ALPINE COUNTY
GROUNDWATER MANAGEMENT PLAN

February 1, 2007

Prepared for:

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LIST OF ABBREVIATIONS AND ACRONYMS

AB	Assembly Bill
AST	aboveground storage tank
BLM	Bureau of Land Management
BMOs	Basin Management Objectives
cfs	cubic feet per second
CWC	California Water Code
CWSD	Carson Water Subconservancy District
DHS	Department of Health Services
DWR	Department of Water Resources
DWSAP	Drinking Water Source Assessment Program
gpm	gallons per minute
GWMP	Groundwater Management Plan
KMPUD	Kirkwood Meadows Public Utility District
mgd	million gallons per day
M & I	municipal & industrial
PCA	possible contaminating activity
RWQCB	Regional Water Quality Control Board
SOPs	Standard Operating Procedures
STPUD	South Tahoe Public Utility District
SWRCB	State Water Resources Control Board
TAC	Technical Advisory Committee
TMDL	total maximum daily load
TSC	Technical Steering Committee
USGS	United States Geological Survey
UST	underground storage tank
WDID	Waste Discharge Identification
WDR	Waste Discharge Requirement

SECTION 1.0
INTRODUCTION

The Alpine County Planning and Administration Department ("Alpine County") has developed this Groundwater Management Plan ("GWMP") to provide guidance in managing the groundwater resources within the County. Projected development in the County has created a need for resource planning and management to ensure a supply of high quality groundwater for anticipated growth. This GWMP: 1) documents existing groundwater conditions, management policies and procedures; 2) provides a framework for the County and other water users to implement effective water resource management programs, including related surface water resources; 3) presents a number of recommended actions that would result in achieving sustainable groundwater supplies (the first action under the GWMP would be the development of a groundwater monitoring program); and 4) is consistent with the water resource elements provided in the County's General Plan (Appendix A). This GWMP is the first comprehensive water resource planning tool developed for Alpine County.

This GWMP is organized into four sections. Section 1.0 summarizes the regulatory requirements and provides information on public outreach. Section 2.0 provides a description of the physical conditions in Alpine County including climate, hydrology, geology, groundwater levels and groundwater quality. Section 2.0 also provides water demand and supply, and well infrastructure information. Section 3.0 describes management plan elements and the implementation of selected GWMP components. References cited in this GWMP are listed in Section 4.0. Figures are either embedded within the text or provided within the "Figures" section of this GWMP, based on their content.

1.1 Plan Authority and Administration

On December 20, 2005, the Alpine County Board of Supervisors formally approved resolution 2005-75 directing the County to proceed with the development of a countywide AB 3030 GWMP (Appendix B). The County is an authorized groundwater management agency pursuant to the California Water Code ("CWC") § 10753 (a). This GWMP does not conflict with existing

ordinances or other groundwater management plans within the County, and is consistent with the water resource elements of the County's General Plan (Appendix A).

1.2 AB 3030 History

In 1992, the Legislature enacted the California Groundwater Management Act (AB 3030) to encourage local public agencies to adopt plans to manage groundwater resources within their jurisdictions. Provisions were created in CWC Sections 10750 et. seq. with the intent to manage the safe production, quality, and proper storage of groundwater. AB 3030 codifies 12 voluntary components of a GWMP. In 2002, SB 1938 was signed into law. SB 1938 amended the CWC with seven required components of a GWMP for any public agency seeking State funds administered through the Department of Water Resources ("DWR") for groundwater projects. In 2003, DWR published *Bulletin 118 – Update 2003, California's Groundwater.* Bulletin 118 contains seven recommended components of a GWMP. Under the CWC, a GWMP must include the mandatory, voluntary and suggested components summarized in Table 1-1.

1.3 Management Objectives

Alpine County initially established management objectives on January 7, 2003 with the approval of Groundwater Ordinance No. 646-03 (Appendix C), which addresses the potentially harmful extraction of groundwater resources for use outside the County. This GWMP is consistent with the findings and purposes of Groundwater Ordinance No. 646-03, which are summarized below:

- The protection of the health, welfare and safety of the residents within Alpine County;
- The protection and prevention of the harmful extraction and exportation of groundwater resources for use outside of Alpine County;
- Recognition that the principle developed in the case law of California that water may be appropriated from a groundwater basin if the groundwater supply is in surplus and exceeds the reasonable and beneficial needs of overlying users;
- Recognition that much of the farm production within Alpine County depends upon the use of water to produce field crops, which significantly contributes to the value of agricultural crops produced and;
- Recognition that groundwater is an important part of the water supply for residential needs within Alpine County.

Table 1-1. Mandatory, Voluntary and Suggested Components of an AB 3030 GWMP	
AB 3030 GWMP Component Description	**GWMP Section**
CWC § 10750 et seq., Mandatory Components	
1. Documentation of public involvement statement.	1.6
2. Establish Management Objectives.	1.3 and 3.2
3. Monitoring and management of groundwater elevations, groundwater quality, inelastic land surface subsidence, and changes in surface water flows and quality that directly affect groundwater levels or quality or are caused by pumping.	3.4
4. Plan to involve other agencies located within groundwater basin.	3.7.2
5. Adoption of monitoring protocols within groundwater basin.	3.4
6. Map of groundwater basin showing area of agency subject to GWMP, other local agency boundaries, and groundwater basin boundary as defined in DWR Bulletin 118.	Figure 1-2
7. For agencies not overlying groundwater basins, prepare GWMP using appropriate geologic and hydrogeologic principles.	2.0
CWC § 10750 et seq., Voluntary Components	
1. Control of saline intrusion.	3.5.6
2. Identification and management of wellhead protection areas and recharge areas.	2.4.5 and 3.5.3
3. Regulation of the migration of contaminated groundwater.	3.5.4
4. Administration of well abandonment and well destruction program.	3.5.2
5. Mitigation of conditions of overdraft.	3.6.1
6. Replenishment of groundwater extracted by water producers.	3.6.2
7. Monitoring of groundwater levels and storage.	3.4.1 and 3.4.4
8. Evaluate conjunctive use operations.	3.6.4
9. Identification of well construction policies.	3.5.1
10. Construction and operation by local agency of groundwater contamination cleanup, recharge, storage, conservation, water recycling, and extraction projects.	3.5 and 3.6
11. Development of relationships with state and federal regulatory agencies.	3.7
12. Review of land use plans and coordination with land use planning agencies to assess activities that create reasonable risk of groundwater contamination.	3.7.2
DWR Bulletin 118 Suggested Components	
1. Manage with Guidance of advisory committee.	3.7.3
2. Describe area to be managed under GWMP.	1.4
3. Create link between management objectives, goals and actions of GWMP.	3.0
4. Describe monitoring program.	3.4
5. Describe efforts to coordinate with land use, zoning, or water management planning agencies or activities.	3.7.2
6. Report on implementation of GWMP.	3.8.1
7. Evaluate GWMP periodically.	3.8.1 through 3.8.3

This GWMP supports the long-term maintenance of sustainable, high-quality groundwater resources for the beneficial use of the residents of Alpine County. Beneficial uses include domestic use, agricultural irrigation, municipal supply, and environmental needs. Management objectives include:

- Minimize the long-term drawdown of groundwater levels;

- Protect groundwater quality;
- Prevent inelastic land surface subsidence from occurring as a result of excessive groundwater pumping; and
- Protect against undesirable interactions between groundwater and surface water.

To accomplish these management objectives, this GWMP incorporates a number of components, which are divided into implementation strategies. The implementation strategies elaborate on or expand upon existing activities conducted by Alpine County and others, and assess their effectiveness. They also identify the need for additional activities when necessary.

1.4 Plan Area

The CWC restricts areas that may be included in a GWMP to areas outside the service area of other local agencies, water corporations regulated by the Public Utilities Commission or mutual water companies without the agreement of the local agency (CWC § 10750.7 (a)). Table 1-2 provides a list of the local agencies within Alpine County. Areas under an existing AB 3030 GWMP, and adjudicated areas also need agreement to be included in a GWMP (§ 10750 (b)). There are no areas in Alpine County that are adjudicated, or are under an existing AB 3030 GWMP. Therefore, the GWMP includes the entire area of Alpine County.

Table 1-2. Local Agencies and their Established Agreement Status for Inclusion in the GWMP.

Local Agency	Established Agreement Status
Markleeville Water Company	No
Lake Alpine Water Company	Yes
Kirkwood Meadows Public Utility District	Yes
Woodfords Mutual Water Company	No
South Tahoe Public Utilities District	Yes

The GMWP area within Alpine County is shown on Figure 1-1, covering an area of approximately 475,520 acres. Approximately 2.3 percent of this area occurs within the County's only designated groundwater basin, the Carson Valley Groundwater Basin, which extends into Nevada. Major areas of groundwater use in Alpine County include the Mesa Vista residential

area, Fredericksburg, Paynesville, Woodfords, Markleeville, Loope Canyon, Kirkwood, Bear Valley and Hope Valley. Water utilities in the County include the Markleeville Mutual Water Company, the Lake Alpine Water Company, the Kirkwood Meadows Public Utility District ("KMPUD") and the Woodfords Mutual Water Company.

The Carson Valley Groundwater Basin is the only DWR-recognized basin within Alpine County. As illustrated in Figure 1-2, the majority of the Carson Valley Groundwater Basin is within Nevada (approximately 273,300 acres). The southern section of the basin lies within Alpine County, with approximately 10,700 acres (approximately 3.8 percent of the total basin acreage). The Nevada portion of the basin includes the cities of Gardnerville and Minden, and the communities within the Genoa, Johnson Lane, Indian Hills and Jacks Valley areas. The Alpine County portion of the basin includes the headwaters of the Carson River, the major recharge source to the basin.

The political boundary of Alpine County is bordered on the east by Douglas County, Nevada. In California, the following counties share a common border with Alpine County, from north to south: El Dorado, Amador, Calaveras, Tuolumne and Mono. State Highways 4 and 88 cross Alpine County east to west, and State Highway 89 crosses the county from north to south.

1.5 Plan Development Process

The five-step development process for a GWMP under AB 3030, as defined under CWC § 10753.2 through 10753.6, is summarized and illustrated below:

Step 1 -- Provide public notification of a hearing on whether or not to adopt a resolution of intention to draft a GWMP and subsequently complete a hearing on whether or not to adopt a resolution of intention to draft a GWMP. Following the hearing, draft a resolution of intent to draft a GWMP.

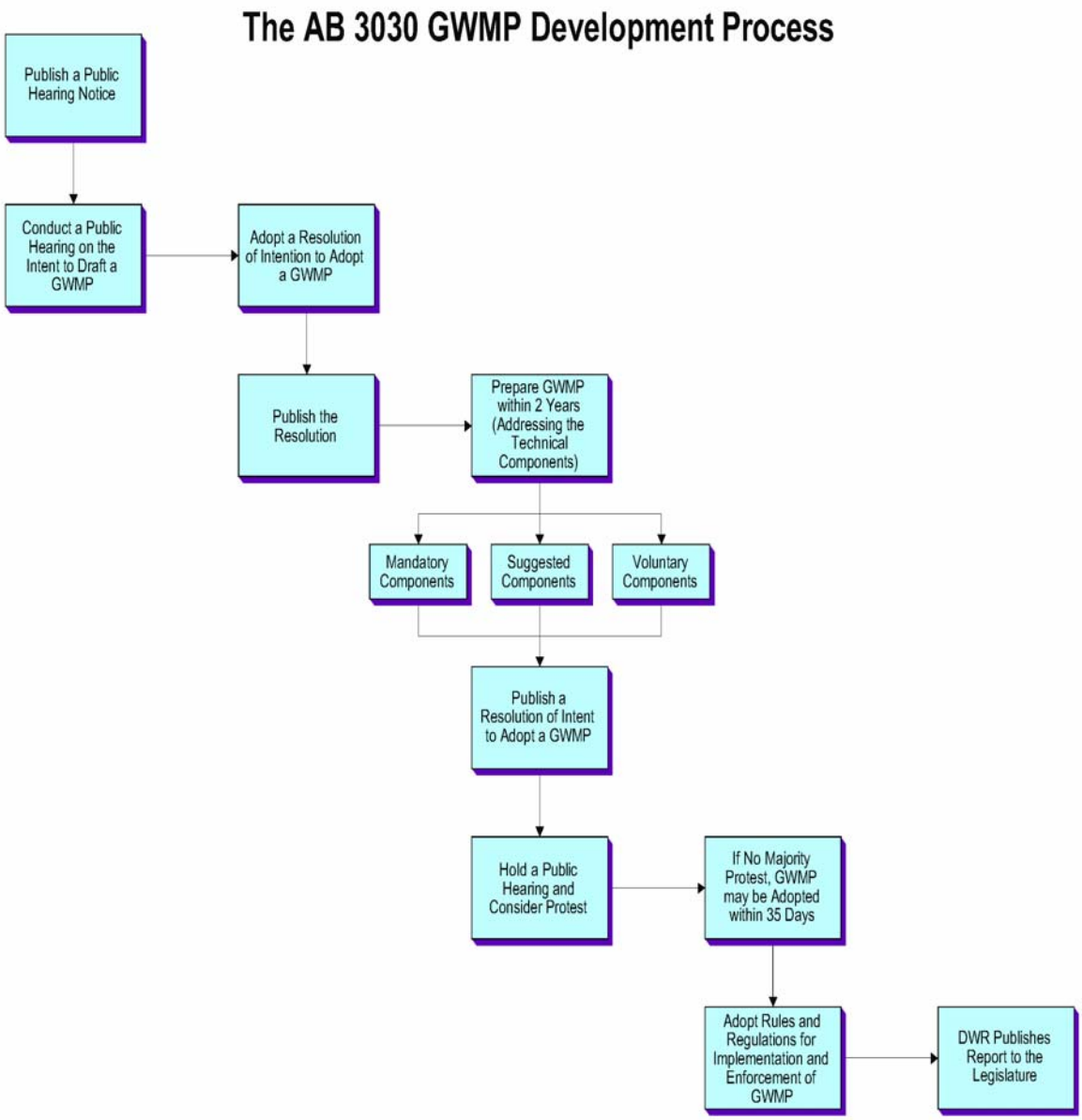
Step 2 -- Adopt a resolution of intention to draft a GWMP and publish the resolution of intention in accordance with public notification (6066 gov code; Appendix B). Upon written request, provide copy of resolution of intention to interested persons. The Alpine County Board of Supervisors adopted the resolution of intention to develop a GWMP on December 20, 2005.

Step 3 -- Prepare draft GWMP within two years of the adoption of the resolutions of intention. Provide to the public a written statement describing the manner in which interested parties may

participate in developing the GWMP, as discussed in Section 1.5. This may also include appointing a Technical Advisory Committee ("TAC").

Step 4 -- Provide public notification (6066 gov code) of a hearing on whether or not to adopt the GWMP, followed by a public hearing.

Step 5 -- If protests are received for less than 50 percent of the assessed value of property in the county area the plan may be adopted within 35 days after completion of the step above. If protests are received for greater than 50 percent of the assessed value of the property in the county area, the plan will not be adopted. Section 10753.6 of the CWC (re: writing protest; content; majority protest) states that in order for a majority protest to exist to the adoption of the plan, written protests covering over 50 percent of the assessed value of the land area must be filed and not withdrawn before the conclusion of the second public hearing.



Alpine County has followed this five-step process by conducting the following activities:

- A public hearing notice was published on October 26, 2004.
- A public hearing on the intention to adopt a GWMP was held on November 2, 2004.
- The Alpine County Board of Supervisors adopted Resolution No. 2005-75 of the Intention to Draft a GWMP on December 20, 2005. The Board of Supervisors approved the Resolution with a unanimous vote.
- Alpine County published Resolution No. 2005-75 on December 20, 2005 and the resolution to draft a GWMP was provided upon written request to interested persons.
- The Draft GWMP was prepared within two years of the Resolution No. 2005-75 in accordance with CWC Section 10750 et.seq.

1.6 Public Outreach and Education

Public outreach and education efforts during the development of this GWMP, as required under CWC § 10753.2 through 10753.6, have been performed using: 1) e-mail notifications; 2) flyer distribution throughout the County inviting the public to attend the TAC meetings; 3) postings at the Alpine County website (http://www.alpinecountyca.com); 4) updates published in the Alpine Watershed Group Monthly Newsletter; and 5) frequent updates provided to the Alpine County Board of Supervisors, with opportunities for the public to provide comment directly to the members of this Board.

Alpine County has also reported on GWMP development during meetings with interested stakeholders and the general public including watershed groups, water agencies, independent groundwater users and other interest groups. Stakeholders represented at such meetings have included: KMPUD, Markleeville Water Company, Lake Alpine Water Company, Woodfords Mutual Water Company, the Washoe Tribe of California and Nevada, the Alpine Watershed Group, the Carson Water Subconservancy District ("CWSD"), and various agricultural interests. A chronological list of public outreach activities is provided below.

<u>January 3, 2006</u>

Letters were sent to the following stakeholders regarding the initial development of the GWMP, and the inception of the TAC with the role of the members:

- South Tahoe Public Utility District ("STPUD");
- Alpine Watershed Group;
- Markleeville Water Company;
- KMPUD;
- Lake Alpine Water Company;
- Clint and Jennifer Celio (local ranchers);
- Chris H. Gansberg, Jr. (local rancher);
- Marie Johnson and Kent Neddenriep (local ranchers);
- Hubert Bruns (local rancher); and
- The Washoe Tribe of Nevada and California.

STPUD, Alpine Watershed Group, KMPUD and Lake Alpine Water Company accepted the County's request to become members of the TAC.

April 3, 2006

The Alpine Watershed Group News Briefs Newsletter included an introduction to the GWMP, and the purpose for its development. This was sent out by e-mail and is available at: http://www.alpinecountyca.com/departments/board of supervisors/alpine_water_agency/watershed news.

May 1, 2006

The Alpine County Website provided an introduction to the TAC, and an invitation for the public to attend the first TAC meeting scheduled on May 24, 2006.

