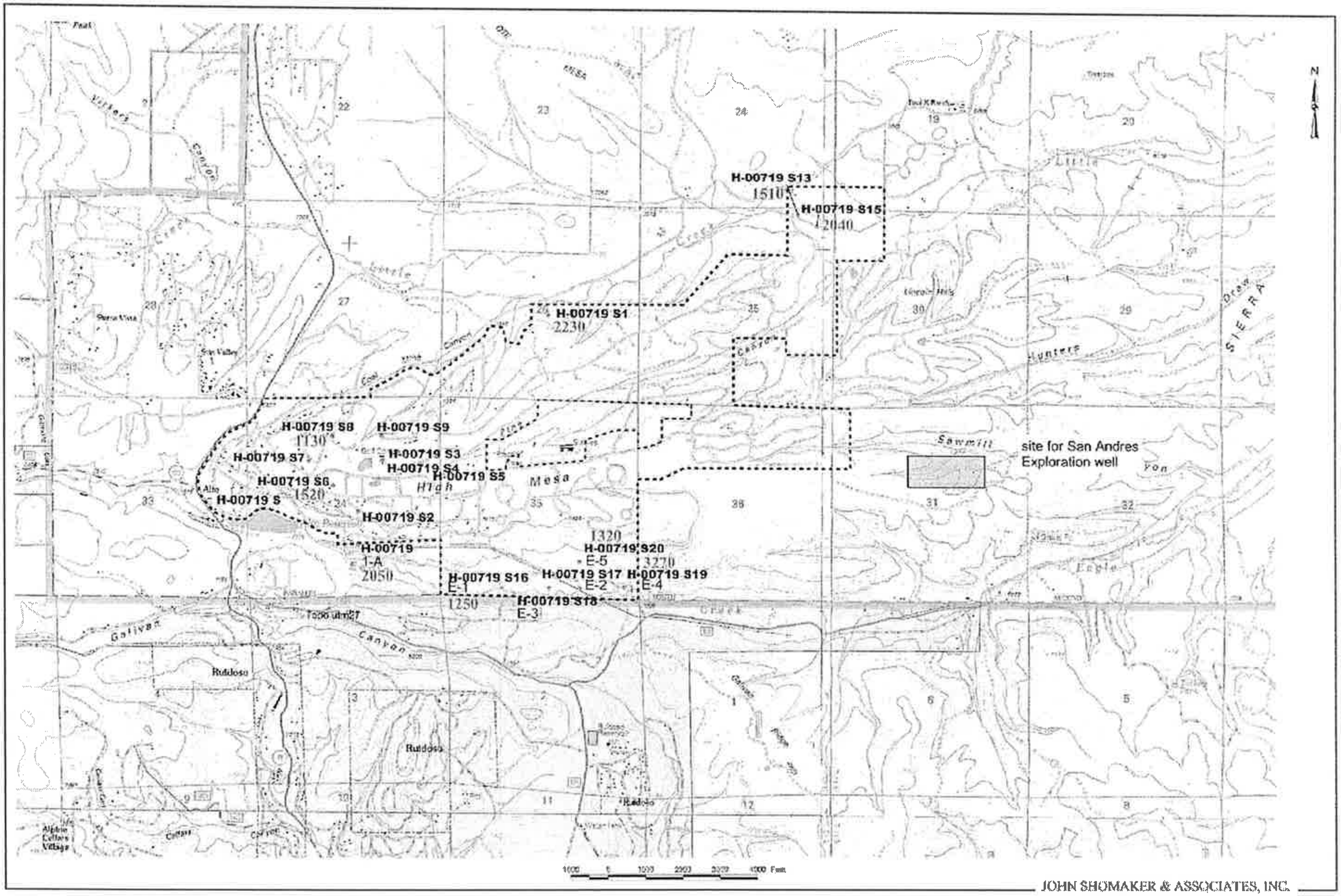


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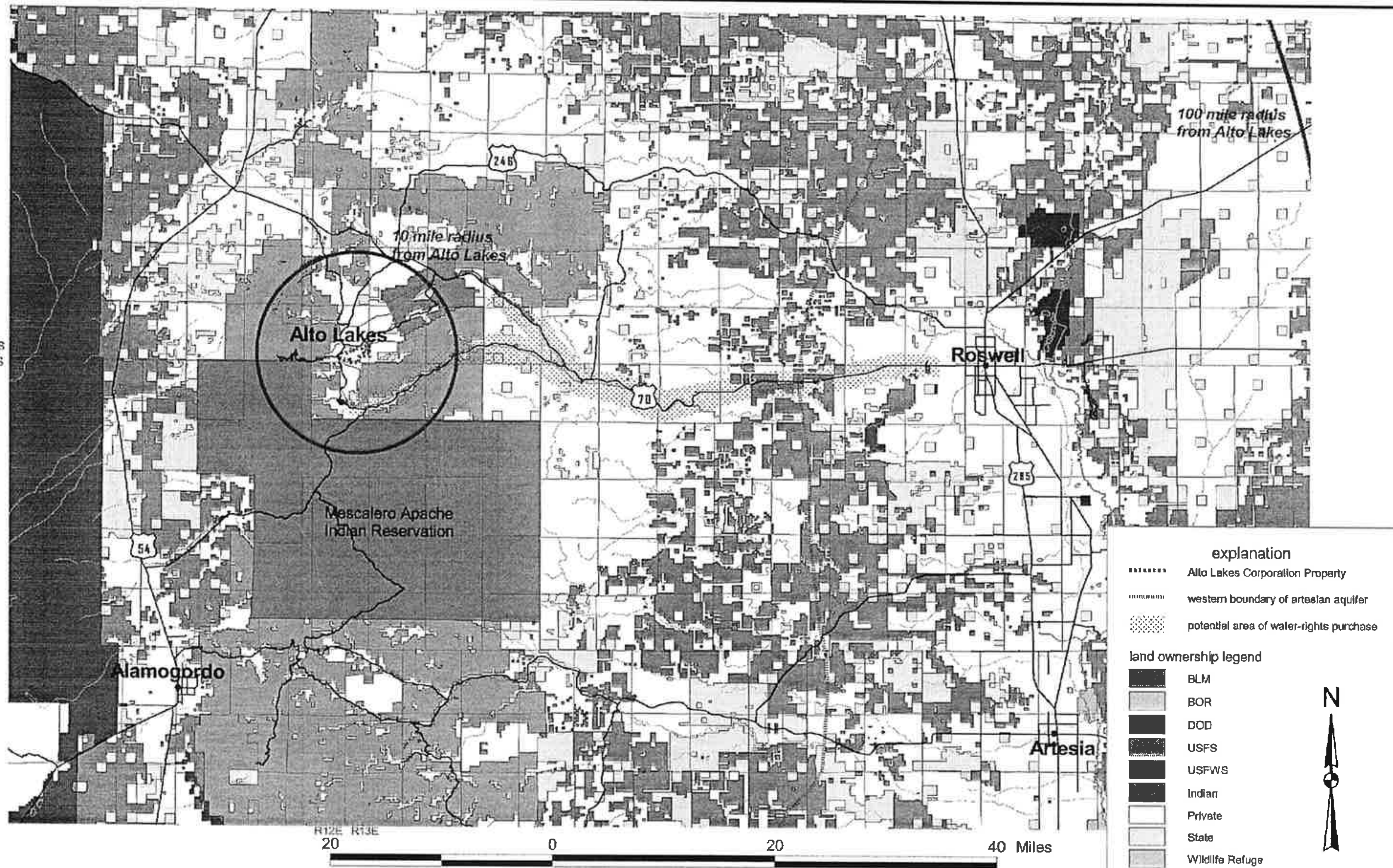
FIGURE 6.2 - SAN ANDRES WELLFIELD - LESS THAN 1 MILE



Map showing land ownership eastward into Hondo and Roswell basins from Alto Lakes.
The best general locations for pursuing purchase of water rights are shown in red stippled area along Highway 70.