May 2, 2006

TAC Meeting Flyers were posted throughout Alpine County for the May 24, 2006 TAC meeting as an invitation to the public. Postings were at the following locations:

- Human Health Services Building in Woodfords;
- General Store in Markleeville;
- Public Library in Markleeville;
- Chamber of Commerce in Markleeville;
- Turtle Rock Park Planning and Building Department in Woodfords;
- Turtle Rock Park Bulletin Board;

- Kirkwood Station on Highway 88 in Kirkwood; and
- Alpine County Planning and Administration Building in Markleeville.

May 3, 2006

The Alpine Watershed Group News Briefs Newsletter included an introduction to the TAC and an invitation for the public to attend the first TAC meeting scheduled on May, 24, 2006. This was sent out by email and is available at:
http://www.alpinecountyca.com/departments/board_of_supervisors/alpine_water_agency/watershed_news.

May 24, 2006

A TAC meeting was held with Alpine County stakeholders and the public.

June 8, 2006

The U.S. Bureau of Land Management ("BLM") in Carson City was invited to serve on the TAC, and was added to the TAC upon their acceptance.

June 12, 2006

The U.S. Forest Service ("USFS") in Carson District was invited to serve on the TAC, and was added to the TAC upon their acceptance.

June 13, 2006

The Alpine Watershed Group conducted a meeting and provided an update on the GWMP.

June 14, 2006

The Alpine Watershed Group News Briefs Newsletter included an update and summary of the May 24, 2006 TAC meeting, and an invitation to the public to attend future TAC meetings. This was sent out by email and is available at:
http://www.alpinecountyca.com/departments/board_of_supervisors/alpine_water_agency/watershed_news.

June 21, 2006

A presentation to the CWSD Board of Directors provided an update on the GWMP.

July 10, 2006

The Alpine Watershed Group News Briefs Newsletter included an overview of the AB 3030 GWMP Process, and the current status of the draft GWMP.

August 15, 2006

A presentation to the Alpine County Board of Supervisors and the public provided a summary of the GWMP.

Summer, 2006

The Carson Water Subconservancy District published an article in "The Flow" on the Alpine County GWMP, titled *Alpine County Protecting Groundwater Resources*.

September 19, 2006

The Alpine County Board of Supervisors discussed the GWMP process in the context of the County's regional water planning efforts.

October 2, 2006

A report on the GWMP was provided to the South Tahoe Public Utility Contract Commission.

October 24, 2006

The GWMP process was discussed with the Lahontan Regional Water Quality Control Board.

December 6, 2006

A meeting was held with the TAC to present the final draft of the GWMP, and solicit comments for the final version.

1.7 Technical Steering Committee

A technical steering committee ("TSC") was formed during the GWMP's inception in 2005. Subsequently, quarterly meetings have been held to ensure that County staff and other interested parties have had the chance to provide adequate input into the GWMP. This short-term committee includes the following groups:

- Alpine County (including members from the planning department, administration, the health department);
- CWSD; and
- Alpine Watershed Group.

SECTION 2.0
CHARACTERIZATION OF GROUNDWATER RESOURCES

2.1 Introduction

The characterization of groundwater resources within Alpine County includes: 1) the physical setting (topography and climate); 2) a discussion of hydrology including five identified watershed areas; 3) a description of surface water quality data; 4) an overview of the hydrogeologic setting including a description of the Carson Valley Groundwater Basin (Figure 1-2) and non-designated areas pursuant to DWR Bulletin 118 ("non-designated areas"), and summaries of groundwater elevation and flow data, and groundwater quality data; 5) a description of well infrastructure including locations, depths and well yields; and 6) an overview of water supplies and demands in the County. Alpine County's major groundwater resource is located within the Carson Valley Groundwater Basin, and within fractured bedrock and unconsolidated aquifers in the non-designated areas.

2.2 Physical Setting

The topographic and climatic setting of Alpine County directly influences the County's groundwater and surface water resources. Topography significantly affects weather patterns, which control the rate timing of surface water flows and the amount of groundwater recharged into the alluvial and bedrock aquifers. Groundwater supplies and stream flows are replenished by precipitation and snowmelt on a seasonal basis as a function of altitude.

2.2.1 Topography

Alpine County comprises 743 square miles of land situated along the crest of the Sierra Nevada mountain range. Topographic features within the County include high-elevation peaks and ridges, mountain meadows, deep canyons and numerous lakes and creeks (Figure 1-1). Elevations within the County range from approximately 4,700 feet above mean sea level (amsl) in the Carson Valley to above 11,000 feet amsl at along the crest of the Sierra Nevada mountain range. The higher elevations occur in the headwaters areas of the East Fork of the Carson River.

2.2.2 Climate

Alpine County features a range of climatic conditions, ranging from high desert to high alpine characteristics including cold, wet winters and variable summer temperatures in the summer months with occasional convective thunder showers. The east portion of Alpine County falls within the rainshadow of the Sierra Nevada's. This is reflected in differences in climate between the west slope and east slope portions of the County. However, temperature and precipitation data was only available for the Woodfords and Markleeville weather stations (Number 049775 and 045356, respectively), which are provided below in Tables 2-1 and 2-2:

Table 2-1. Climate Record for Woodford's California (049775)
Period of Record: 7/ 1/1948 to 8/31/1990

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	43.3	47.3	51.2	58.7	66.9	77.0	85.0	83.3	76.1	65.5	52.2	45.2	62.6
Average Min. Temperature (F)	22.1	24.8	27.4	32.0	38.5	46.0	52.6	51.4	45.2	37.7	29.3	23.8	35.9
Average Total Precipitation (in.)	3.61	2.99	2.21	1.09	0.85	0.55	0.53	0.60	0.80	1.34	3.01	3.59	21.19
Average Total SnowFall (in.)	22.3	16.4	17.6	6.6	1.6	0.0	0.0	0.0	0.0	1.2	9.7	17.5	93.1
Average Snow Depth (in.)	4	3	1	0	0	0	0	0	0	0	1	2	1

Table 2-2. Climate Record for Markleeville California (045356)
Period of Record: 7/ 1/1948 to 12/31/2005

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.5	46.6	53.0	56.6	66.3	75.3	84.2	83.9	76.6	66.6	52.7	43.9	62.6
Average Min. Temperature (F)	18.7	20.5	24.7	27.6	34.4	39.0	44.4	43.7	37.3	29.1	22.6	16.9	29.9
Average Total Precipitation (in.)	3.99	3.00	2.70	1.37	1.16	0.64	0.40	0.58	0.47	1.11	2.47	3.39	21.28
Average Total Snowfall (in.)	16.5	20.6	13.5	7.1	1.1	0.3	0.0	0.0	0.0	0.7	6.9	18.4	85.1
Average Snow Depth (in.)	5	5	3	0	0	0	0	0	0	0	1	3	1

Figures 2-1 through 2-4 illustrate some of these climate data in graphical formats:

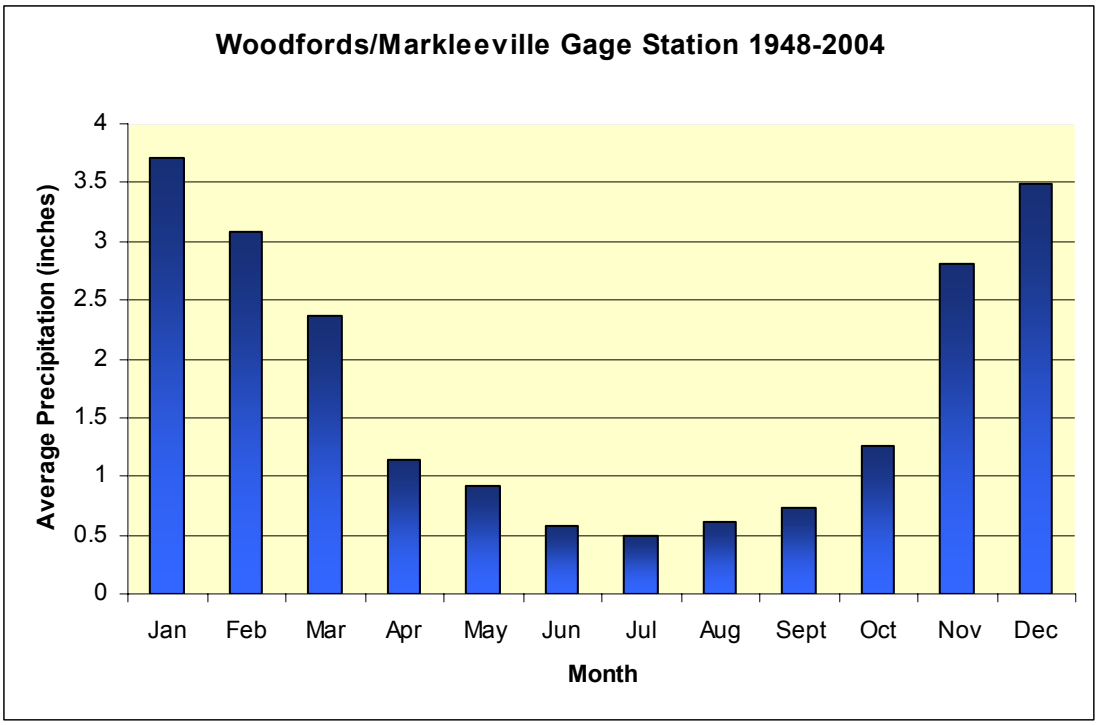


Figure 2-1. Average Monthly Precipitation (inches) at the Woodfords/Markleeville Station.

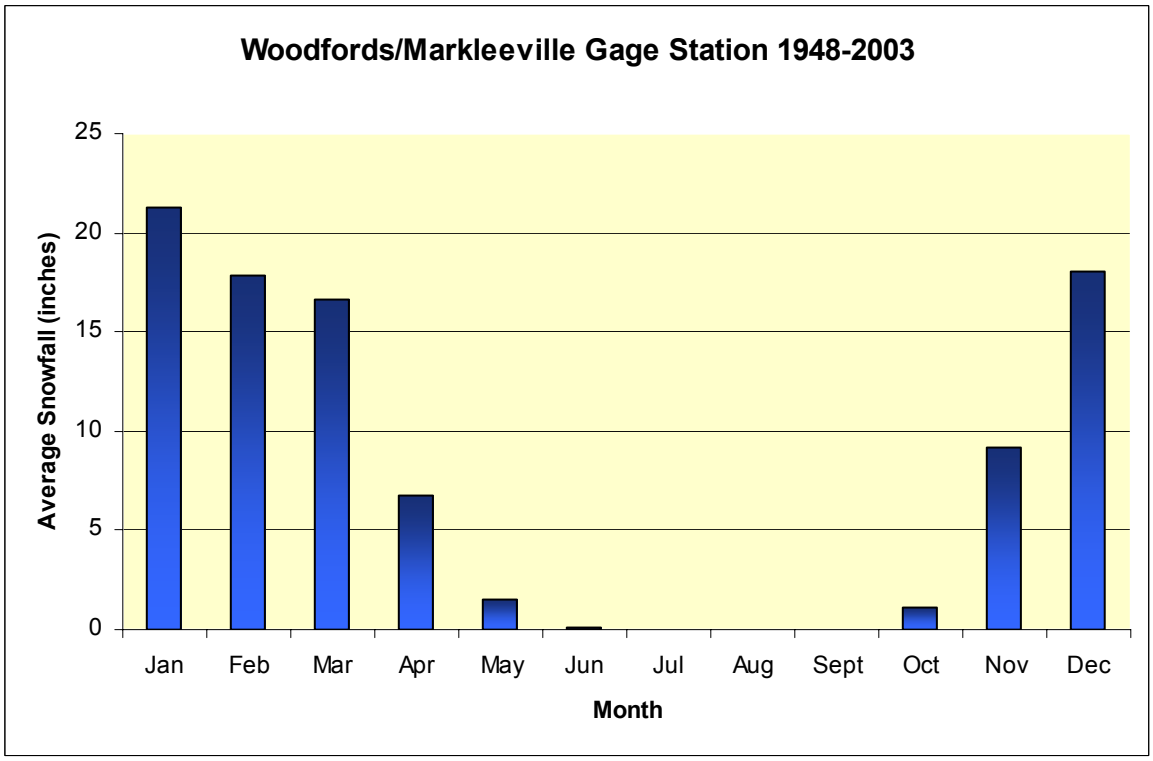


Figure 2-2. Average Monthly Snowfall (inches) at the Woodfords/Markleeville Station.

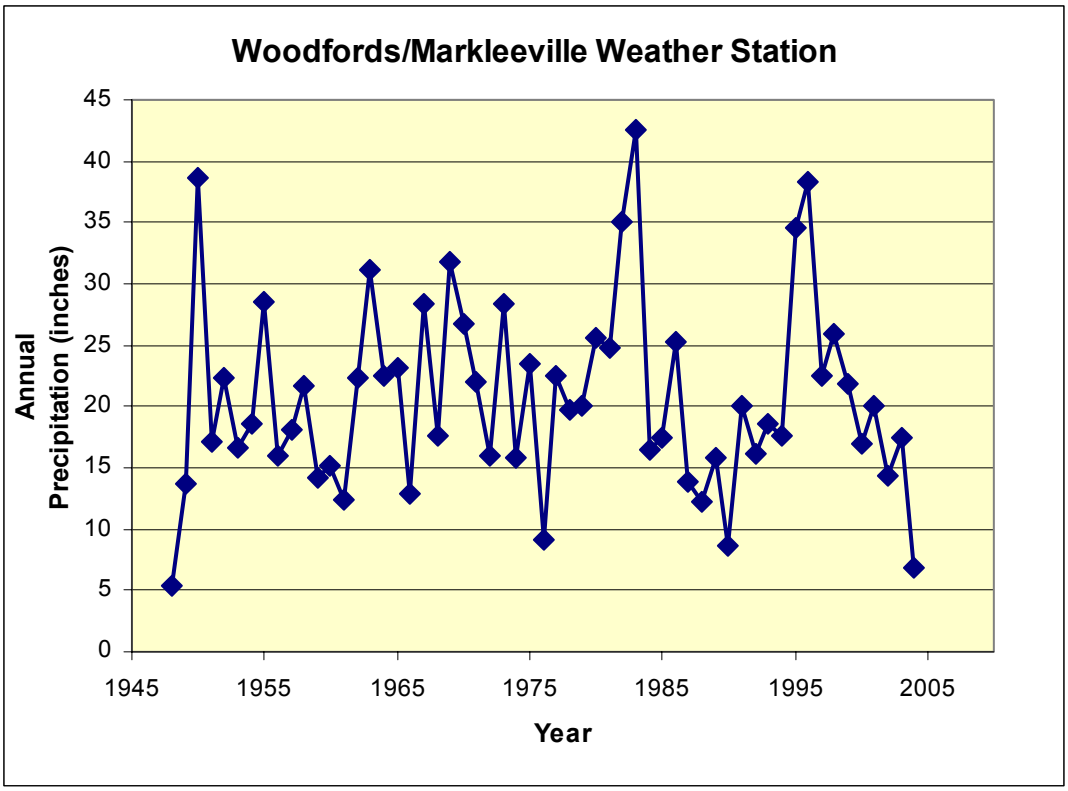


Figure 2-3. Annual Precipitation (inches) at the Woodfords/Markleeville Station.

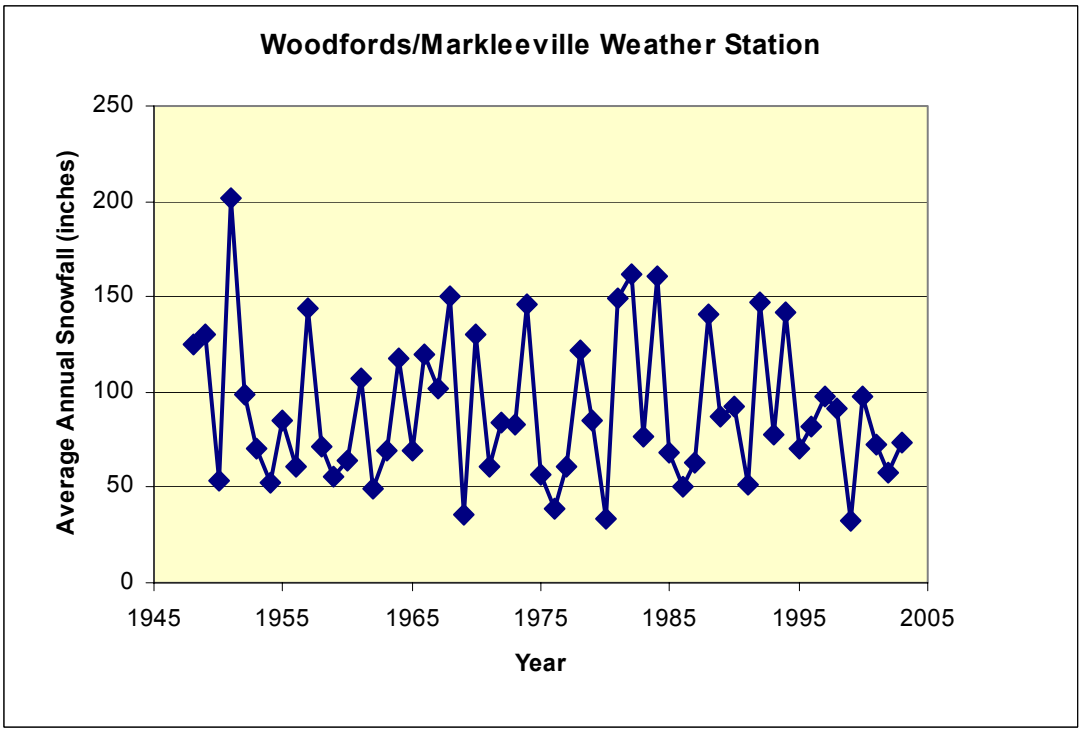


Figure 2-4. Annual Snowfall (inches) at the Woodfords/Markleeville Station.

The average monthly precipitation at this station during the winter varies between 2 and 4 inches, and the average monthly snowfall during the winter ranges from 16 to 22 inches. The average annual precipitation for the period of record, from 1948 through 2004, was 21.2 inches (Figure 2-3). Based on precipitation values less than half the annual average, drought years were observed in 1947, 1976, 1990 and 2004. Figure 2-4 shows the average annual snowfall data over the same period, which averaged 92.3 inches and does not correlate with drought periods.

The Markleeville/Woodfords weather stations are located at relatively low elevations, less than 5,650 feet amsl, and do not reflect climate conditions at higher elevations. A surrogate weather station that would represent conditions at somewhat higher elevations in Alpine County is the Echo Summit/Sierra Ski weather station (042671), located due north of Carson Pass in El Dorado County at an elevation of 7,750 feet amsl. Table 2-3 presents the climate record for this station.

Table 2-3. Climate Record for Echo Summit Ski (042671)
Period of Record: 7/ 1/1948 to 3/31/1994

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	38.8	39.2	40.9	47.6	54.8	63.8	71.5	71.6	65.5	56.0	43.0	38.4	52.6
Average Min. Temperature (F)	21.9	21.6	23.2	26.9	32.8	41.1	47.3	47.7	42.6	35.2	26.2	22.3	32.4
Average Total Precipitation (in.)	7.25	8.28	8.07	3.68	1.91	1.56	0.70	0.71	2.02	3.50	6.77	6.27	50.73
Average Total Snow Fall (in.)	74.7	78.4	83.5	34.7	10.3	2.7	0.0	0.0	3.5	12.2	48.5	63.8	412.5
Average Snow Depth (in.)	53	71	74	58	26	3	0	0	0	1	9	33	27

Alpine County's precipitation comes primarily from winter storms that originate in the Pacific Ocean, up to the Gulf of Alaska. As these storms move eastward over the central Sierra Nevada, they adiabatically expand, cool, condense, and precipitate their moisture as snow or rain. The storms average about four days in duration, while warmer, clear weather typically prevails between storms. Precipitation varies across the County depending on elevation and the

proximity to the Sierra Crest. Typically, 80 percent of the County's average annual precipitation is in the form of snowfall occurring from November to April.

2.3 Hydrology and Watersheds

Melting of the winter snowpack, principally from March through June, provides Alpine County with significant surface water flows to several major watersheds including the Stanislaus, Mokelumne and Carson Rivers. From a geographic perspective (i.e., total surface area of Alpine County), less than half of the County drains westward to the San Joaquin Valley (Stanislaus and Mokelumne watersheds). The majority of the area within the County occurs on the east slope of the Sierra Nevada, and drains into the Carson River watershed.

Figure 2-5 includes many of the features shown in Figure 1-1, and illustrates the watershed areas within the County. A number of tributary streams occur within the County including Markleeville, Leviathan, Wolf and Indian Creeks. Important lakes and reservoirs shown in Figure 2-5 include Caples Lake, Silver Lake, Bear Lake, Upper and Lower Blue Lakes, Utica Reservoir, Union Reservoir, Red Lake, Lost Lake, Lake Alpine, Upper and Lower Kinney Lakes and Highland Lake.

2.3.1 Carson River Watershed

The Carson River Watershed is located east of the crest of the Sierra Nevada, and encompasses approximately 3,966 square miles in Alpine County, California and Douglas County, Carson City, Lyon County, and Churchill County in Nevada. Of this total, approximately 46 percent of the watershed is within Alpine County. The watershed consists of five hydrographic basins. The southern portion of the Carson Valley hydrographic basin and the headwaters areas for the Carson River are located in Alpine County. The approximate 184-mile length of the river starts at the headwaters areas and continues to its terminus in the Carson Sink.

The headwaters areas of the Carson River include two independent tributaries, the East and West Forks. The West Fork begins near Lost Lakes at an elevation of approximately 9,000 feet amsl. The East Fork begins south of Ebbett's Pass, within the Carson-Iceberg Wilderness, at an

elevation of approximately 11,460 feet amsl. The two Forks merge about one mile southeast of Genoa, Nevada, and form the main stem of the Carson River. The upper reach of the Carson River continues from the confluent for 11 miles to Mexican Dam. The middle reach of the Carson River starts at Mexican Dam and terminates at Lahontan Reservoir. The lower reach of the Carson River starts at begins at the Lahontan Dam and terminates at the Carson Sink.

Average annual streamflow data in cubic feet per second (cfs) for the West Fork of the Carson River at the Woodfords gaging station #10310000 (period of record, 1900-1907; 1938 to 2004) and the East Fork of the Carson River at the Markleeville gaging station #10308200 (period of record, 1960, 2004) are shown in Figures 2-6 and 2-7, respectively. Both gaging stations exhibit peak flows during the spring months, with a rapid decline during the summer months.

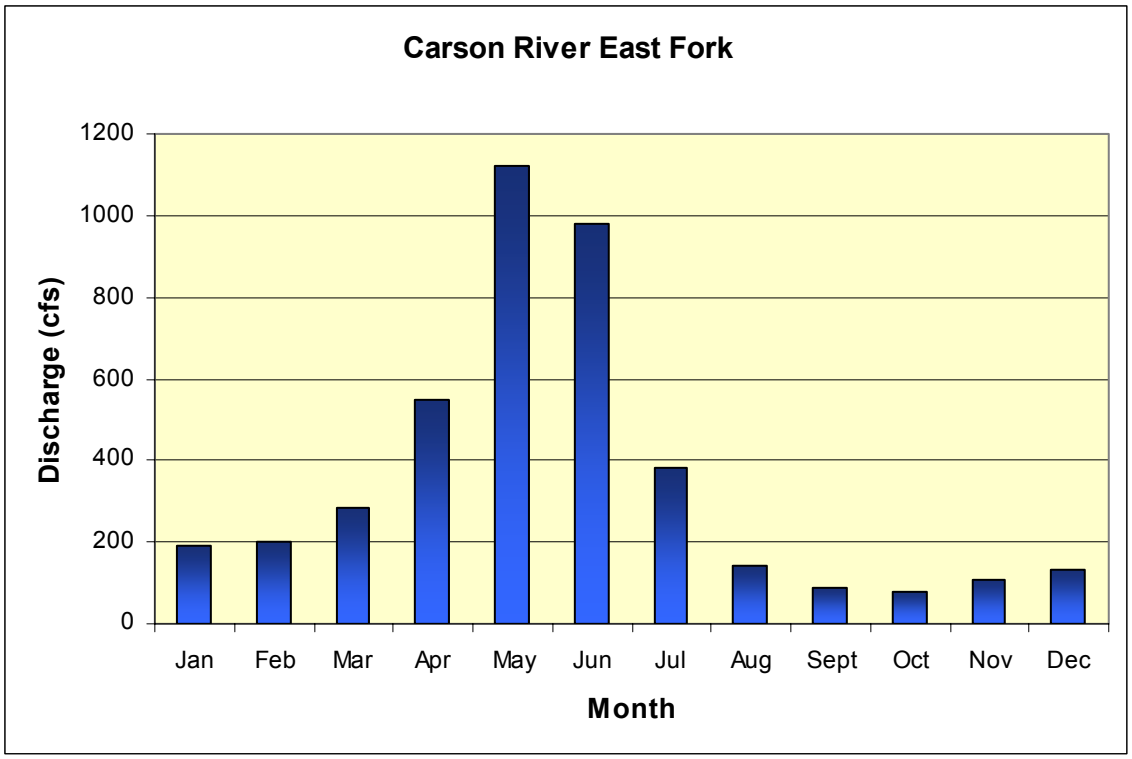


Figure 2-6. Average Annual Streamflow at the East Fork Markleeville Gage (#10308200)

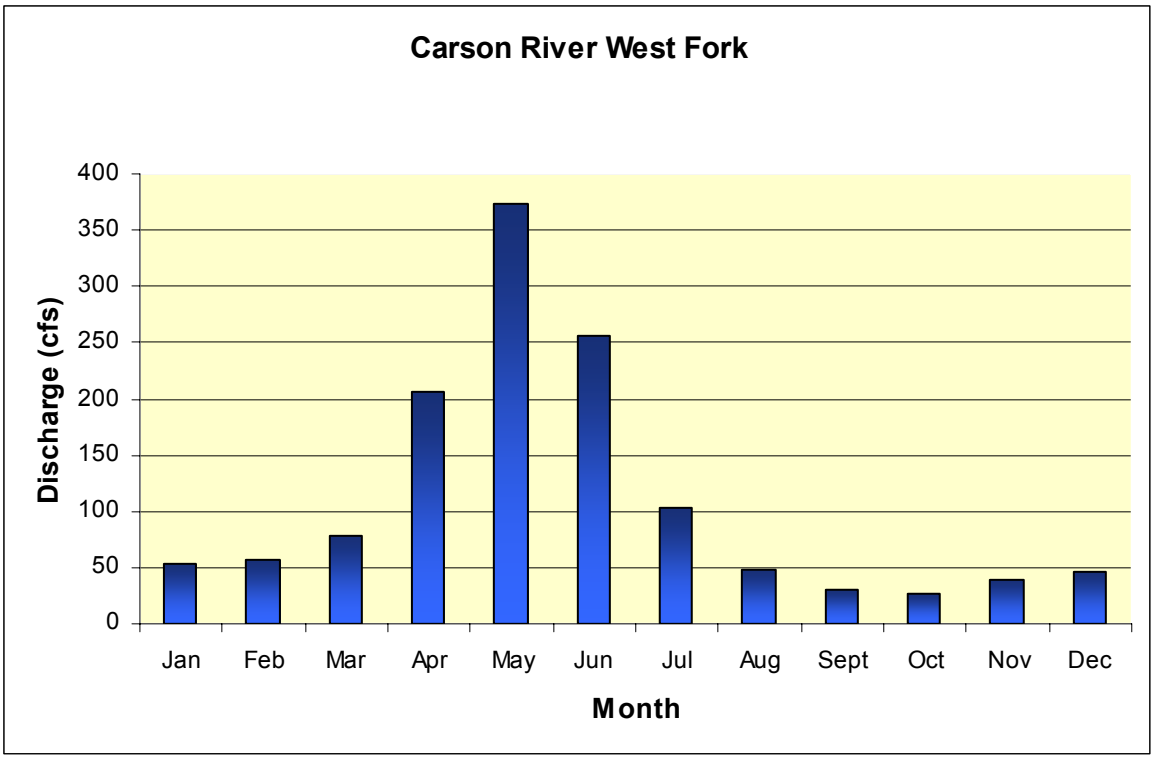


Figure 2-7. Average Annual Streamflow at the West Fork Woodfords Gage (#10310000)

2.3.2 American River Watershed

The American River Watershed encompasses approximately 2,100 square miles within Placer, El Dorado, Alpine and Sacramento Counties, and includes the North, Middle, and South Forks of the American River. The South Fork, the only major tributary in Alpine County (Figure 2-5), drains approximately 804 square miles of watershed, and is approximately 55 miles in length, with elevations ranging from 500 feet near Folsom Reservoir to 10,000 feet near the crest of the Sierra Nevada.

Tributary creeks to the South Fork of the American River include Silver Fork, Alder Creek, Weber Creek, Rock Creek and Kirkwood Creek, which drains to Kirkwood Meadow (a tributary to the South Fork). Another tributary includes Caples Creek, which flows into Caples Lake Reservoir. The reservoir is located approximately two miles from the Kirkwood Resort, and serves as a drinking water source and recreational area. Streamflow data for the South Fork of the American River is not available within Alpine County.

2.3.3 Mokelumne River Watershed

The Mokelumne River drains approximately 661 square miles and is one of the largest tributaries to the San Francisco Bay-Delta areas. Headwaters areas for the North Fork of the Mokelumne River include the area south of Ebbetts Pass and Upper and Lower Blue Lakes (Figure 2-5). Flow data for the North Fork of the Mokelumne River is not available within Alpine County.

2.3.4 Stanislaus River Watershed

The Stanislaus River Watershed encompasses approximately 1,075 square miles, and the 65-mile Stanislaus River is one of the largest tributaries to the San Joaquin River. Of the three forks of the Stanislaus River, only the headwaters areas of the North Fork are located in Alpine County. The North Fork of the Stanislaus River is fed by several creeks including Highland, Beaver and Silver Creek before it joins the Stanislaus River at the New Melones Reservoir. Silver Creek feeds Lake Alpine, which is a tributary to the North Fork of the Stanislaus River (Figure 2-5). Streamflow data for the North Fork of the Stanislaus River is not available for Alpine County.

2.3.5 Truckee River Watershed

The Upper Truckee River Watershed is located almost entirely in El Dorado County, California, with approximately three square miles of the watershed within Alpine County. The Upper Truckee River begins one mile northwest of Red Lake Peak in Alpine County where it serves as the headwaters for this watershed, north of Highway 88 (Figure 2-5). Streamflow data for the Upper Truckee River is not available within Alpine County.

2.4 Hydrogeologic Setting

Alpine County lies in the Sierra Nevada physiographic province, between the Basin-and-Range province to the east and the Central Valley province to the west. The geological history of the Sierra Nevada can be traced to the Jurassic period, approximately 150 million years ago. At that time, an island arc was created along the western margin of North America from the subduction of the oceanic Pacific Plate beneath the continental crust of the North American Plate. Bodies of magma, resulting from the melting of the subducting Pacific Plate, rose upward to form: 1)

volcanic rocks of the island arc environment; and 2) plutonic (i.e., granitic) rocks emplaced at depth. Granitic rocks of the Sierra Nevada batholith generally formed between 150 million and 85 million years ago into overlying volcanic and sedimentary rocks, which were subjected to intense heat and pressure. These conditions led to the formation of various types of metamorphic rocks (i.e., metasedimentary and metavolcanic rock types) found in the Sierra Nevada.

Erosion of the proto-Sierra Nevada down to a range of low mountains, only a few thousand feet in elevation, occurred by the end of the Cretaceous Period (about 65 million years before present). About 25 million years ago, the mountains started to rise, and tilt towards the west along large fault systems on the eastern margin of the range. This uplift, which resulted from the thinning and extension of the crust within the adjacent Basin-and-Range province to the east, has continued until recent times. During this period, the earth's climate went through several cycles of heating and cooling. The cooling periods created large alpine glaciers along the crest of the range, which carved out U-shaped valleys. The combination of glacial and river erosion: 1) formed glacial till and outwash deposits, and fluvial deposits; and 2) created steep topography and deep exposures of the granitic and metamorphic rocks that were formed during the emplacement of the Sierra Nevada batholith.

Coincident with the extension and thinning of the earth's crust due to extensional forces resulting from the lateral movement of the Pacific Plate relative to the North American Plate, a large volume of volcanic rocks erupted in the Sierra Nevada and Basin-and-Range provinces. Within the area of Alpine County, volcanic rocks of Miocene and Pliocene age were deposited on top of the older, eroded granitic rocks in the Sierra Nevada. Many of the volcanic eruptions resulted in volcaniclastic rocks, which were deposited in topographically low areas as a mixture of ash, mud and rock fragments. To the north, the Sierra Nevada range transitions into the volcanic Cascade Range that includes active volcanoes.

The abbreviated geologic history of the Sierra Nevada mountain range presented above provides the background for understanding the occurrences of granitic and volcanic bedrock, and variably consolidated sedimentary deposits resulting from glacial and fluvial processes. In addition, the

Carson Valley Groundwater Basin, located at the northeastern margin of the County, occupies a structural basin (i.e., graben) along the western margin of the Basin-and-Range province. This basin is filled with alluvial deposits that form the only significant basin-fill aquifer in the County.

A geologic map of Alpine County is provided as Figure 2-8A, and the map explanation is provided as Figure 2-8B. This map shows the predominance of volcanic rocks (brown- and red-colored units in Figure 8A) and granitic rocks (pink-colored units in Figure 8A) in the County. Metamorphic rocks are depicted in blue and green colors, and alluvial deposits are shown in yellow colors on the geologic map.

2.4.1 Carson Valley Groundwater Basin

The Carson Valley Groundwater Basin (Basin 6-6) extends from California northward into Nevada. The small portion of the basin within Alpine County includes the Mesa Vista residential area and the town of Woodfords, Paynesville and Fredericksburg (Figure 1-1). Groundwater resources within the basin exist in both confined and unconfined basin-fill sedimentary deposits. A shallow aquifer, underlying the western margin of valley floor at the base of the Carson Range is less than 100 feet below ground surface (bgs). A second, deeper aquifer that underlies most of the valley floor is generally deeper than 200 feet bgs. A U.S. Geological Survey ("USGS") study described unconfined groundwater levels within five feet of the land surface underlying most of the valley floor, with depths to water increasing to over 100 feet near the margins of the valley (Maurer, 1986). The principal source of groundwater recharge to the basin-fill aquifers is seepage from the West Fork of the Carson River.

The shallow aquifer is composed of basin-fill deposits, which have been sub-divided into two units by the USGS: 1) unconsolidated valley fill deposits of Quaternary age along the western side of the valley; and 2) Tertiary sedimentary deposits exposed on the eastern side of the valley that likely extend at depth throughout the valley (Figures 2-8A and 2-8B). The valley fill deposits are composed of generally fine-grained flood-plain deposits to coarse, boulder-rich alluvial fan deposits. These depositional types are inter-bedded as a result of intermittent faulting that occurred concurrently with annual cycles of runoff and sediment deposition

(Maurer, 1985). The alluvial fan deposits are mostly recharged from runoff within the valley and, in turn, provide recharge to the overlying basin-fill deposits.

Basin-fill deposits also occur in the northwestern and Diamond Valley portions of the Carson Valley Groundwater Basin (Jennings and Koenig, 1963). The alluvial aquifers are likely to be locally confined due to discontinuous lenses of clay and fine-grained flood-plain deposits of various thicknesses (Maurer 1986). Based on a geophysical study performed by the USGS, the thickness of the basin-fill deposits decreases to the south, along the axis of the Carson Valley Groundwater Basin, from approximately 1,000 feet at the Nevada-California line to approximately 200 feet about 2.5 miles south of the state line (Maurer 1986). The Carson Valley Groundwater Basin is bounded on the west by a steep fault scarp with 5,000 feet of relief from the valley floor to the crest of the Carson Range, and is bounded on the east by more gently sloping terrain. The basin terminates against bedrock south of Woodfords, California.