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FIGURE 6.3 SAN ANDRES WELLFIELD - GREATER THAN 1 MILE

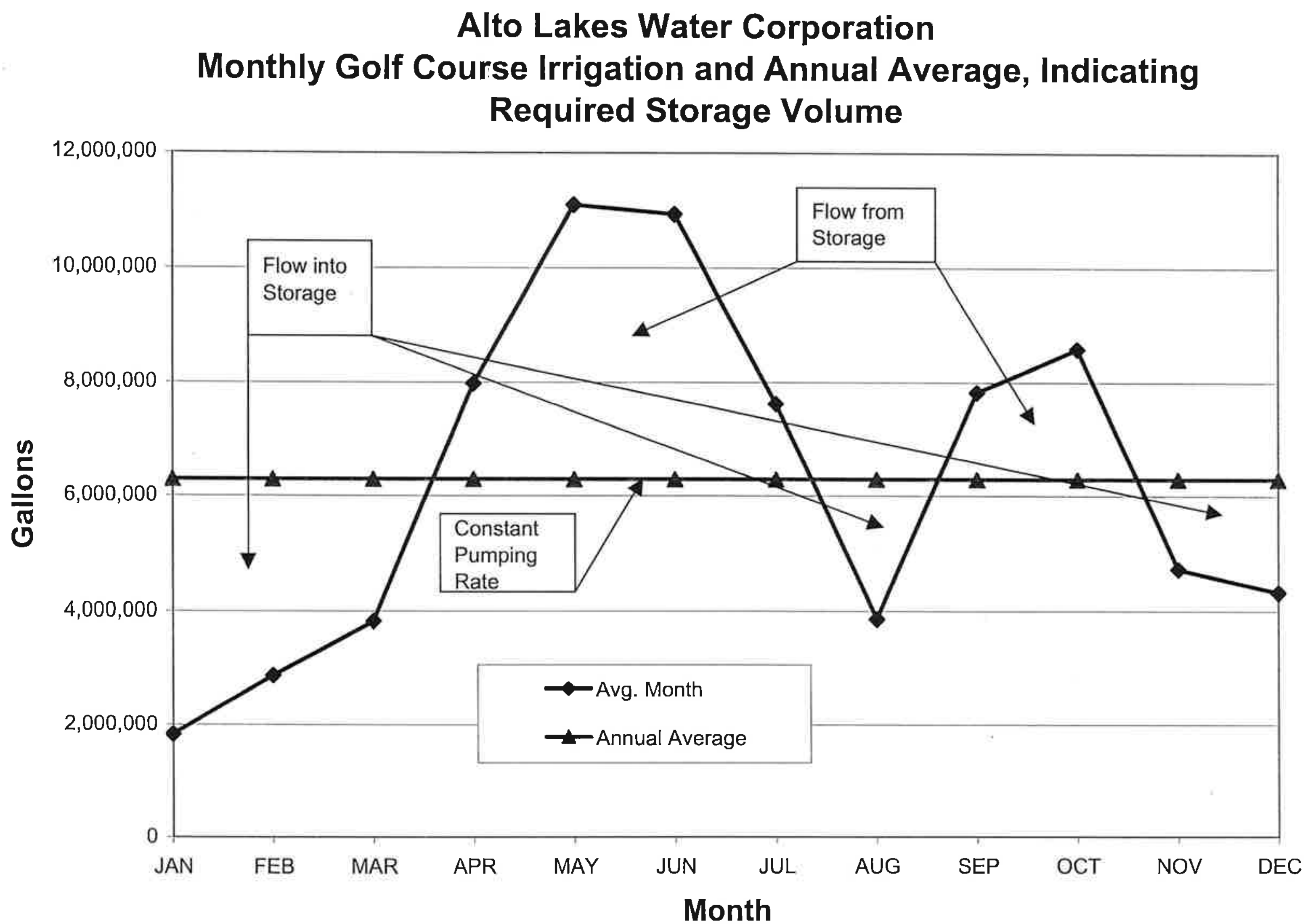

Alto Lakes Water Corporation
Monthly Golf Course Irrigation and Annual Average, Indicating
Required Storage Volume
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
Gallons
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