A poorly understood bedrock aquifer underlies, and occurs adjacent to, the basin-fill deposits within the Carson Valley Groundwater Basin. Weathered horizons and fracture zones in the upper few hundred feet of the bedrock aquifer: 1) provide secondary permeability and storage for recharge from up-gradient portions of the mountain blocks; and 2) sustain perennial stream and spring flows in the mountain block. Below this zone, the bedrock units are assumed to have very low hydraulic conductivity values and, therefore, would not appear to be an important source of groundwater in this portion of the Carson Valley Groundwater Basin (Maurer 1986).

2.4.2 Bedrock Aquifers

Given that the great majority of Alpine County is underlain by volcanic and granitic bedrock (approximately 98 percent of the land surface, as shown in Figure 2-8A), bedrock aquifers comprise the most widespread source of groundwater for beneficial use. Also, as discussed below, the bedrock aquifers at high elevations also serve as the principal recharge areas in the County. The bedrock geology within the drainage basin of the East Fork of the Carson River consists of volcanic and volcaniclastic rocks, including lava flows, ash flow and ash fall tuffs, mudflows, and volcanic breccias. The bedrock geology within the drainage basin of the West

Fork of the Carson River is similar, with larger areas of granite outcrops. At higher elevations in the southern portion of the County, the majority of exposed bedrock is composed of granite.

USGS reports (Dillingham, 1980; Maurer 1986) describe confined hydraulic head conditions in the bedrock aquifer near the town of Genoa in Douglas County, Nevada. These conditions, which result from weathered or fractured zones in the bedrock at depth, may also be present within Alpine County. However, large variations in bedrock aquifers should be expected due to the variety of volcanic and granitic rock types, and complex structural features (i.e., the faults, and fracture zones).

The following geologic characteristics of the bedrock aquifers control the storage, transmission and yield of groundwater resources: lithology, porosity, degree of faulting and fracture or joint development, and degree of connectivity to recharge sources. Bedrock aquifers are defined on the basis of secondary permeability characteristics, and generally exhibit preferred flow orientations along fractures that result in anisotropic flow conditions (primary permeability characteristics of alluvial aquifers, on the other hand, are often generally described as isotropic). In addition, bedrock aquifers can exhibit compartmentalization, where hydraulic communication between blocks bounded by clay-filled faults or shear zones can be extremely limited.

Secondary permeability in the bedrock units that occur in Alpine County result from: 1) the cooling of volcanic rocks as they are deposited on the land surface; and 2) the creation of joints, faults and fracture zones in volcanic and granitic rocks resulting from tectonic forces in the earth's crust. Fractured bedrock aquifers near land surface are defined by DWR as having a gross fracture porosity of two percent or less. Conceptually, fracture porosity tends to decrease with depth (i.e., fractures get narrower and become more widely spaced). Fractured rocks associated with fault zones, or the intersections of fault zones, make the best targets for water resource development.

Water resource development within bedrock aquifers is typically more difficult to assess than in unconsolidated alluvial aquifers because of the complexities associated with the characterization of fracture zones and connection to recharge sources. One example of this complexity is that

clay-filled structural zones can impede groundwater flow. In addition, groundwater levels and well yields can decline during dry summer months or extended drought periods due to limited storage capacity within fractured bedrock. Typically, a successful groundwater resource development program in bedrock aquifers requires a comprehensive analysis of geological and geophysical data prior to drilling.

Three major fault zones (the East Carson Valley, the Genoa and the Antelope Valley Faults) have been mapped within the north-northeastern portion of the County, in the Markleeville and Woodfords areas (Figure 2-8A and 2-8B). The East Carson Valley Fault extends for 60 miles along the east face of the Carson Range, from Reno, Nevada through Woodfords to an area west of Highlands Peak, within the interior of Alpine County. The Genoa Fault, an active earthquake fault in the area, forms the steep eastern slope of the Carson Range. The Antelope Valley Fault extends along the northeastern boundaries of Alpine and Mono Counties. Most of the fault zones within Alpine County are north trending and exhibit arcuate geometries, while subsidiary faults are commonly oriented in an east-west direction (Wagner et. al., 1981 and Krenig, 1982).

2.4.3 Unconsolidated Aquifers

Outside of the Carson Valley Groundwater Basin, unconsolidated aquifers with the potential to produce groundwater are limited to relatively small areas in the Hope, Diamond, Pleasant and Bagley/Silver King Valleys. These areas may exhibit sufficient recharge conditions and storage capacities to produce sustainable quantities of groundwater. The localized occurrences of unconsolidated glacial and fluvial deposits of Quaternary age known to occur within Alpine County may not be thick enough, or laterally extensive enough, to produce significant quantities of groundwater.

2.4.4 Groundwater Elevations and Flow

Very limited groundwater elevation data have been collected in Alpine County to date. As part of the STPUD water quality monitoring program in Diamond Valley, where reclaimed water is applied, elevation measurements from the following STPUD monitoring wells have been collected: ACMW-01AW, ACMW-01BE, ACMW-02N, ACMW-02S, ACMW-03, ACMW-04W, ACMW-06N, and ACMW-06S. These shallow monitoring wells, constructed to less than

35 feet below ground surface in alluvial deposits, are used to evaluate water quality conditions in relation to the STPUD effluent management program. Because of the artificially recharged effluent, such localized groundwater elevation data from the STPUD monitor wells cannot be used to assess regional groundwater elevation trends.

No other groundwater monitoring programs are currently active in Alpine County. Monitoring of both groundwater elevations and water quality establishes a baseline for current conditions to assess how groundwater conditions are affected by land use and related water resource development. A comprehensive monitoring program can: 1) identify trends and emerging issues such as overdraft or impairment of aquifers; 2) measure the effectiveness of programs and policies designed to protect and manage the groundwater resource; and 3) provide the basis to make long-term management decisions. Given that groundwater monitoring (elevations and water quality) is an essential component in effective groundwater management, Alpine County will need to implement site-specific programs where development or other changing patterns of land use are anticipated.

Groundwater elevation measurements also provide the basis for understanding flow paths, particularly in unconsolidated alluvial aquifers. Groundwater flow in such aquifers is generally controlled by three factors: 1) the quantity and distribution of recharge to the system; 2) surface topography; and 3) the hydraulic conductivity (permeability) of the aquifer materials. Groundwater flow in bedrock aquifers may be more complicated, particularly where fault or fracture zones strongly affect groundwater flow (e.g., preferential flow along fractures, limited hydraulic communication between compartmentalized blocks bounded by fractures).

Generally, groundwater flow patterns of a regional nature are known in Alpine County based on topography and the orientations of major watershed features. Groundwater flow within the Carson River watershed flows from the margins of the basin towards the Carson River, and then downward along the course of the river. In the area of the STPUD application of recycled water for irrigation reuse, the groundwater flow pattern is toward Indian Creek and the West Fork of the Carson River (California Regional Water Quality Control Board; 2004).

2.4.5 Recharge Areas

Precipitation (rain and snowfall) falling on the land surface is the ultimate source of recharge to aquifers, either directly or indirectly. Precipitation may either be evaporated, intercepted by plants and transpired back to the atmosphere, converted to overland flow, or saturate the soils and eventually percolate to underlying aquifers. Overland flow itself often becomes a major source of aquifer recharge as streams, rivers or unlined ditches and canals traverse permeable areas where the groundwater level is at a lower elevation than the stream or river bed. I n areas where groundwater levels are at, or above, the stream or river beds, groundwater may be discharged back to the stream or river.

Conditions affecting the amount of recharge an aquifer may receive include the quantity, seasonal timing, and type of precipitation (i.e., rain or snow), the nature of the surface the precipitation falls on (i.e., permeable or impermeable surfaces), and the available pathways for water to reach the aquifer. Precipitation falling as rain during summer months may all evaporate or transpire, whereas precipitation falling as snow during colder months will melt slowly, saturate the soil cover, and percolate to the underlying aquifer. Precipitation falling on impermeable surfaces may be carried away as overland flow. Depending on the nature of the channels carrying the overland flow, as described above, this water may or may not contribute to aquifer recharge.

Recharge estimates are based on widely variable natural conditions described above and the inability to directly observe or measure infiltration at a large scale. A commonly used method of estimating recharge, known as the Maxey-Eakin (1949) method, relies on an empirical water balance approach. The Maxey-Eakin method was developed by comparing the estimated annual volume of precipitation in groundwater basins in the Great Basin physiographic province with the estimated basin groundwater discharge, and the difference between the two is assumed to be equal to evaporation plus transpiration. A relationship between annual precipitation and the percentage of that precipitation that percolates to the underlying aquifer was then developed. For example, if an area receives between 15 and 20 inches of precipitation per year, 15 percent of the precipitation would be estimated as recharge. If an area receives greater than 20 inches per year of precipitation, the recharge percentage is estimated to be 25 percent. Where

precipitation is less than eight inches per year, no recharge is estimated to occur in the Maxey-Eakin method.

All of Alpine County receives at least 20 inches per year of precipitation, and some areas receive greater than 60 inches per year (Figure 2-9), resulting in a high recharge potential (approximately 2 to 15 inches per year) based on the elevation-precipitation relationships described above. Bedrock aquifer systems, however, have complex flow paths and potentially limited connectivity across large distances. This condition complicates generalized recharge estimates from precipitation values, and emphasizes the need for a detailed understanding of localized recharge areas related to groundwater pumping areas within the County. Protection of the recharge areas would include limiting developments or land uses that would significantly alter infiltration characteristics or increase the overland transport of precipitation away from the recharge areas.

Groundwater recharge also results from irrigation practices (e.g., the conveyance of irrigation tail water) and, based on site-specific groundwater elevation data, from the application of STPUD reclaimed water. For example, when the reclaimed water is released from the reservoir during the dry months, it feeds small intermittent streams and creeks that are normally dry during that time period. Infiltration losses from these streams and creeks are a source of recharge to the water table.

2.4.6 Groundwater Quality

Groundwater quality in Alpine County is generally good, resulting from the natural conditions present in the unconsolidated and bedrock aquifers. Localized conditions of adverse groundwater quality conditions typically result from anthropogenic factors. Natural conditions that affect groundwater quality include the geochemistry and mineralogy of the geologic materials through which groundwater flows, occurrences of clays or organic compounds, and the generally low concentrations of dissolved ions present in rainfall and surface water runoff.

Groundwater wells that are used as a public drinking water source are required, under Title 22 of the California Code of Regulations, to provide analytical results to the California Department of

Health Services ("DHS"). Anthropogenic (human-caused) factors that can affect groundwater quality include, but may not be limited to:

- Abandoned wells, which can serve as a conduit for contaminants into groundwater when they are not properly closed and sealed.
- Active or abandoned mines, which can contribute acid rock drainage ("ARD"), sedimentation and heavy metals to streamflows and, potentially to groundwater. There are 40 abandoned mines within Alpine County, including the Leviathan Mine, which has sourced ARD and metals to Bryant Creek, a tributary to the East Fork of the Carson River. Also, the Colorado Hill Mine, which is southwest of the Leviathan Mine, has been a source of ARD to Monitor Creek (USFS, 2006). The USFS completed remediation efforts to prevent ARD from reaching surface water.
- Underground storage tanks ("USTs") have the potential to source fuel, oil and/or solvents to groundwater if they are not properly drained, removed or abandoned. There are currently six open leaking underground fuel tank cases, and one open spill, leaks, investigation, and cleanup ("SLIC") case in Alpine County according to the State Water Resources Control Board ("SWRCB") Geotracker database.
- Septic systems, which can source nitrates and total dissolved solids to groundwater.
- Solid waste disposal sites, which can impact groundwater quality, if seepage from the disposal site migrates to groundwater. Solid waste disposal sites in Alpine County include the Turtle Rock site in Markleeville, and the closed Emigrant Trail site in Fredericksburg and the closed Grover Hot Springs site. These sites are under the jurisdiction of the Local Enforcement Agency, the Mono County Health Department, as identified in the California Integrated Waste Management Board's Solid Waste Information System.

2.4.7 Land Subsidence

Land subsidence can result from extensive pumping of groundwater from unconsolidated aquifers. As the water table declines, water pressure is lowered, causing the fine soil particles holding water to compact. When soil compaction of the clay layers occurs, the land lowers above the aquifer causing the permanent loss of groundwater storage capacity. Land subsidence does not occur in bedrock aquifers. The only potential area that land subsidence would likely occur within Alpine County would be the Carson Valley Groundwater Basin. To date, monitoring of land subsidence in this area has not been implemented.

2.5 Surface Water Quality

Based on data for the following eight monitoring locations provided by the Alpine Watershed Group ("Watershed Group"; 2004), the quality of surface water in the County is generally good:

- Carson River West Fork at Woodfords;
- Carson River West Fork at the Paynesville Bridge;
- Carson River West Fork at Pickett's Junction;
- Carson River East Fork below Carson River Resort;
- Carson River East Fork at County Bridge 31-13;
- Hot Springs Creek;
- Markleeville Creek at Library Bridge; and
- Silver Creek at Highway 4 County Bridge 31-12.

Sampling of surface water at these eight locations within the upper Carson River watershed was implemented by the Watershed Group in April 2004. Sampling for conductivity, turbidity, dissolved oxygen, ortho-phosphorus, total phosphorus, nitrates, coliform, *E. coli*, temperature and pH is also conducted on a seasonal basis, and after storm events. Typically, surface water meets drinking water quality standards, with the exception of metals, pH and sulfate in discharges from the Leviathan Mine (NDEP; 2002a) and from other smaller abandoned mines, and concentrations of phosphorus from the Indian Creek Reservoir (CRWQCB, 2002). Because areas of hydraulic connection between streams and underlying aquifers can source contaminants to groundwater, impaired surface water quality can adversely impact groundwater quality.

Alpine County continues to develop programs and partnerships to monitor, collect and analyze surface water quality data that will provide information on the health of the surface water bodies within the County. Such programs provide the County with the opportunity to network, share informational resources, and develop a multi-disciplinary approach to varied water resource and management issues. These programs and partnering organizations are described below.

2.5.1 Upper Carson River Watershed Water Quality Monitoring Program

Alpine County, in cooperation with the CWSD, STPUD, Desert Research Institute ("DRI"), and the Watershed Group, has received funding from the California SWRCB under the Clean Water Act Section 205(j) Grant Program. The project provides data to guide prioritization for potential future projects and total maximum daily load ("TMDL") development in the upper Carson River watershed. Parameters monitored as part of this program include water turbidity, algae, oily sheen, foam or suds, air temperature, water temperature, dissolved oxygen, pH, electrical conductivity, total nitrogen, ortho-phosphate, total phosphorus, sodium absorption ratio, percent sodium, coliform and suspended solids.

2.5.2 Alpine Watershed Group

The Alpine Watershed Group, through the use of grants and an extensive network of volunteers, assists Alpine County in assessing and monitoring the health of the upper Carson River watershed by analyzing samples for the above parameters including *E. Coli* and Total Coliform. The group has formed cooperative relationships with the SWRCB, CWSD, USFS, Central Sierra Resource Conservation District and California Fish and Game.

2.5.3 Carson Water Subconservancy District

CWSD is a multi-county, bi-state agency dedicated to establishing a balance between the needs of the communities within the Carson River Watershed and the function of the river system. A 13-member Board of Directors includes representatives from each of the five counties within the watershed (Alpine County in California and Douglas County, Carson City, Lyon County and Churchill County in Nevada), plus two representatives from the agricultural community. CWSD's mission is to work within existing governmental frameworks to improve watershed conditions and strives to involve all counties and communities in these efforts.

2.5.4 South Tahoe Public Utility District

STPUD provides innovative and efficient drinking water, wastewater collection, treatment and recycling services to the residents of South Lake Tahoe. STPUD is an important stakeholder in Alpine County given the amount of reclaimed water the agency supplies for irrigation purposes and its commitment to water management activities. These activities include: the management of the Indian Creek Reservoir for recreational purposes; the management of the Harvey Place

Reservoir for the storage of the reclaimed water; and the commitment to soil, groundwater and surface water quality through an extensive sampling program developed in the areas receiving the reclaimed water. STPUD's monitoring program: 1) requires the sampling and analysis of groundwater from eight domestic wells in ranch areas that use the recycled water for irrigation; and eight dedicated monitoring wells installed by STPUD (Figure 2-10); and 2) includes surface water samples from the West Fork of the Carson River.

2.6 Well Infrastructure

Well completion reports on file with DWR, USGS, the Alpine County Health Department, the Mono County Health Department and STPUD indicate that a total of 258 wells exist in Alpine County. The wells are classified by use as follows: domestic (178), irrigation (8), municipal (12), industrial (5), monitoring (11), public (24), and other (20). A database was established to summarize the wells with completion reports on file. These data are summarized in Table 2-4 (average depths of wells given in feet bgs).

Table 2-4. Summary of Alpine County Well Infrastructure

	Domestic		Industrial		Irrigation		Municipal/Public		Monitoring		Other	
Geologic Setting	**# of wells**	**Average Depth**	**# of wells**	**Average Depth**	**# of wells**	**Average Depth**	**# of wells**	**Average Depth**	**# of wells**	**Average Depth**	**# of wells**	**Average Depth**
Carson Valley Groundwater Basin	126	253	3	205	3	333	10	265	11	49	2	102
Bedrock Areas	40	286	--	--	5	241	20	223	0	0	14	121

2.6.1 Well Depths

Figures 2-11 and 2-12 illustrate the range of depths and frequency of occurrence of domestic well depths in Alpine County for the Carson Valley Groundwater Basin and bedrock areas, respectively. In general, the Carson Valley Groundwater Basin exhibits more domestic wells, and a greater percentage of wells constructed at shallower depths compared to the bedrock areas.

2.6.2 Well Yields

Well yields may be limited by the type of demand placed on a well and/or the characteristics of the aquifer. For example, domestic wells would not be required to pump as much water as a municipal supply well or an irrigation well. Because of the hydraulic characteristics of the basin-fill sedimentary deposits, the area with the highest potential well yields in Alpine County is the Carson Valley Groundwater Basin. Table 2-5 summarizes well yield data reported in driller's logs, based on extraction rates observed during construction and, in some cases, testing of the wells. Domestic wells in the Carson Valley Groundwater Basin produce an average yield of 28 gallons per minute (gpm), while domestic wells in the bedrock areas of Alpine County produce an average yield of 15 gpm. Municipal wells in the Carson Valley Groundwater Basin produce between 50 to 500 gpm, and municipal wells in the bedrock aquifers generally yield 25 gpm.

Table 2-5. Summary of Well Yields in Alpine County

Areas	Well Type	Number of Wells with Yield Values	Well Yield Range (gpm)	Well Yield Average (gpm)
Carson Valley Groundwater Basin	Domestic	93	2 to 500	28
	Industrial	2	20 to 40	30
	Municipal	2	50 to 500	27.5
	Public	5	15 to 100	40.5
Bedrock	Domestic	29	1 to 100	15
	Irrigation	2	15	15
	Public	13	1 to 125	22.9
	Municipal	2	25 and 25	25
	Other	12	0.5 to 90	15

2.6.3 Well Water Quality

Insufficient water quality data for the wells summarized in Table 2-4 are available at the present time to comprehensively evaluate water quality issues in these wells. As stated in Section 2.4.6, groundwater quality conditions in Alpine County are good to excellent, with limited and localized anthropogenic impacts. Such conditions would be reflected in the quality of groundwater from wells summarized in Table 2-4.

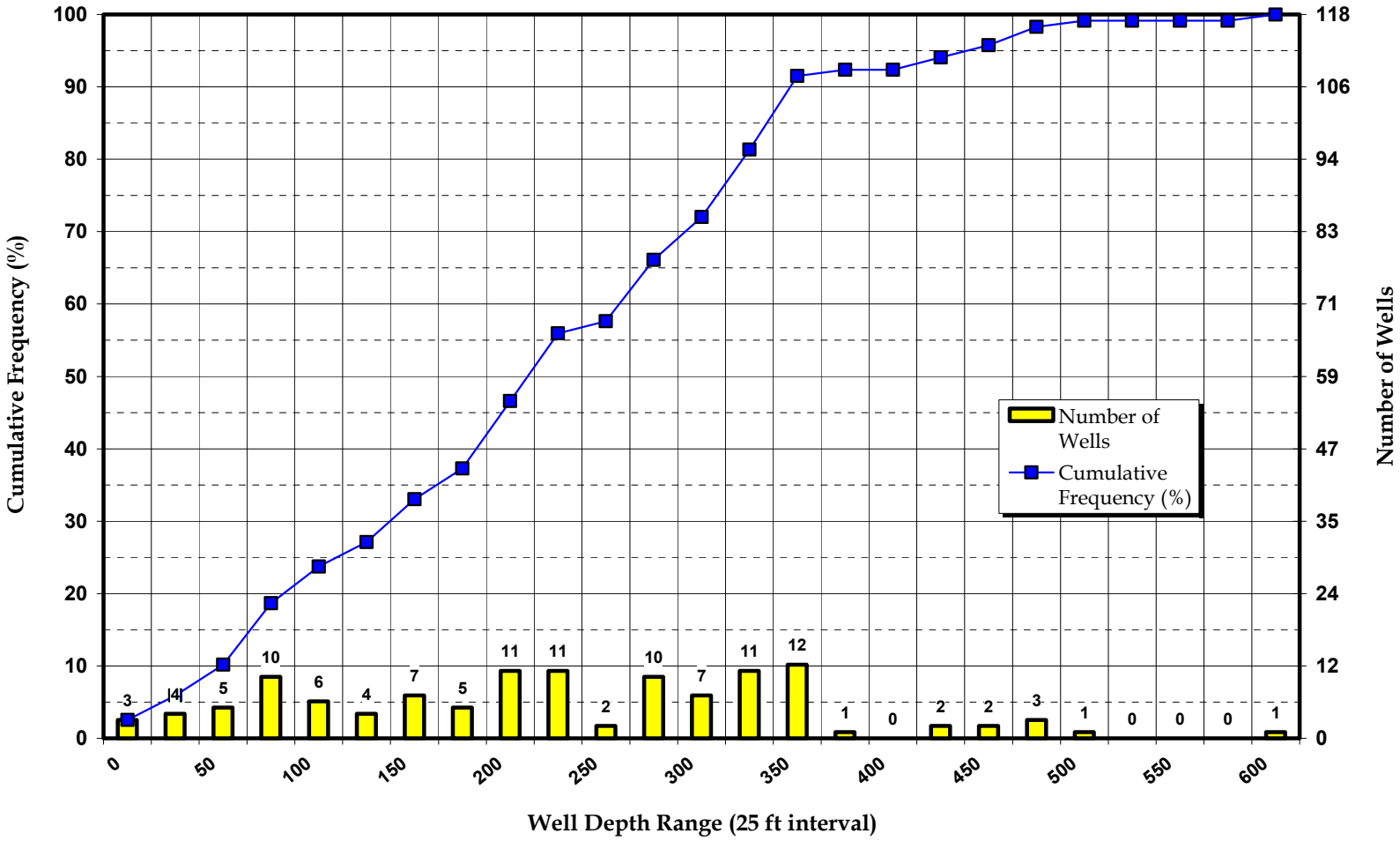


Figure 2-11. Depth Distribution and Cumulative Frequency of Domestic Wells in the Carson Valley Groundwater Basin in Alpine County

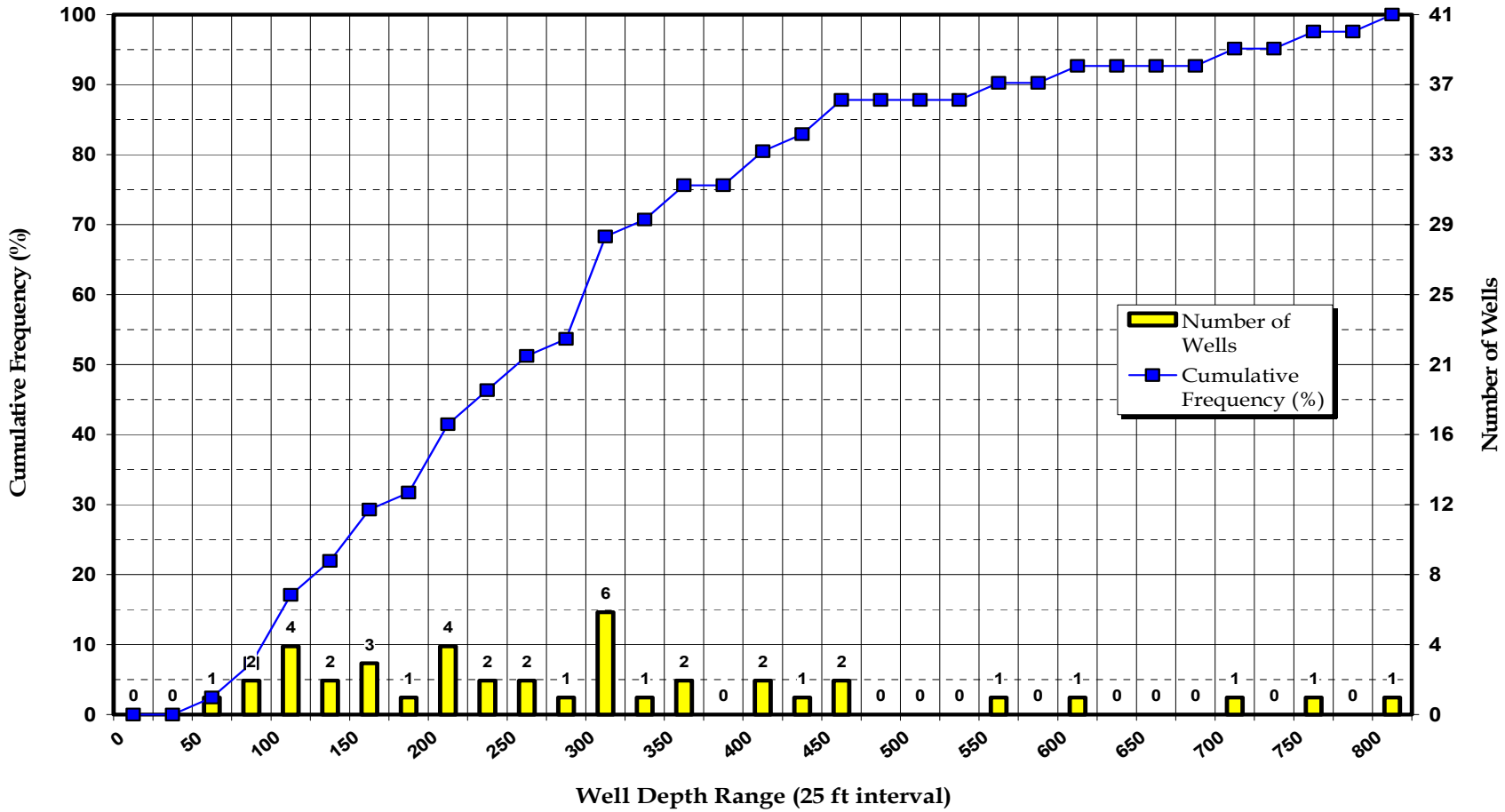


Figure 2-12. Depth Distribution and Cumulative Frequency of Domestic Wells in the Hardrock Portion of Alpine County

2.7 Water Demands and Supply Sources

Water demand and supply was calculated by DWR using the applied water method, which calculates the measurable and managed component of the hydrologic cycle used for environmental, agricultural, municipal and industrial purposes. The applied water calculation creates a baseline understanding of existing water demand, which will provide the basis for the County's GWMP.

2.7.1 Water Demand

Table 2-6, derived from DWR (2001), summarizes estimated water demands by sector for a normal year including agricultural, municipal and industrial ("M&I"), domestic and environmental demands. The majority of water demand in 2001 in Alpine County was from the agricultural sector, accounting for 97.3 percent of the total demand. The remaining demand (2.7 percent) was for M&I use including public water system supply wells and domestic wells in more rural areas of the County. Environmental demands would include State and Federal wildlife refuges, and publicly or privately managed wetland habitat. Although the environmental demand is represented as zero in Table 2-6, it is known that the California Fish and Game owns Red Lakes and Stillwater. Conveyance losses, also represented as zero in Table 2-6, represent water lost during the conveyance of supplies to their destination, including evaporation, riparian evapotranspiration, and percolation to groundwater, and spillage from the system.

Table 2-6. Normal Year Water Demand (in acre-feet) for Alpine County

Agricultural Demand	M&I Demand	Environmental Demand	Conveyance Losses	Total Applied Water
18,200	500	0	0	18,700

The agricultural water demand in Alpine County is primarily used for irrigating pastureland. Information from the DWR indicates that the irrigated crop area in Alpine County was approximately 4,000 acres for the period from 1998 to 2001. Approximately 3,800 acres of the 4,000 irrigated acres were pasture and 200 acres were alfalfa (Figure 2-10 and 2-13). Based on these data, the majority of STPUD reclaimed water was used for irrigation. No foreseeable

changes are expected for the agricultural land use pattern, primarily due to the limited amount of suitable soils and the climate of the area.

Municipal and industrial demand in Alpine County is dependent on the County's population. According to the U.S. States Census Bureau, the population of Alpine County more than doubled from 1970 to 2005. Table 2-7 summarizes population data for Alpine County from the period from 1970 to 2005.

The majority of the population in Alpine County resides in the Mesa Vista residential area and within or near the towns of Markleeville, Woodfords and Paynesville. The areas of Kirkwood and Bear Valley are year-round destination resorts, experiencing water demand in summer and winter months. As presented in Table 2-7, the population of Alpine County increased from 484 people to 1,159 people from the year 1970 to 2005. As population increases, demands for groundwater and surface water resources also increase.

Table 2-7. Population of Alpine County (1970 to 2005)

Year	1970	1980	1990	2005
Population	484	1,097	1,113	1,159

Information provided by the California State Department of Finance and the U.S. Census Bureau

2.7.2 Water Supply Sources

Based on DWR records from 2001, 18,700 acre-feet of water was used in Alpine County. Of this total, about 72 percent of the water demands in the County (13,400 acre-feet) were derived from surface water sources such as lakes, streams, rivers, springs, creeks and reservoirs. Approximately 23 percent was derived from the STPUD reclaimed water program, and two percent from groundwater sources (Table 2-8). This significant use of surface water to meet demands is consistent with the County's topography, climate and population base.

Table 2-8. 2001 Supply Sources to Meet Water Demands (in acre-feet)

Local Surface Water	STPUD Reclaimed Water WaterWater	Groundwater	Total Demand
13,400	4,344	300	18,700

Figures 2-10 and 2-13 show the water sources and land use within Alpine County, which illustrate that surface water supplies are primarily used to irrigate pastureland and seed crops in the Carson Valley Groundwater Basin. Surface water supplies are primarily diverted from the East and West Fork of the Carson River, and Bear Lake in Bear Valley. STPUD provided an average of 4,344 acre-feet per year of reclaimed water between 1997 and 2005 (STPUD, 2006). STPUD provides treated wastewater from South Lake Tahoe to six ranches in the Carson Valley Basin.

SECTION 3.0
MANAGEMENT PLAN ELEMENTS

The elements of Alpine County's GWMP are described in this section including management goals and objectives, and plan components that need to be implemented. A summary of GWMP actions, and expected implementation dates, is presented in section 3.8.

3.1 Goal and Objectives

Alpine County's goal of establishing and implementing groundwater management elements will: 1) create a sustainable water resource for agricultural, environmental, recreational and municipal uses; 2) protect residents' health, welfare, safety and quality of life; and 3) achieve the specific groundwater basin management objectives ("BMOs") adopted by the County under Ordinance No. 646-03, which has the primary purpose of conserving groundwater. BMOs are a mandatory component of an AB 3030 GWMP, and will provide the County with methodical procedures for implementing this plan.

To accomplish the goals of the GWMP, and to support Groundwater Ordinance No. 646-03, the following management objectives have been adopted:

- Minimize the long-term drawdown of groundwater levels;
- Protect groundwater quality;
- Prevent inelastic land surface subsidence from occurring as a result of excessive groundwater pumping; and
- Protect against undesirable interactions between groundwater and surface water.

As shown in Table 1-1, a number of mandatory, voluntary, and suggested components constitute the GWMP, which are discussed under the following four headings:

- Groundwater Monitoring;
- Groundwater Resource Protection;
- Groundwater Supply, and
- Stakeholder Involvement.

3.2 Groundwater Monitoring

Groundwater monitoring is an important part of any groundwater management plan, and is used to document baseline conditions and to identify groundwater elevation and water quality trends that may indicate potential overdraft conditions and adverse chemical effects, respectively (a related monitoring activity would be associated with potential land subsidence effects). Localized groundwater monitoring activities in Alpine County are currently conducted by STPUD, as described in Section 2.0 of this GWMP, and by public water systems in accordance with DHS drinking water regulations to protect municipal water supplies. These existing monitoring programs are not designed to identify regional trends. An effective groundwater monitoring program would: 1) complement these existing programs; 2) follow the progression presented in Figure 3-1; and 3) include the following elements:

- Cover the entire County, with priority areas where existing or potential overdraft or water quality conditions have been identified;
- Include water level, water quality, and subsidence components;
- Select or install wells that are representative of area aquifers;
- Monitor according to a regular schedule using a set of standard operating procedures ("SOPs");
- Be conducted by suitable and trained personnel (e.g., County staff, DWR staff or contractors) selected during the implementation phase of the GWMP; and
- A well database that includes well location based on global positioning system and/or state or local survey coordinates, well depth, well construction and date of construction, well production, groundwater elevation and water quality data (e.g., bacteriological and chemical characteristics), and other appropriate information.

SOPs for monitoring groundwater conditions (elevations and water quality) in Alpine County are provided in Appendix D of this GWMP. The SOPs are consistent with monitoring programs conducted by other counties in California as part of their groundwater management programs, and may be modified during the implementation phase of Alpine County's GWMP, as necessary. Additional related SOPs provided in Appendix D include field notes and documentation, monitor well installation and development, instrument calibration, sample preservation, sample handling, and borehole and well destruction.