Month
Flow into Storage
Flow from Storage
Constant Pumping Rate
Avg. Month
Annual Average

FIGURE 6.4

Alto Lakes Water Corporation
Summary of Water Supply Development Alternatives
2004 to 2044

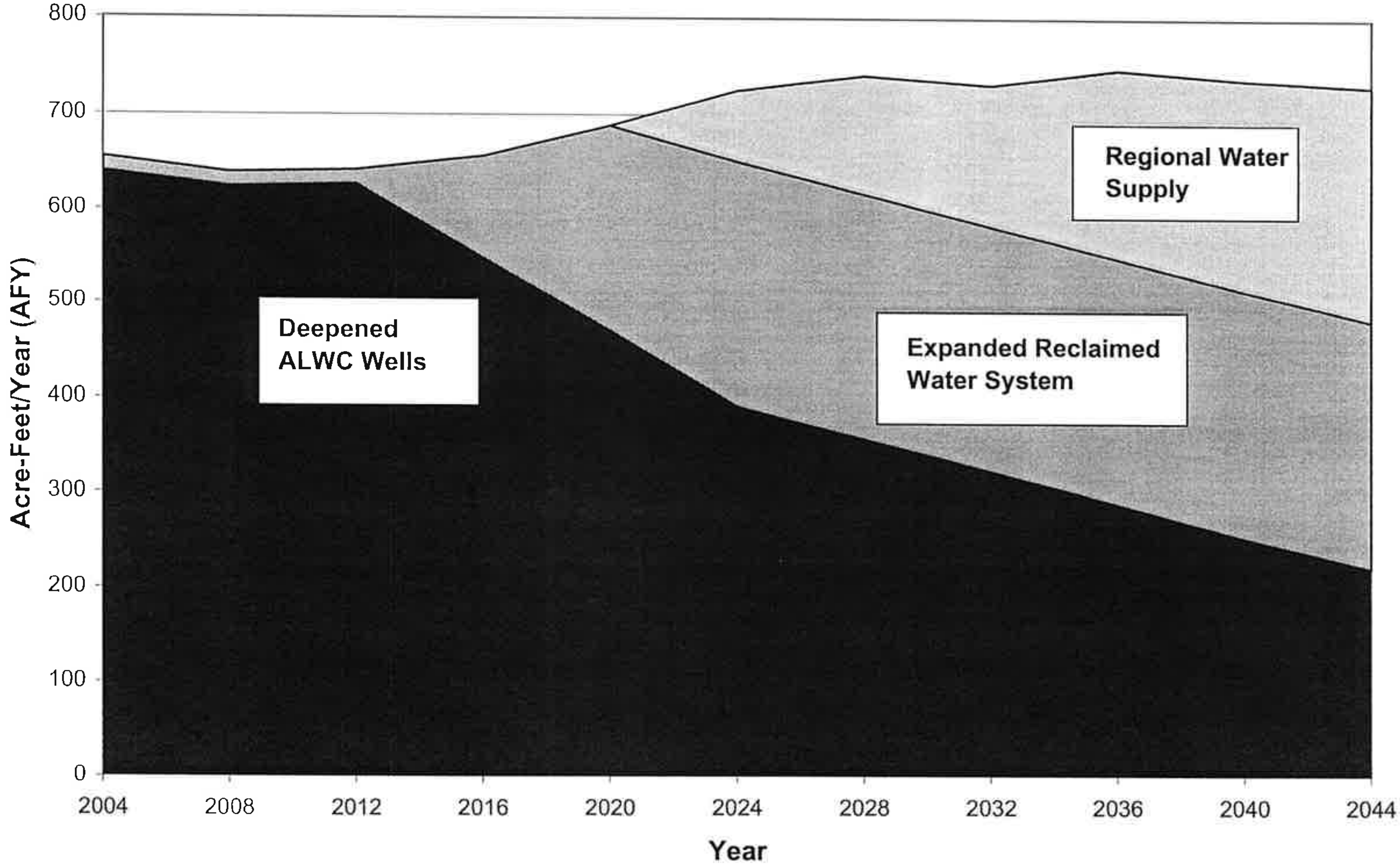


FIGURE 8.1

Alto Lakes Water Corporation
Water Balance and Supply Development Alternatives
2004 to 2044

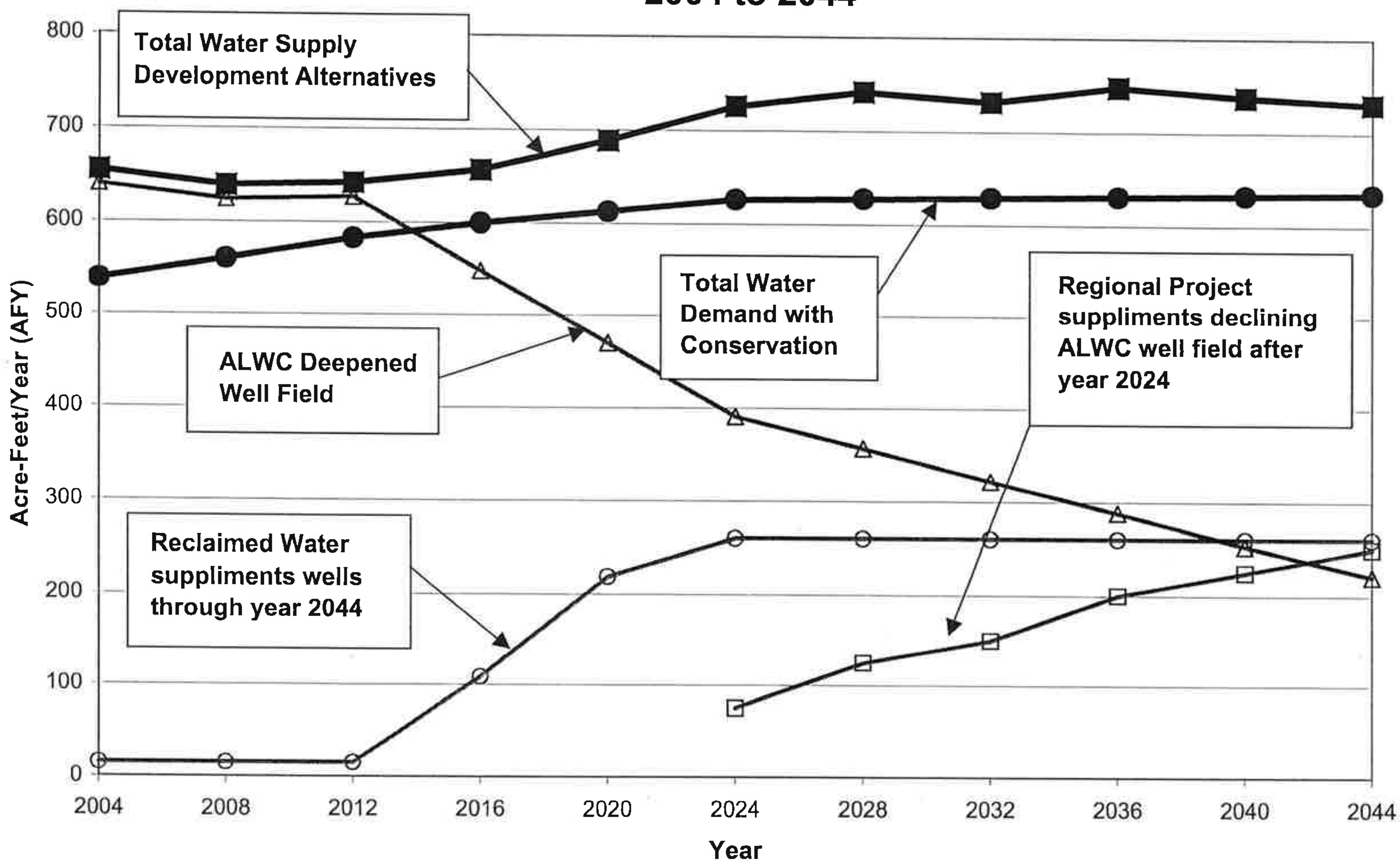
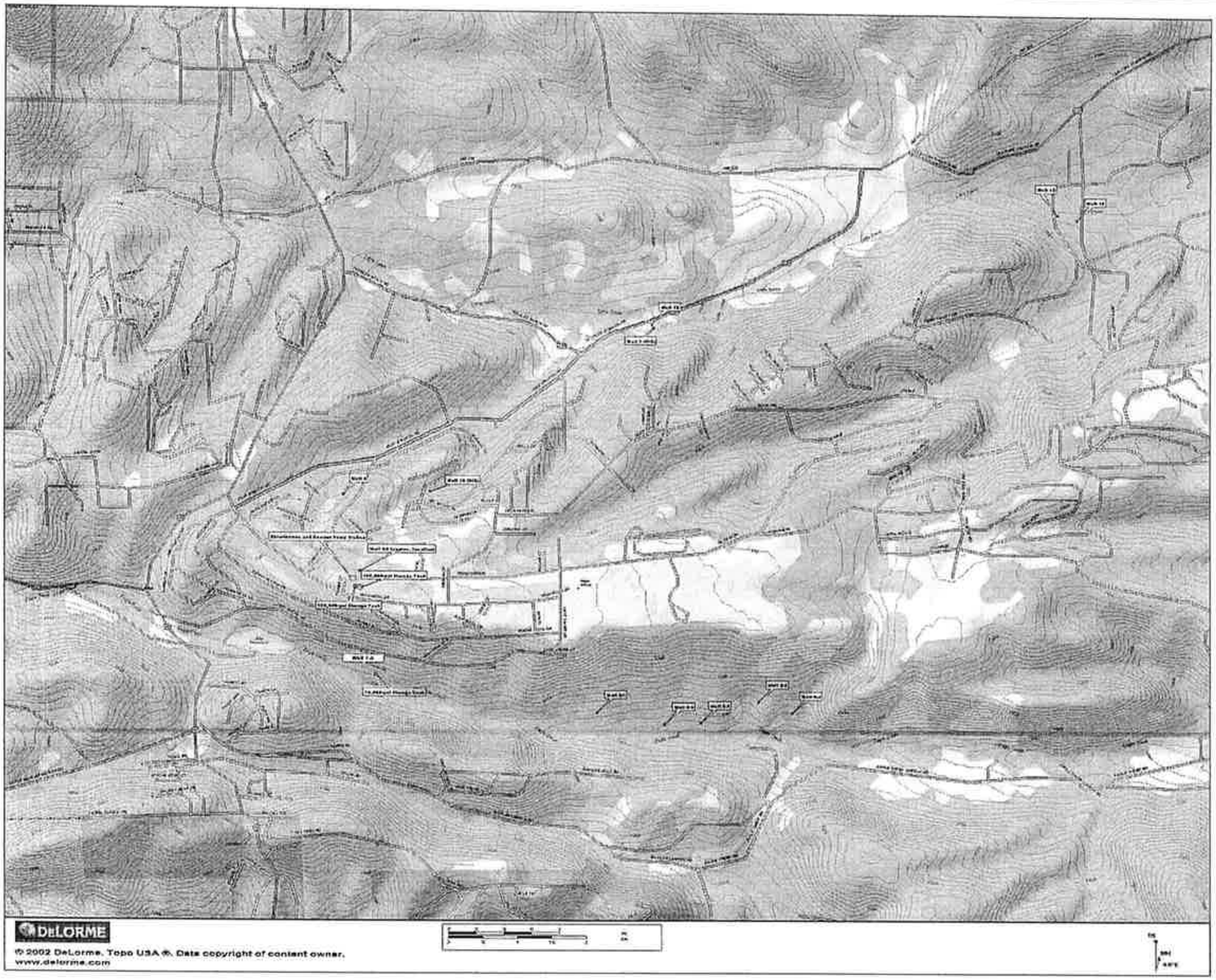