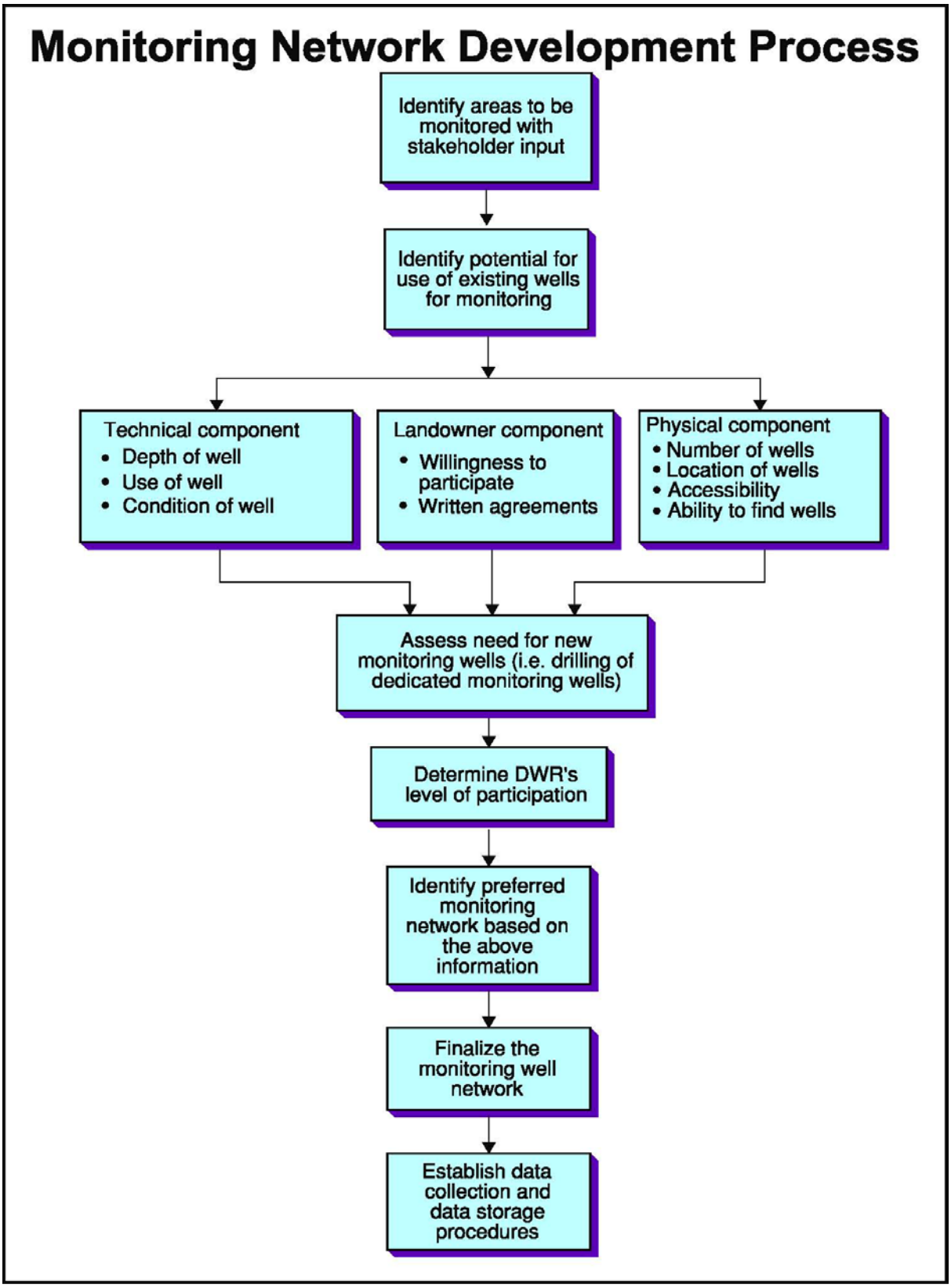


Figure 3-1. Groundwater Monitoring Development Process

3.2.1 Groundwater Elevation Monitoring

A groundwater elevation monitoring program implemented by Alpine County should, wherever possible, use existing groundwater wells and add new monitoring wells as needed. Groundwater elevation monitoring using low-yield supply wells produce reliable data that, however, must be understood in the context of the rates and frequency of pumping. Dedicated monitoring wells provide much more reliable groundwater elevation information because the levels in the monitoring wells are not affected by pumping. Installation of dedicated monitoring wells is typically more expensive than monitoring of existing production wells. The groundwater elevation monitoring program should include the following steps:

- Input from Stakeholders should be obtained regarding the prioritization of areas to be monitored.
- Identification of collaborating agencies if the monitoring is done as a partnership.
- Identification of existing wells in specific areas that could be used to monitor groundwater elevations.
- Formation of agreements with landowners to allow monitoring, and permission to identify the well as a monitoring well.
- Collection of complete well construction records (e.g., well depth, screened interval, casing diameter).
- If funding is available, survey the well to establish specific coordinates and top of casing or other measuring point on the well.
- Identification of SOPs for water elevation monitoring.
- Measurement of groundwater elevations in the monitoring wells a minimum of three times per year, during the spring, summer and fall.
- Formalization of procedures for data management and input.
- Reporting of groundwater elevation monitoring results on a bi-annual basis.
- Evaluation of installation of non-pumping monitoring wells.

Alpine County's monitoring program would benefit from working with DWR's Central District, with staff who perform water level monitoring in many counties in California, and with the USGS' current program in the Carson Valley Groundwater Basin.

3.2.2 Groundwater Quality Monitoring

Groundwater quality monitoring can be used to assess trends in water quality changes due to changes in groundwater-related activities in the County including excessive groundwater pumping, which may induce groundwater flow from deeper aquifers resulting in higher concentrations of constituents. The water quality monitoring program should be implemented in a collaborative effort with DWR Central District, the USGS, STPUD and/or the Alpine Watershed Group. The following steps associated with the water quality monitoring program would be similar to that of the groundwater elevation monitoring program and, wherever possible, individual monitoring wells should be used for both programs:

- Identification of collaborating agencies if the monitoring is done as a partnership.
- Identification of potential water quality monitoring wells.
- Formation of agreements with landowners to allow monitoring, and permission to mark the well as a monitoring well.
- Collection of complete well construction records if available.
- Identification of SOPs for water quality monitoring.
- Collection of water quality parameters such as: pH, temperature, EC, and alkalinity.
- Formalization of procedures for data management and input.
- Reporting of groundwater level monitoring results on a bi-annual basis.

3.2.3 Inelastic Land Subsidence Monitoring

Inelastic land subsidence occurs from the irrecoverable compaction of the soil matrix when water is removed, and generally occurs when groundwater elevations are lowered significantly. Inelastic land subsidence typically occurs in aquifers composed of unconsolidated sediments. Because the great majority of the land surface in Alpine County is composed of bedrock, land subsidence due to groundwater pumping would not be an issue in these areas. However, subsidence may occur in the Carson Valley Groundwater Basin if groundwater levels are lowered significantly. The purpose of such monitoring would be to protect surface land features from subsidence and surface structures from potential collapse.

Implementation of a land subsidence monitoring program would be based on groundwater elevation data collected from the Carson Valley Groundwater Basin. If the elevation data were to indicate a rapidly declining water table, the County and other potentially affected entities may elect to initiate subsidence monitoring using one or more available methods to measure land subsidence (e.g., extensometers and global positioning satellites). Extensometers use a pipe inside a well casing to determine subsidence. The pipe inside the casing extends from land surface to some depth through compressible sediments and is monitored to detect changes in the elevation of the ground compared to the top of the pipe. Global positioning satellites are used to conduct surveys that calculate the ground surface elevation.

3.2.4 Groundwater Monitoring Actions

Proposed actions to be taken by Alpine County and its partners in the groundwater monitoring program during the implementation phase of the GWMP include:

- Prioritize areas that are in the greatest need for groundwater elevation and water quality, programs based on changing land use patterns and/or identified data gaps.
- Identify the appropriate monitoring methodology for each area based on existing wells.
- As needed, rehabilitate old wells or construct new wells for specific areas, based on available funding.
- Work with state and federal agencies to secure funding for expansion of the monitoring network.
- Coordinate with DWR and local landowners to ensure that selected wells are maintained as part of a long-term monitoring program.
- Develop a monitoring schedule.
- Develop a reporting plan to share data with appropriate stakeholders.

3.5 Groundwater Resource Protection

This section of the GWMP describes policies, guidelines, and County ordinances that relate to groundwater resource protection issues. As described in sections 3.5.1 through 3.5.6, Alpine County has enacted several ordinances, plan elements, CWC requirements, and DWR recommendations.

3.5.1 Well Construction Policies

The CWC (13700 through 13806) requires proper construction of wells, and minimum standards for the construction of water supply and monitoring wells are specified in DWR Bulletins 74-81 and 74-90. DWR also requires well driller reports for all wells. The County Health Department administers a well permitting and well construction program under *AC Code 8.36 Ord. 364 § 1, 1976 – Wells* (Appendix E), and requires that new wells, or existing permitted wells that need to be deepened, are constructed in accordance with Bulletin 74. Enforcement is achieved through permitting and inspections of new wells, including site visits to verify the existence of a sanitary seal and concrete slab as part of new well construction. In support of DWR regulations, the County will take the following actions associated with the construction of new wells:

- Develop wellhead and recharge area protection programs including, but not limited to, the identification of recharge areas and the development of site-specific protection programs.
- Collect well driller's reports for supply and monitor wells drilled in Alpine County.
- Coordinate with the health department to make well standards available through the Alpine County Health Department website.

3.5.2 Well Abandonment and Well Destruction Policies

Unused, abandoned, or improperly destroyed wells can allow groundwater contamination by establishing a preferential pathway for pollutants entering a well from the surface, or by allowing communication between aquifers of varying quality. Improperly abandoned wells also pose a serious physical hazard to humans and animals. The County conforms to DWR's Well Standards Bulletins 74-81 and 74-90 by requiring permits for the destruction, abandonment and modification of wells under *AC Code 8.36, Ord. 364 § 1, 1976– Wells* (Appendix E). *AC Code 8.36* addresses the deconstruction, abandonment and modifcation of wells and requires Health Department approval and a permit prior to commencement of well destruction activities. The County will take the following actions in regards to well destruction policies:

- Coordinate with the Health Department to make *AC Code 8.36, Ord. 364 § 1, 1976– Wells* available through the Alpine County Health Department website.

- Coordinate with the Health Department to provide information on how to properly abandon wells on the Alpine County Health Department Website or through mailed updates, flyers and newsletters to the public.
- Discuss well abandonment, destruction and modification ideas and issues, at regularly scheduled meetings such as at the TAC meetings.
- Alpine County does not have an inventory of abandoned wells. The County shall develop an inventory of abandoned wells by coordinating with the Health Department. Currently the Health Department has a permitting process for the abandonment, destruction and modification of wells within the County, but should create an electronic tracking method to inventory the wells.

3.5.3 Wellhead Protection Measures

A wellhead protection area is defined by the Safe Drinking Water Act ("SDWA") as "the surface and subsurface area through which contaminants are likely to pass before reaching a well or group of wells used for public water systems." The identification of wellhead protection areas for public water systems is a component of the Drinking Water Source Assessment Program ("DWSAP") administered by DHS. The following three components are included in the program: 1) a delineation of capture zones; 2) an inventory of potential contaminating activities ("PCAs"); and 3) a vulnerability analysis.

A delineation of capture zones in Alpine County would include an estimate of groundwater gradients and the surface area overlying the portion of an aquifer that contributes water to a well, typically within 2-, 5- and 10-year time-of-travel periods. PCAs can include industrial, commercial, agricultural and residential sites, infrastructure sources such as utilities and roads, and other potential sources of pollution not yet identified. The PCAs are assigned a risk ranking, ranging from "very high" for such sources as gas stations, dry cleaners and landfills, to "low" for such sources as schools, lakes, and non-irrigated agricultural areas. A vulnerability analysis would include determining the most significant threats to the quality of the drinking water supply by evaluating PCAs in terms of risk rankings, proximity to wells, and Physical Barrier Effectiveness ("PBE"). Information contained in the DWSAP is limited to public drinking water wells within Alpine County.

In 2003, the DHS DWSAP lists 42 active public drinking water wells and 12 inactive public drinking water wells within the county in Alpine County (Table 3-1). The County's wellhead protection program will include the following actions:

- Coordinate with DHS to update and continue the DWSAP program.
- Support DHS efforts to further wellhead protection.
- Develop a wellhead protection program for domestic wells.

3.5.4 Regulation of the Migration of Contaminated Groundwater

Contaminated groundwater, if present, would be identified through groundwater quality monitoring. Regulation of the migration of contaminated groundwater can only occur with adequate monitoring. One of the uses of regional water elevation and quality monitoring is to identify large-scale trends in groundwater. Given that there is no county-wide groundwater elevation or quality monitoring program in place, Alpine County will take the following actions:

- Work to develop a water elevation and quality monitoring program, as described in section 3.4.4 of this GWMP.
- Consider developing programs to identify trends in groundwater levels and water quality.

3.5.5 Groundwater Contamination Cleanup

The cleanup of groundwater contamination within Alpine County would be a coordinated effort between the Health Department and the appropriate State or Federal agencies to address the issue on a case by case basis. The County will take the following actions to assist groundwater contamination cleanup activities:

- Work to develop a water elevation and quality monitoring program, as described in section 3.4.4 of this GWMP.
- Assist in the coordination with appropriate agencies such as the SWRCB, the Lahontan Regional Water Quality Control Board, the Department of Toxic Substances Control, and the U.S. Environmental Protection Agency.

Table 3-1. Drinking Water Well Locations, Primary Water Source Type and the PCA*

Well(s) Location	Primary Water Source	Potential Contaminating Activity
Diamond Valley School	Groundwater	Septic Systems, Wells, Schools
Woodfords Station Store	Groundwater	Not Identified
Woodfords Mutual Water Company	Groundwater	Septic Systems, Housing, Transportation Corridor, Wells, Equipment Storage Areas, Utility Stations
Markleeville Water Company	Surface Water	Managed Forests, Sewer Collection Systems, Surface Water, Housing, Wells
Caples Lake Resort	Groundwater	Septic Systems
Lake Alpine Improvement Assn. 1	Groundwater	Not Identified
Sorenson's Resort	Groundwater	Septic Systems
Shay Creek Summer Home Tract	Groundwater	Septic Systems
Carson River Resort	Groundwater	Septic Systems
Sorenson's Subdivision HOA	Groundwater	Septic Systems
Lake Alpine Rec. Area	Groundwater	Managed Forests, Recreational Area, Sewer Collection Systems,
Turtle Rock County Park	Groundwater	Septic Systems
Hope Valley Resort	Groundwater	Septic Systems, Sewer Collection Systems,
Sierra Pines Mobile Home Park	Groundwater	Septic Systems, Sewer Collection Systems, Gas Stations, Housing, RV Parks, ASTs, Transportation Corridors
USFS-Stanislaus NF – Bloomfield DG	Groundwater	Not Identified
USFS-Stanislaus NF – Highlands Lakes CG	Groundwater	Not Identified
USFS-Stanislaus NF – Highlands Lakes CG #2	Groundwater	Not Identified
Hope Valley Campground	Groundwater	Not Identified
Silver Creek Campground	Groundwater	Not Identified
Snowshoe Springs Campground	Groundwater	Septic Systems
Crystal Springs Campground	Groundwater	Septic Systems
Woods Lake Rec. Area	Groundwater	
Indian Creek Reservoir C G	Groundwater	Not Identified
Caples Lake Campground	Groundwater	Not Identified
Camp Llahona	Groundwater	Septic Systems
Camp Peaceful Pines	Groundwater	Managed Forests, Septic Systems
Mt. Reba Lodge	Groundwater	Gas Stations, Sewer Collection Systems
Alpine County Social Services Bldg.	Groundwater	Gas Stations, Septic Systems
Blue Lake Lower Creek	Groundwater	Not Identified
Blue Lake Middle Camp	Groundwater	Septic Systems
Blue Lake Upper Dam	Groundwater	Not Identified
Sand Flat CG #1	Groundwater	Not Identified
Sand Flat CG #2	Groundwater	Not Identified
Sand Flat CG #3	Groundwater	Not Identified
Sand Flat CG #4	Groundwater	Not Identified
Sand Flat CG #5	Groundwater	Not Identified
Sand Flat CG #6	Groundwater	Not Identified
Mt. Sierra School	Groundwater	Septic Systems, Housing, Transportation Corridors, Wells, Schools, Manage Forests
Lake Alpine Water Company	Surface Water	Not Identified
Kirkwood Meadows Public Utilities	Groundwater	WWTP, Sewer Collection Systems, Chemical Storage, Auto Repair Shops, Fleet Terminals, Machine Shops, Utility Stations, ASTs, USTs, Grazing, Waste Transfer Facilities, Cement/Concrete Plants, WDR Permitted Discharges, Fire Stations, Food Processing, Wells
Caltrans-Woodfords Maintenance Station	Groundwater	Gas Station, Septic System
Caltrans-Caples Lake Maintenance Station	Groundwater	Gas Station, Septic Systems
CA State Parks – Grover Hot Springs	Groundwater	Transportation Corridors, Campgrounds, Surface Water.

Notes:

* PCAs are current or historic human activities that have an actual or potential origin of contamination for a drinking water source.

3.5.6 Control of Saline Water Intrusion

Saline water intrusion has not been identified as an issue or potential issue in Alpine County. The County will evaluate groundwater water data for evidence of increasing salinity as part of the proposed groundwater quality monitoring program.

3.6 Groundwater Supply

As described above, based on DWR 2001 data (see Table 2-8, above), water use in Alpine County primarily consists of surface water and STPUD reclaimed water (72 percent surface water and 26 percent reclaimed water). Only two percent is currently derived from groundwater sources. In order for Alpine County to effectively manage its groundwater resources, proposals for planned future uses of groundwater must be made available to the County. The County would then be able to evaluate the benefits and potential impacts of the actions in the context of other projects or resource management activities occurring in the same area. Because groundwater has not historically been a significant supply source, this issue has not come before the County. However, if groundwater resources were to be subjected to increased use in the future, the County has a number of alternatives for the protection of water resources, as described in Sections 3.6.1 through 3.6.4 of this GWMP.

3.6.1 Overdraft Conditions

Overdraft conditions occur where groundwater is extracted faster than it can be replenished by natural or artificial recharge. Given the amount of precipitation, and potential groundwater recharge within the County, it is not likely that the high-elevation aquifers will experience an overdraft condition in the foreseeable future. However, there is a potential for overdraft in isolated areas within the County where lower natural recharge rates occur (e.g., portions of the Carson Valley Groundwater Basin). Hydraulic characteristics of bedrock aquifers may also result in localized overdraft conditions. Because historic and current groundwater use within Alpine County has been limited, overdraft conditions in Alpine County have not yet been documented.

3.6.2 Groundwater Conservation

Alpine County has a conservation element in the County's General Plan, which emphasizes the importance of the County's surface and groundwater resources to County residents. The County also passed Ordinance 646-03, which bars the extraction of groundwater for use outside of the County without first obtaining a permit. Permits are also required for groundwater substitution programs related to the transfer of surface water out of Alpine County.

3.6.3 Conjunctive Management Activities

Conjunctive management of water resources involves the coordinated measurement, storage and use of surface and groundwater resources, including the following three components: 1) reducing groundwater use and substituting with surface water (known as in-lieu recharge); 2) storage of water in the ground, either by artificial recharge, or in-lieu recharge; and 3) pumping the stored water for use at a later time, typically in the summer when surface water flows are low. The STPUD reclaimed water program is an example of conjunctive management, which provides irrigators with a water source that is not groundwater.