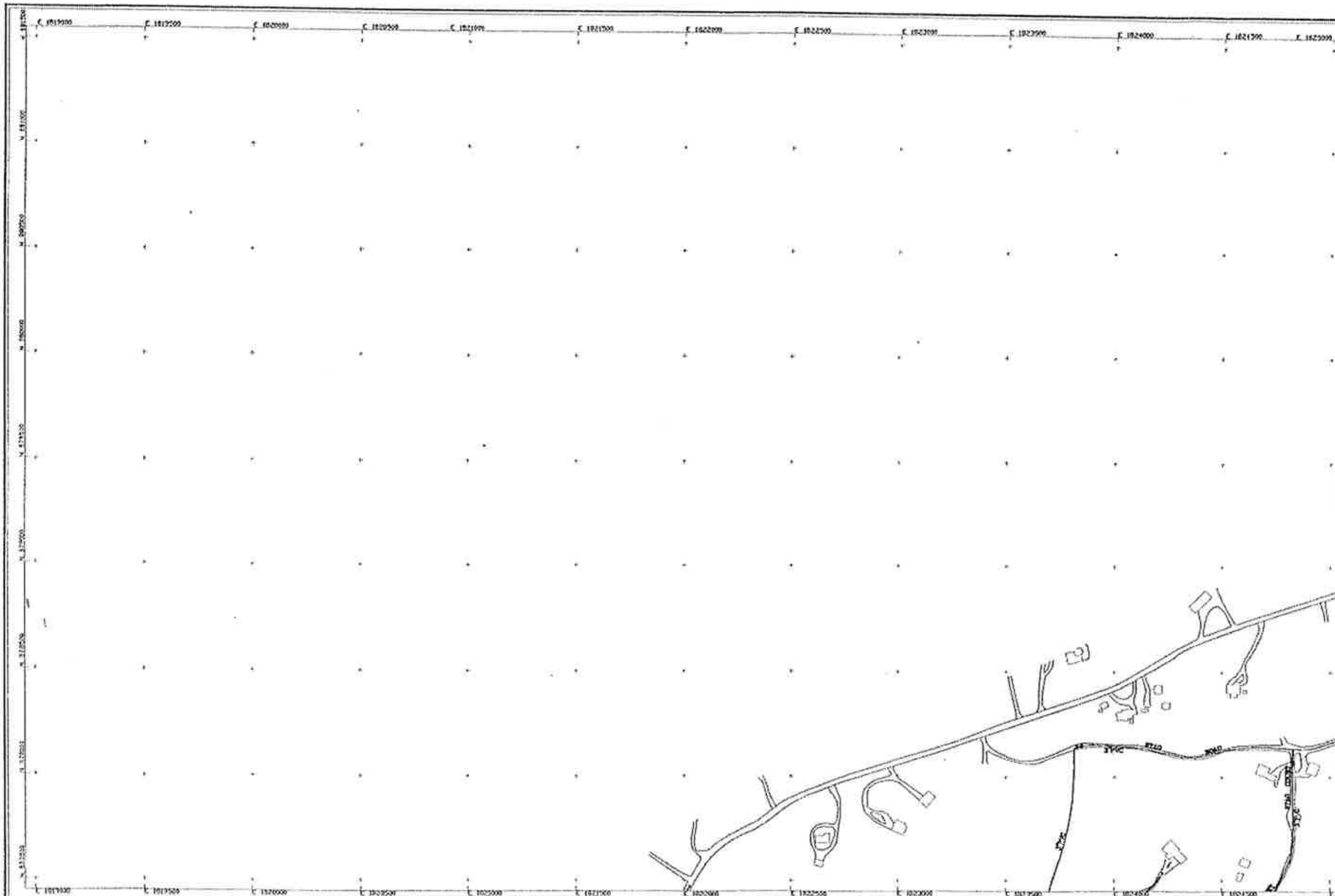
FIGURE 8.2



Livingston Associates, P.C.
Consulting Engineers

ALTO LAKES
W ATER
CORPORATION

FIGURE 9.1



Map Legend	9.2	9.3	9.4
9.5	9.6	9.7	
9.8	9.9	9.10	

COMPILED BY PHOTOGRAMMETRIC METHODS FROM PHOTOGRAPHY ACQUIRED JULY 7, 2011

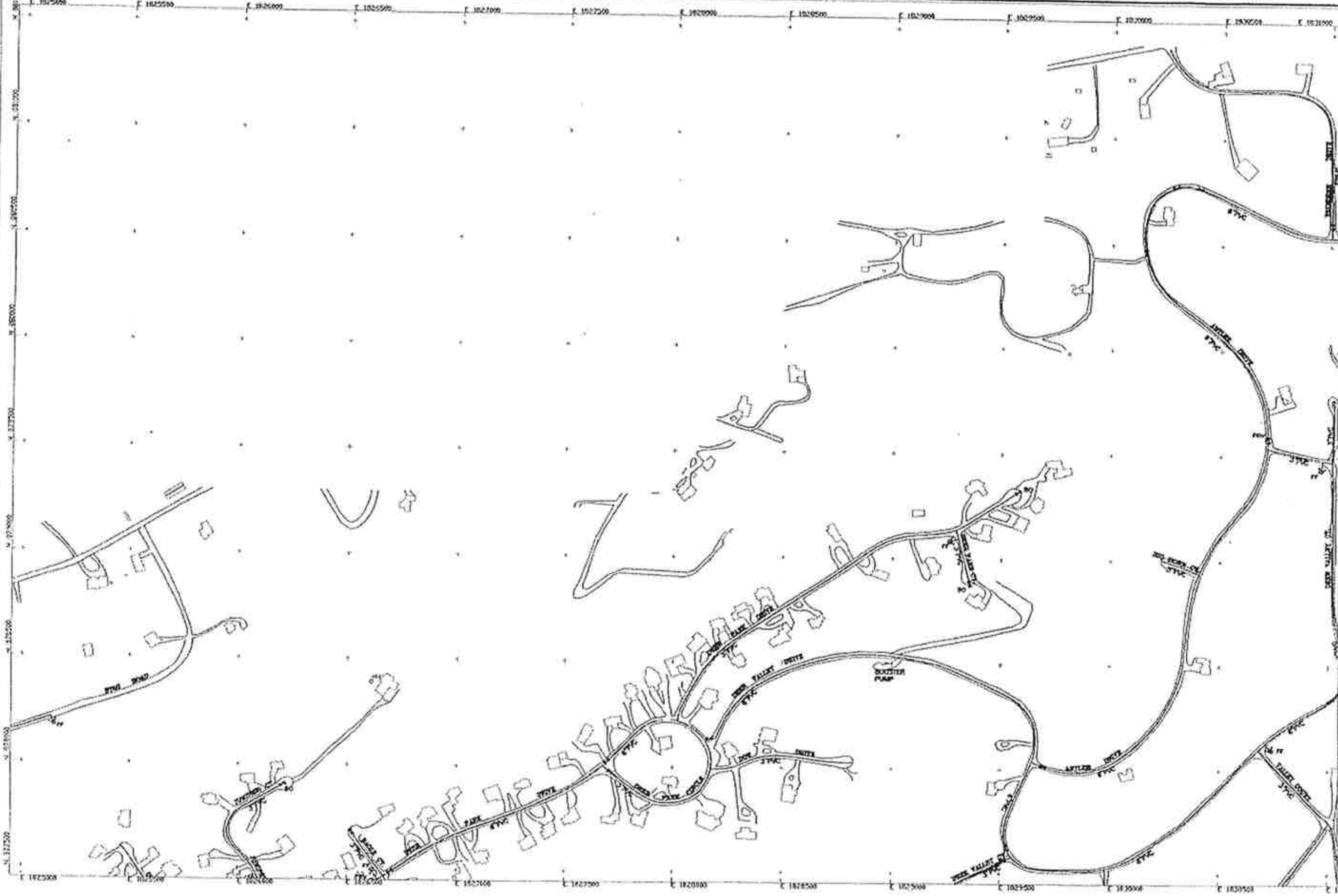
Control based on State Plane Coordinates and have been converted to ground distances and azimuths.