3.6.4 Groundwater Supply Actions

Alpine County will take the following actions related to groundwater supply issues:

- Facilitate the update of the Water Resources Section of the County General Plan's Conservation Element (Appendix A of this GWMP).
- Support continuation of Ordinance 646-03.
- Support continuation of the STPUD reclaimed water program, and associated groundwater monitoring to ensure water quality standards are maintained.
- Continue to pursue funding to facilitate the protection and conservation of the County's groundwater resources.

3.7 Stakeholder Involvement

Stakeholder groups involved in the management of Alpine County's groundwater resources have participated in the development of this GWMP. Stakeholder activities have included public involvement, interagency cooperation, and the creation of the TAC. The County has worked

with the public, other agencies and districts, and the TAC to incorporate their concerns and interests into this GWMP. Alpine County will also continue to involve these stakeholders during the implementation phase of this GWMP.

3.7.1 Public Involvement

Public outreach and education was included during development of the Alpine County GWMP. The County encouraged public participation by making GWMP updates and draft documentation available on their website at http://www.alpinecountyca.com. GWMP progress and updates were also provided to the public via the Alpine County Watershed Group's monthly newsletter called *Alpine Watershed Group News* Briefs, which is distributed electronically to interested parties. The public was invited to attend and actively participate in the TAC meetings.

3.7.2 Interagency and District Cooperation

Effective groundwater management will require and cooperation between numerous local, State and Federal agencies. Alpine County has existing partnerships with the following agencies and organizations pertaining to water resource management within the County:

- **Kirkwood Meadows Public Utilities District ("KMPUD"):** KMPUD is a local water district that provides drinking water sources to the Kirkwood area.
- **Lake Alpine Water Company:** The Lake Alpine Water Company provides drinking water from Bear Lake to the residents of Bear Valley.
- **Markleeville Mutual Water Company:** The Markleeville Mutual Water Company provides drinking water to the residents of Markleeville.
- **South Tahoe Public Utilities District:** STPUD works directly with Alpine County in regards to the reclaimed water use and export program.
- **Carson Water Subconservancy District:** CWSD works directly with Alpine County on resource and management issues pertaining to the Carson River watershed and the Carson Valley Groundwater Basin.
- **The California Department of Water Resources:** DWR works with Alpine County to maintain programs that benefit local groundwater management efforts.
- **State Water Resources Control Board:** SWRCB is the lead state water agency responsible for maintaining water quality standards and providing the framework for groundwater protection efforts. The County has a working relationship with the SWRCB, which currently funds a watershed coordination program within the County.
- **Alpine Watershed Group:** The Alpine Watershed Group is a voluntary group that

works with Alpine County on issues pertaining to the Carson River Watershed.

- **United States Geological Survey:** The USGS conducts streamflow, surface water and groundwater quality and groundwater elevation monitoring in Alpine County.
- **Bureau of Land Management:** BLM manages public lands within Alpine County.
- **United States Forest Service:** USFS manages national forest lands within Alpine County (Stanislaus National Forest, Eldorado National Forest, Humboldt-Toiyabe National Forest, Mokelumne Wilderness, Carson-Iceberg Wilderness).

3.7.3 Technical Advisory Committees

The TAC was created to provide expertise and guidance on groundwater issues in Alpine County, and is comprised of representatives from various agencies, water districts, and interest groups. Primary functions of the TAC include:

- Bringing the stakeholders together to discuss and provide local knowledge and expertise on the current conditions of Alpine County's water resources;
- Providing guidance during development and implementation of the GWMP;
- Holding quarterly meetings; and
- Periodically reviewing and updating the GWMP.

The TAC is comprised of representatives from the following agencies and groups (similar to the stakeholder list provided above; descriptions are given for new entities not previously described):

- **Alpine County Planning Department:** plans for growth and land use changes, and provides information and recommendations on land development, within the County.
- **Alpine County Administration Department:** provides support services and information to the Board of Supervisors, the County's governing authority, and assists with grant applications and administration.
- **Carson Water Subconservancy District.**
- **South Tahoe Public Utilities District.**
- **Kirkwood Meadows Public Utility District.**
- **Alpine Watershed Group.**
- **Alpine County Planning Commission:** The Alpine County Planning Commission makes decisions and/or recommendations on the Alpine County General Plan, proposed subdivisions, rezoning, use permits and variances.

- **Lake Alpine Water Company.**
- **Bureau of Land Management.**
- **United States Forest Service.**

3.7.4 Stakeholder Involvement Actions

The County will take the following actions in regards to stakeholder involvement:

- Continue to provide information to the public through the County's website and through the *Alpine Watershed Group News.*
- Continue to develop and foster interagency and inter district cooperation.
- Continue to seek GWMP implementation guidance from the TAC.

3.8 Groundwater Management Plan Implementation, Reporting and Updating

This GWMP describes Alpine County's groundwater management objectives, the physical setting of Alpine County, and components of the GWMP. These sections fulfill AB3030 recommended components and SB 1938 required components for a GWMP, and some of the recommended components from DWR's Bulletin 119-2003, as indicated in Table 1-1. Sections 3.8.1 through 3.8.3 describe implementation, reporting, and updating of the GWMP.

3.8.1 Groundwater Management Plan Implementation

Plan implementation actions are identified at the end of each plan component section, and are summarized in Table 3-2. Individual plan components and implementation actions are found in sections 3.4 through 3.8. Plan implementation actions are identified at the conclusion of each section.

3.8.2 Groundwater Management Plan Reporting

As a groundwater monitoring program is developed, Alpine County will issue annual progress reports that will include a summary of physical conditions of groundwater and an assessment of current management actions. Annual progress reports will provide an analysis of groundwater trends, allowing for the dissemination of groundwater information to assist in planning activities. The County will make the reports available to interested stakeholders, and will include:

- Groundwater elevation and water quality monitoring results for the preceding year, along with historical trends, as available.
- A summary of management actions taken during the period being reported.
- A discussion of how management actions are progressing towards meeting objectives.
- A summary of proposed management actions.
- A summary of actions taken to coordinate with other agencies and departments.

3.8.3 Groundwater Management Plan Updating

This GWMP documents the current understanding of groundwater conditions and existing management practices. As more information is gathered through monitoring, the County and stakeholders will gain an increased understanding of the groundwater resources in Alpine County. As a result of this increased knowledge, management objectives and measures will likely need to be updated and this GWMP will be revised accordingly. The County will consider improvements to the GWMP, and will seek TAC input and guidance for plan updates.

Table 3-2. Plan Component Implementation

Component Group	Description of Action	Implementation Schedule
Groundwater Monitoring	Identify areas that may need groundwater level, groundwater quality, or subsidence monitoring based on identified data gaps.	Fall 2007
	Identify the appropriate monitoring methodology for each area based on existing or new infrastructure.	
	Prioritize the rehabilitation or construction of new wells based on the needs of each area and available funding.	
	Work with state and federal agencies to secure funding for expansion of the monitoring network.	Ongoing
	Coordinate with DWR and local landowners to ensure that selected wells are maintained as part of a long-term monitoring program.	Ongoing
	Develop a monitoring schedule.	Fall 2007
	Develop a reporting plan to share data with appropriate stakeholders.	Fall 2007
Groundwater Resource Protection	Support environmental health's efforts to further wellhead and recharge protection.	Ongoing
	Support DWR Central District efforts to collect water well driller's reports for wells drilled in Alpine County.	Ongoing
	Coordinate with the Health Department to make well standards available through the Alpine County Health Department website.	Fall 2007
	Coordinate with the Health Department to make *AC Code 8.36, Ord. 364 § 1, 1976– Wells* available through the Alpine County Health Department	Fall 2007
	Coordinate with the Health Department to provide information on how to properly abandon wells on the Alpine County Health Department Website or through mailed updates, flyers and newsletters to the public.	Ongoing
	Discuss well abandonment and destruction ideas and issues, at regularly scheduled meetings such as at the TAC meetings.	Ongoing
	Coordinate with DHS and The Alpine County Health Department to update and continue the DWSAP program.	Ongoing
	Support DHS and the Alpine County Health Department's efforts to further wellhead protection.	Ongoing
Groundwater Resource Protection - Continued	Consider support of a wellhead protection program for domestic wells in Alpine County.	Fall 2007
	Consider developing programs to identify trends in groundwater levels and quality that may be contamination.	Fall 2007
	Assist the Health Department in coordination with appropriate agencies such as the SWRCB, the Lahontan Regional Water Quality Control Board, the Department of Toxic Substances Control, and the U.S. Environmental Protection Agency to identify potential contamination sources.	Ongoing
Groundwater Supply	Facilitate the update of the Water Resources Section of the County General Plan's Conservation Element;	Concurrent with General Plan Development
	Support continuation of Ordinance 646-03.	Ongoing
	Support continuation of the STPUD reclaimed water program	Ongoing
Stakeholder Involvement	Continue to provide information to the public through the County's website and through the *Alpine Watershed Group News.*	Ongoing
	Continue to develop and foster interagency and inter district cooperation.	Ongoing
	Continue to seek GWMP implementation guidance from the TAC.	Ongoing

SECTION 4.0
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Appendix A.

Water Elements from the Alpine County General Plan, 2005

environment and human health. Pollution potential is especially high where large concentrations of wood-burning stoves and conditions of temperature inversion may exist.

The County, in cooperation with the Great Basin Unified Air Pollution Control District, controls pollution The State Air Resources Board has measured the County's attainment of the State ambient air quality standards for most air pollutants. The entire Great Basin Unified Air Pollution Control District was classified as non-attainment of State standard for suspended particle matter. None of the test sites used to determine this classification were located in Alpine County. Alpine County is considered in attainment of Federal Standards for this pollutant. (See Data Base Section 2.2)

ELEMENT I - SECTION B

G. P. GOAL NO. 3 — **MEET OR EXCEED FEDERAL AND STATE AIR QUALITY REGULATIONS**

POLICY NO. 3 — The County should continue to consult with the Great Basin Unified Air Pollution Control District regarding any proposed project which has the potential to adversely affect ambient air quality.

C. WATER

Surface Water

Surface waters on the eastern slope of Alpine County have been adjudicated. Rights to quantities of water are established and a rotation schedule is practiced by water users during late summer and fall months. Users with low priority water rights have difficulty meeting needs during this period in drought years.

A decree by the U.S. District Court for the District of Nevada binds existing water rights and practices on the Eastern Slope. The Truckee-Carson Pyramid Lake Water Settlement Act of 1990 provided federal confirmation of water rights declared in the decree. The adjudication specifies that segments of the Carson River East Fork in California and the Carson River West Fork above Woodfords are governed by California riparian law. Supervision upon these segments by the region's Water Master is limited. Under California riparian law, land owners adjacent to either of the stream segments are entitled to use water that is available. The potential, therefore, exists for future land developments to draw surface water from supplies which are already inadequate for established down stream uses. (See Data Base Section 3.2.).

ELEMENT I - SECTION C

G. P. GOAL NO. 4 — **MAINTAIN ADEQUATE SUPPLIES OF SURFACE WATER IN ALPINE COUNTY FOR ALL CURRENT AND FORESEEABLE NEEDS**

POLICY NO. 4a — Alpine County should remain opposed to any reduction in quantities of surface water presently administered to users in the County for in county uses under the final decree issued by the District Court for the District of Nevada involving the United States of America versus Alpine Land and Reservoir Company (1980) unless or until reasonable alternatives for supply of water for County's agricultural needs are secured.

POLICY NO. 4b Development on lands draining to the Carson River should not significantly diminish the present supply of surface water to any tributary or channel of said river segments.

POLICY NO. 4c Analysis of run-off from new land developments should consider individual or cumulative increase flows of existing stream or river channels and down stream users.

POLICY NO. 4d Acquire and maintain water rights to protect the County's interest and future needs.

Groundwater Quantity

Based upon an analysis of the data researched and presented in Data Base Section 3.3 and Appendix A, it is estimated that the most reliable supplies of groundwater in Alpine County may be found in recent alluvial deposits (stream and river deposits indicated by map unit symbol Qal in Appendix A.). Lake deposits, glacial deposits, volcanic bedrock, and granitic bedrock generally represent areas with increasingly unreliable quantities of groundwater. (See chart, Appendix A-1.).

The Carson River West Fork alluvial fan which underlies the vicinity of Woodfords, Paynesville, and Fredericksburg is estimated to contain approximately 100,000 acre feet of groundwater. Water available to recharge this groundwater supply is estimated to be less than 16,000 acre feet per year. Assuming withdrawal rates equal to 230 gallons per day per permanent residence and 58 gallons per day per seasonal residence (Data Base Section 3.26) approximately 12 million gallons or 38 acre feet of groundwater are taken from the alluvial fan each year. The ratio of withdrawn by Alpine County water users to available recharge may be as high as 1:400 (excluding consideration of the fact that some withdrawn water is replaced).

Water supplies in the entire Carson Valley are estimated by the State of Nevada to be 32,000 acre feet per year. Appropriations are 37,000 acre feet per year. It is reported that not all appropriations are used in a given year and therefore appropriations are nearly equal to supply. (See Data Base 3.31).

Areas important to groundwater recharge include coarse sand near stream deposits along mountain fronts and stream and river channels (Data Base Section 3.3). Groundwater supplies serving Bear Valley and Kirkwood developments are discussed in the Specific Plans for those areas.

ELEMENT I - SECTION C

G. P. GOAL NO. 5 **MAINTAIN ADEQUATE SUPPLIES OF GROUNDWATER IN ALPINE COUNTY FOR ALL CURRENT AND FORESEEABLE NEEDS**

POLICY NO. 5a Groundwater withdrawals should not exceed or significantly draw-down groundwater supplies.

POLICY NO. 5b Alpine County should oppose any significant reduction in quantities in groundwater in the County due to extractions by wells that serve areas outside of the County.

POLICY NO. 5c Coverage of land that would reduce infiltration from run-off or

surface water should be minimized in areas important for groundwater recharge including coarse (gravelly) deposits along mountain fronts and stream or river channels.

POLICY NO. 5d No parcel should be created or development approved that may involve structures intended for human occupancy unless an acceptable means of water supply has been established.

Surface Water Quality

Under State Law the primary responsibility for insuring maintenance of water quality lies with Regional Water Quality Control Boards. By waiver, Alpine County is allowed to approve developments involving less than 6 dwelling units without higher approval from the appropriate Regional Water Quality Control Board. Existing County Ordinances set certain standards and requirements for maintaining surface and groundwater quality in addition to those requirements set forth by the Water Quality Control Boards. (See Data Base Section 3.41). Regional Water Quality Control Board objectives and available historic water quality records are reproduced in Appendix F. (See Data Base Sections 3.42, 3.44, and 3.45). Siltation and sedimentation are the result of erosion. Any development involved in earth disturbance, particularly some forestry practices, can result in erosion and degrade surface water quality by siltation. A certain amount of erosion occurs as a result of natural processes. Erosion is further addressed in the Soils Section of this element.

Surface or hard rock mining operations can degrade surface water quality through increased siltation or the release of natural or induced adverse chemical substances. Each has been historically documented in Alpine County. (See Data Base Section 3.42).

Agricultural waste can also affect the quality of surface waters especially where high concentrations of livestock are tended near surface or groundwater supplies. See Data Base Section 3.45).

ELEMENT I - SECTION C

G. P. GOAL NO. 6 **IMPROVE AND MAINTAIN THE QUALITY OF ALPINE COUNTY'S SURFACE WATER RESOURCES IN COOPERATION WITH THE LAHONTAN AND CENTRAL VALLEY REGIONAL WATER QUALITY CONTROL BOARDS**

Ground Water Quality

Groundwater contamination can be a primary consideration when planning residential developments that are intended to utilize individual sewage disposal systems. Data Base Section 3.14 describes the possibilities for contamination of groundwater supplies by individual sewage disposal systems. Primary concerns include:

1. Soils that do not adequately percolate or that are too close to groundwater supplies;
2. Too many septic systems too close together;
3. Improper septic system maintenance.

In Alpine County additional septic tank filtration limitations may exist in areas underlain by fractured granitic bedrock or containing perched water tables. (See Data Base Section 3.43).

The Soil Conservation Service has described all of Alpine County as containing severe septic system filtration limitations. More detail regarding soil capabilities is provided in soils reports which have been incorporated into the Data Base by reference and which are available for review at the Alpine County Planning Department. Soils capability data was a determinant in establishing appropriate land uses, parcel sizes, and densities indicated on the Land Use Map.

County Ordinance 365-77 controls the construction of sewage disposal systems in Alpine County. County Ordinance 364-76 regulates the construction, modification, repair, and abandonment of wells in the County. Both Ordinances are intended to prevent groundwater contamination and protect the health, safety, and welfare of the County's population. County Ordinance 365-77 does not preclude the establishment of alternatives to conventional individual sewage disposal systems "in selected areas if they are individually designed and received by the Health Department".

ELEMENT I - SECTION C

G. P. GOAL NO. 7 — **MAINTAIN SAFE, CLEAN GROUNDWATER SUPPLIES THAT ARE ADEQUATE FOR ALL CURRENT AND FORESEEABLE BENEFICIAL USES**

POLICY NO. 7a The County should notify, inform, and provide adequate time for response to the appropriate Regional Water Quality Control Board regarding all projects for which County approval is necessary except those for which waiver provisions have been granted.

POLICY NO. 7b No parcel should be created or development approved that may involve structures intended for human occupancy unless an acceptable means of sewage disposal has been proven available.

POLICY NO. 7c Residential developments utilizing individual sewage disposal systems should not be allowed to accumulate in a given area in such concentrations that they collectively pose a threat to groundwater quality.