SCALE 1"=200'

CONTOUR INTERVAL 4'

WATER SYSTEM DISTRIBUTION MAP

FIG. 9.2



Map Legend	9.2	9.3	9.4
9.5	9.6	9.7	
9.8	9.9	9.10	

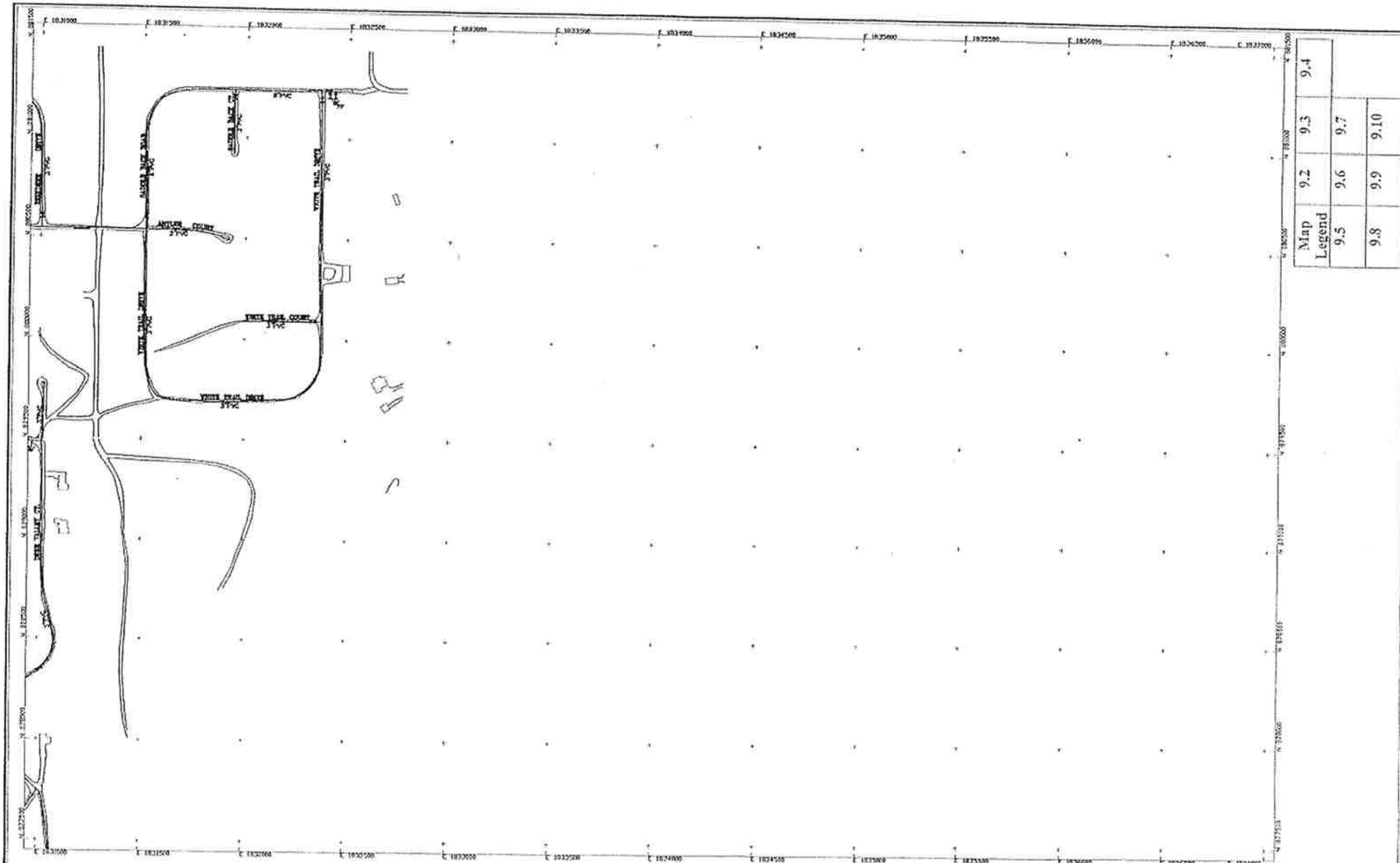
COMPILED BY PHOTOGRAMMETRIC METHODS
FROM PHOTOGRAPHY ACQUIRED JULY 7, 2003

Field control provided by D.T. Collins and Associates, Inc. of Ruidoso, NM. Control based on the State Plane Coordinates and have been converted to ground distances and azimuths.

5' ortho-photography generated from 1:7200 photography and controlled by the 1"=200' mapping.

SCALE: 1"=200'
CONTOUR INTERVAL: 4'

WATER SYSTEM DISTRIBUTION MAP
FIG. 9.3



COMPILED BY PHOTOGRAMMETRIC METHODS
FROM PHOTOGRAPHY ACQUIRED JULY 7, 2003

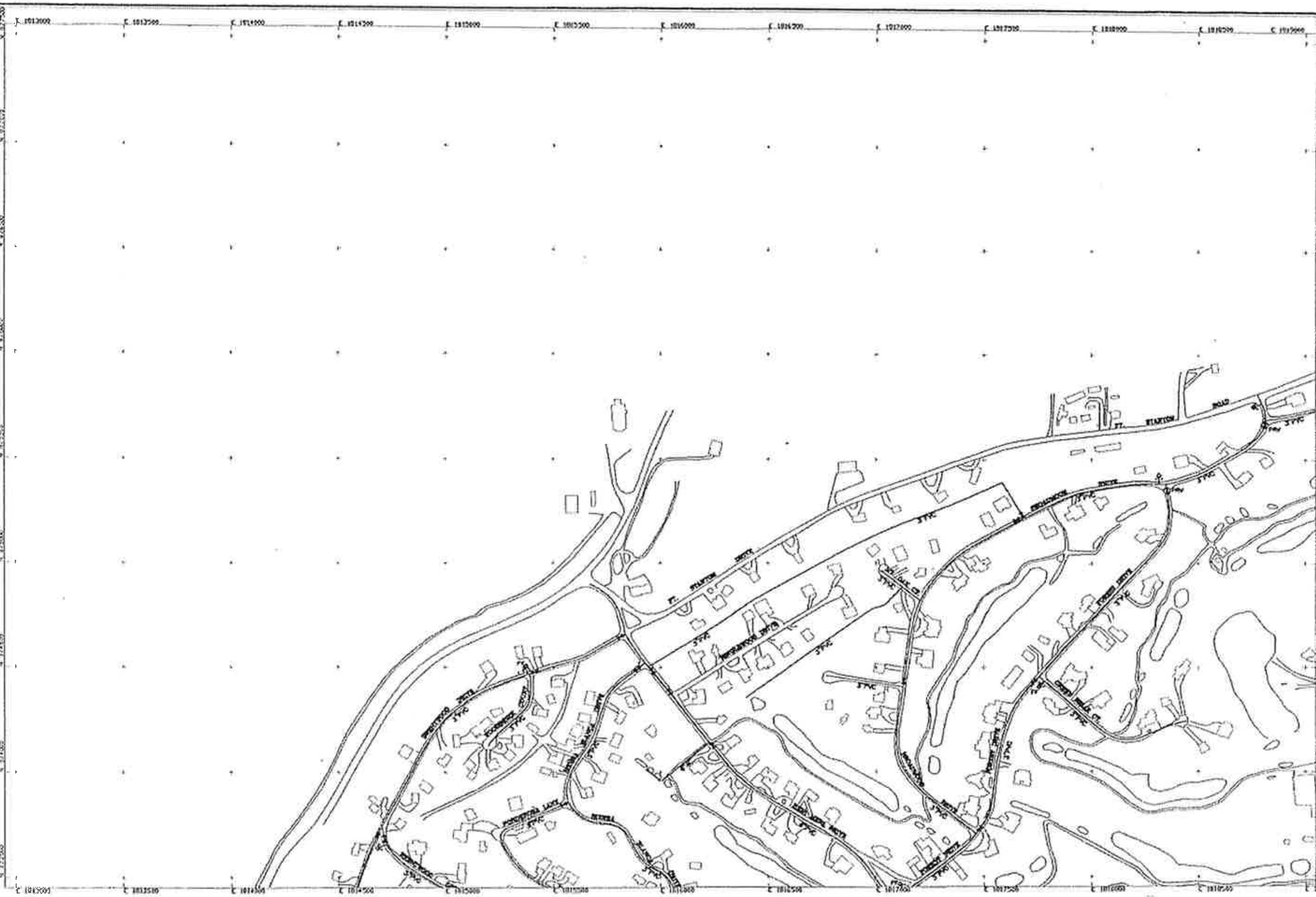
Field control provided by D.T. Collins and Associates, Inc. of Ruidoso, NM
Control based on the State Plane Coordinates and have been converted to ground distances and azimuths.

.5' ortho-photography generated from 1/2000 photography and controlled by the 1"=200' mapping

SCALE 1"=200'

CONTOUR INTERVAL 4'

WATER SYSTEM DISTRIBUTION MAP
FIG. 9.4



Map Legend	9.2	9.3	9.4
9.5	9.6	9.7	
9.8	9.9	9.10	

COMPILED BY PHOTOGRAMMETRIC METHODS
FROM PHOTOGRAPHY ACQUIRED JULY 7, 2003

Field control provided by D.T. Collins and Associates, Inc. of Ruidoso, NM. Control based on the State Plane Coordinates and have been converted to ground distances and azimuths.

5' orthophotography generated from 1:7200 photography and controlled by the 1"=200' mapping

SCALE: 1"=200'

CONTOUR INTERVAL: 4'

WATER SYSTEM DISTRIBUTION MAP

FIG. 9.5