D. WETLANDS

Wetlands in Alpine County include rivers, streams, lakes, ponds, wet meadows, and other areas with riparian and aquatic habitat. Due to their sensitive nature and ecological significance wetlands are protected by Federal Law

Federal Law regulates and State and Federal Agencies provide policies for development in wetlands. The U.S. Army Corps of Engineers and the U.S. Environmental Protection Agency define wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include "swamps, marshes, bogs and similar areas". The U.S. Fish and Wildlife Service (USFWS) defines wetlands as "lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water" and have "one or more of the following attributes":

1. At least periodically, the land supports predominantly hydrophytes;
2. The substrate is predominantly undrained hydric soil; and

3. The substrate is non-soil and is saturated with water or covered by shallow water sometime the growing season of each year.

Section 404 of the Clean Water Act requires that prior to depositing dredged or fill materials into "waters of the United States including wetlands" a permit must be obtained from the U.S. Army Corp of Engineers. When reviewing permit applications the Corp follows EPA guidelines, also provided under Section 404.

Projects requiring permits are submitted to the U.S. Fish and Wildlife Service and California Department of Fish and Game for advisory review. All projects which could potentially impact wetlands are also reviewed by the Department of Fish and Game through the CEQA process. Fish and Game Commission policies for wetlands, which are used by the Department when reviewing projects, are shown in Appendix P.

ELEMENT I - SECTION D

G. P. GOAL NO. 8 — **PRESERVE AND PROTECT WETLAND AREAS**

POLICY NO. 8 — Minimize development in or conversion of wetlands.

IMPLEMENTATION MEASURE: Require the submittal of a detailed wetland delineation, performed by a qualified biologist, for development projects proposed in or near suspected wetland areas.

IMPLEMENTATION MEASURE: Require proponents of development projects in wetland areas to mitigate impacts on wetlands such that, at minimum, there will be no net loss of either wetland habitat values or acreage.

IMPLEMENTATION MEASURE: Require U.S. Army Corps review prior to County approval of projects impacting wetlands.

IMPLEMENTATION MEASURE: No use that would involve significant vegetation removal or earth disturbance should be allowed in stream environment designated areas. Due to the generalized standard used to delineate stream environments, variances in the above standards should be allowed where it can be proven projects will not generate unmitigable significant adverse effects upon the following features: groundwater recharge, surface water quality, aquatic or riparian habitat, wet lands, archaeological sites, aesthetics, and cliff or stream bank erosion. The County may approve projects that would impact designated stream environment areas where it is found that negative effects upon any of the listed parameters are outweighed by public need or concern.

However, variance provisions should not apply to streams presently

serving or intended to serve as habitat for threatened trout species. The County may require developers to dedicate land or easements to and along streams that support fisheries for the protection of stream environments or their public use.

E. PLANT LIFE

Threatened Rare or Endangered Plants

No Federal or State listed rare or endangered plants have yet been identified within Alpine County. The approximate location of species that have been classified as endangered or rare by the California Native Plant Society, are shown on the Land Use Map. These species, illustrated on the land use map, are to be evaluated in the future for possible inclusion to the State's List of Rare and Endangered Plants. State Law requires that rare or endangered plants are not to be disturbed without giving the California Department of Fish and Game a reasonable period of time within which to remove or otherwise protect them.

ELEMENT I - SECTION E

G. P. GOAL NO. 9 — **PROTECT AND INCREASE THE POPULATIONS OF THREATENED, RARE, OR ENDANGERED PLANT SPECIES**

POLICY NO. 9 — Areas containing or suspected of containing rare, endangered, or threatened plants should not be disturbed without providing the California Department of Fish and Game a reasonable period of time within which to investigate, remove, or otherwise protect them.

F. AGRICULTURE

Due to climate and other factors, agriculture in Alpine County is limited primarily to cattle production and some sheep production. While agriculture in the County is not considered a significant income producer in terms of employment or County revenues, it has been a steady component of the local economy for over 100 years. Under U.S. Forest Service Multiple Use Practices much additional range is provided. (See Data Base Sections 7.3 and 11.12). The County's best agricultural soils are rated Capability Class III (when irrigated) on a scale in which the best agricultural lands would be Class I and the worst Class VIII. The value of the County's agricultural lands should not be underestimated because, through time, urban development may continue to remove from production more valuable agricultural lands in other areas potentially increasing the use and value of more marginal agricultural lands. The County's agricultural lands are also aesthetically important to the County.

Cattle ranching practice in Alpine County involves the seasonal transportation of livestock between summer range at high elevations and winter pasture at lower elevations, mountain meadows, and lower elevation irrigated agricultural lands. Open space zoning has been applied to these areas on the Land Use Map.

The Markleeville Public Utility District system presently operates at half capacity. The system's excess capacity creates economic difficulties for the entity. Should water quality become degraded by present or added use of individual septic systems in the surrounding area, annexation and hook-ups to the Markleeville Public Utility District system could be required. capacity could thus be attained sooner than expected and an expansion of the facility could become necessary.

The Kirkwood Public Utility District system has been expanded to accommodate planned development during the short term planning period. Long term planning includes increased capacity.

The Bear Valley Water District facilities are expected to meet anticipated needs during the short-term planning period. During the long-term future, development of the Bear Valley Ski resort complex could require annexations and expansions of the system.

Water Systems

Of five water systems being operated on Alpine County's eastern slope, only the Markleeville Mutual Water Company is on record as having problems in meeting current or projected needs. Lack of adequate year-round water supplies have lead the company to require that new developments in the Markleeville area provide wells, increased storage, and hookups. However, increased Federal and State Water Quality standards will likely place most small systems in the County in jeopardy of non-attainment of both standards and increased capacity demands. In the future, new development may be required to provide water source and infrastructure improvements to meet the increased demands it generates. (Fire protection needs addressed in the Hazards Element are not included.)

On the west slope, Kirkwood anticipates future water needs for snowmaking capability and, potentially, for domestic use in both the Kirkwood planned development community and in the surrounding areas of Caples Lake. Short-term capacity increases of larger storage tanks and new wells are planned. Alpine County has applied for water appropriations for Caples Lake to meet future economic, domestic and recreational development needs in this regional area. In the Bear Valley Planning area, the Lake Alpine Water Company system will require expansion for each phase of planned build-out at Bear Valley. Water demand at build-out of the Bear Valley subdivision is expected to be 300 to 400 acre feet per year. Engineering estimates indicate that the needs may be filled by surface and groundwater resources available at the development, however, the water system that presently served the old Bear Valley subdivision may need expansion to serve existing lots that remain undeveloped to serve expansions planned at Bear Valley Ski Company. Water from Lake Alpine or other area resources should be pursued, according to historical understandings, to meet these needs.

Power & Telephone

Power and Communications facilities and services are addressed in the Circulation Element.

ELEMENT III - SECTION B

G. P. GOAL NO. 26 — **PROVIDE A LEVEL OF PUBLIC SERVICE ADEQUATE TO INSURE THE HEALTH, SAFETY, AND WELFARE OF ALPINE COUNTY CITIZENS AND PROMOTE ECONOMIC DEVELOPMENT**

POLICY NO. 26a Provide additional safety, community services, security personnel and facilities as dictated by growth and development.

OBJECTIVE NO. 26a Develop and maintain a short and long term capital improvement program.

OBJECTIVE NO. 26b Establish a Capital Improvement Fund and budget annually to place monies in the fund.

IMPLEMENTATION MEASURE: A Capital Improvement Program should list buildings, grounds and other public works projects to be constructed in the County. To date only fire protection needs have an adopted plan.

Special Districts should annually submit their own capital improvement programs to the County. All capital improvements should be reviewed for conformance with the General Plan.

POLICY NO. 26b All new commercial or residential units utilizing community sewer or water systems should be required to contain low or restrictive flow water fixtures or devices wherever possible.

OBJECTIVE NO. 26c Apply to the State Water Resources Control Board for set aside of water for future needs in Bear Valley area from Lake Alpine.

IMPLEMENTATION MEASURE: The appropriate steps and responsibilities for accomplishing the objective as well as a means for delivering the Lake Alpine water to users in the Bear Valley Planning Area, when deemed necessary, are presented in the Bear Valley Master Plan EIR (Gretzinger and Weatherby, Inc.), and future water supply for the Bear Valley Area of Alpine County (Bill Dendy and Associates, assisted by James M. Morris, Jr. 1982).

OBJECTIVE NO. 26d Continue to pursue a set aside of water for future needs in the Kirkwood area from Caples Lake with the State Water Resources Control Board.

C. PUBLIC FINANCE

Careful fiscal planning of public services and facilities has long been of importance in Alpine County where few private land holdings, limited commerce and industry, and a small population have constrained revenues. As growth occurs County-wide, both within the permanent population and within the recreation population, the ability to raise revenues to meet new demands will remain constrained due to Propositions 4 and 13. (See Data Base Section 11.2).

Appendix B.

Alpine County Board of Supervisors
Resolution of Intent to Prepare a Groundwater Management Plan

RESOLUTION OF THE BOARD OF SUPERVISORS, COUNTY OF ALPINE, STATE OF CALIFORNIA, NOTICING ITS INTENT TO PREPARE A GROUNDWATER MANAGEMENT PLAN UNDER WATER CODE §10750 *et seq.*, FOR THE AREAS OF ALPINE COUNTY NOT COVERED BY ANOTHER GROUNDWATER MANAGEMENT PLAN UNDER THIS AUTHORITY OR ANY OTHER AUTHORITY))))))))

RESOLUTION NO. 2005 - 75

WHEREAS, the Legislature finds and declares that groundwater is a valuable natural resource in California and should be managed to ensure both its safe production and its quality; and

WHEREAS, it is the intent of the Legislature through the passage of AB3030 (Stats 1992) codified as Water Code *et seq.* to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdiction; and

WHEREAS, the Legislature also finds and declares that the additional study of groundwater resources is necessary to better understand how to manage groundwater effectively to ensure the safe production, quality, and proper storage on groundwater in this state; and

WHEREAS, the adoption of a Groundwater Management Plan is encouraged, but not required by law; and

WHEREAS, any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, that is not subject to groundwater management pursuant to other provisions of law or court order, judgment or decree, may, by ordinance, adopt and implement a groundwater management plan pursuant to this part within all or portion of its service area not served by a local agency or served by a local agency whose governing body, by a majority vote, declines to exercise the authority to implement a groundwater management plan and enters into an agreement with the local agency pursuant to Water Code §10750.7 and §10750.8; and

WHEREAS, the County of Alpine is interested in the development of a groundwater management plan as defined under Water Code §10750 *et seq.* for the areas of the County not covered by a groundwater management plan; and

WHEREAS, prior to adopting a resolution of intention to draft a groundwater management plan, Water Code §10753.2 requires a local agency to hold a public hearing, after publication of notice pursuant to Government Code §6066, on whether or not to adopt a resolution of intentions to draft a Groundwater Management Plan pursuant to this part for the purposes of implementing the plan and establishing a groundwater management program; and

WHEREAS, such hearing was noticed pursuant to Government Code §6066 and held on December 20, 2005 at 10:00 a.m. in the Board of Supervisors Chambers, 99 Water Street in Markleeville, California; and

WHEREAS at the conclusion of the hearing, the local agency may draft a resolution of intention to adopt a groundwater management plan pursuant to this part for the purpose of implementing the plan and establishing a groundwater management plan.

NOW THEREFORE BE IT RESOLVED that the Board of Supervisors of the County of Alpine hereby agree to:

1. Adopt a Resolution of Intention to draft a Groundwater Management Plan pursuant to Water Code §10750 *et seq.* for the purpose of implementing the plan and establishing a groundwater management program.

2. Direct the Clerk of the Board to publish the Resolution of Intention under Government Code §6066 pursuant to Water Code §10753.3(a).

3. Direct the Department of Water and Resource Conservation to prepare the groundwater management plan under Water Code §10750 *et seq.*

4. Direct the Department of Water Resource Conservation to prepare the groundwater management plan within two years of the date of the Resolution of Intention pursuant to Water Code §10753.4.

Passed and adopted this 20th day of December, 2005 at Markleeville, California by the following vote:

AYES: Supervisors Veatch, Jardine, Bennett, Woodrow, Kaiser.

NOES: None.

ABSENT: None.

Donald M. Jardine, Chair, Board of Supervisors,
County of Alpine, State of California

ATTEST:

Barbara Howard

Barbara K. Jones, County Clerk & ex officio Clerk to the Board of Supervisors,
County of Alpine, State of California
By: Barbara Howard, Deputy

APPROVED AS TO FORM:

David A. Prentice, County Counsel

NOTICE OF PUBLIC HEARING

Alpine County Board of Supervisors

Tuesday November 2, 2004 10:00 a.m.

Administrative Office Building Markleeville, California

NOTICE IS HEREBY GIVEN that the County of Alpine will conduct a public hearing by the Board of Supervisors at 10:00 a.m. on November 2, 2004, or as soon thereafter as the matter can be heard at the Alpine County Administrative Office Building, Board Chambers, 99 Water Street, Markleeville, CA to discuss and to solicit citizen input on the Fiscal Year 2004-2005 Local Groundwater Assistance Program sponsored by the California Department of Water Resources Agency.

Maximum award limits are $250,000 and the County proposes to submit an application to develop a groundwater management plan. The purpose of the public hearing will be to discuss the application for funding and to give citizens an opportunity to make their comments known.

If you are unable to attend the public hearing, you may direct written comments to Alpine County, Administration, PO Box 387, Markleeville, CA 96120 or you may telephone 530-694-2287. In addition, information may be obtained at the above address between the hours of 8:00 a.m. and 5:00 p.m. weekdays.

Public input is encouraged.

DATED: October 26, 2004

Barbara Howard

BARBARA K. JONES, County Clerk and ex officio Clerk of the Board of Supervisors, County of Alpine, State of California
By: Barbara Howard, Assistant County Clerk

November 2, 2004

Public Hearing SIGN IN SHEET

Doranna Gletteg
Wanda Coyan
RUGGERO GIGLI
Gunter E. Kaiser
Edwin Morros - KMP
NATE WHALEY - KMP
Hearing 7.2 → Peggy Pollyea CWSD
Nancy Thornburg
Dick Edwards
Jo Rafferty - Record-Courier
Tom [illegible] Alpine Mt properties
Gary Coyan.
Steve Hibbs - Markleeville resident
Ron RHOADS
Kathleen Andrews
Beverly [illegible]
Brian [illegible]
[illegible]

Appendix C.

Alpine County Ordinance No. 646-03: An Ordinance Regarding the Extraction and Exportation of Groundwater from Alpine County.

AN ORDINANCE REGARDING THE EXTRACTION AND EXPORTATION OF GROUNDWATER FROM ALPINE COUNTY))) **ORDINANCE NO. 646-03**

The Board of Supervisors of the County of Alpine, State of California, does ordain as follows:

SECTION 1. The following chapter is hereby added to the Alpine County Code to read as follows:

GROUNDWATER.

ARTICLE 1. DECLARATION OF FINDINGS AND PURPOSE.

Section 1. Regulation of the Extraction for Exportation of Groundwater from Alpine County. The Board hereby finds and declares:

(a) The groundwater underlying Alpine County has historically provided the people and lands of Alpine County with water for agricultural, domestic, municipal and other purposes.

(b) The Board recognizes the principle developed in the case law of California that water may be appropriated from a groundwater basin if the groundwater supply is surplus and exceeds the reasonable and beneficial needs of overlying users.

(c) It is essential for the protection of the health, welfare, and safety of the residents of the County, and the public benefit of the State, that groundwater resources of Alpine County be protected from harm resulting from the extraction of groundwater for use outside the County.

(d) Much of the farm production of the County depends upon the use of water to produce field crops which significantly contribute to the gross value of all agricultural crops produced in the County.

(e) Much of the water supply for residential needs in the County is provided by groundwater.

(f) The groundwater of Alpine County is and will be a vital part of future water use in the County.

(g) The County seeks to foster prudent water management practices to avoid significant adverse overdraft-related environmental, social, and economic impacts. It is therefore essential for the protection of the County's important groundwater resources that the County require a permit to extract groundwater for use outside the County. The Chapter requires a permit for the export of groundwater outside the County and is not intended to regulate groundwater in any other way.

(h) In adopting this Chapter, the County in no way intends to limit either the County or other public entities, in managing groundwater under any other applicable laws in a manner consistent with any adopted groundwater management plan.

ARTICLE 2. DEFINITIONS.

Section 1. Definitions.

(a) "Groundwater Management Act" means Water Code §§10750 et. seq.

(b) "Aquifer" means a geologic formation that stores, transmits and yields any quantity of water to wells and springs.

(c) "Board" means the Board of Supervisors of Alpine County.

(d) "Commission" means the Planning Commission of the County of Alpine.

(e) "County" means the County of Alpine.

(f) "Director" means the Director of Planning or his designee.

(g) "District" means an entity wholly or in part located within the boundaries of the county, which is a purveyor of waters for agricultural; domestic, or municipal use.

(h) "Groundwater" means all water beneath the surface of the earth which is capable of being extracted, and includes, but is not limited to, water occurring in a defined pool or aquifer.

(i) "Hydraulic gradient" means the slope of the water table.

(j) "Hydrology" means the origin, distribution, and circulation of water through precipitation; stream flow; infiltration; groundwater storage, and evaporation.

(k) "Overdraft means the condition of a groundwater supply in which the amount of water withdrawn by pumping exceeds the amount of water replenishing the supply over a period of time and also the point at which extractions from the supply exceed its safe yield plus any temporary surplus.

(l) "Percolation" means the movement of water through the soil to the groundwater table.

(m) "Permeability" means the capability of the soil or another geologic formation to transmit water.

(n) "Piezometric surface" means the surface to which the water in a confined aquifer will rise.

(o) "Porosity" means voids or open spaces in alluvium, other soils and/or rocks that can be filled with water.

(p) "Recharge" means flow to groundwater storage from precipitation, irrigation, infiltration from streams, spreading basins and other sources of water.

(q) "Safe Yield" means the maximum quantity of water which can be withdrawn annually from a groundwater supply under a given set of conditions without causing overdraft or adverse water quality conditions or an undesirable result.

The phrase "undesirable result" is intended to refer to a lowering of the groundwater levels resulting in, or tending to result in, the eventual depletion of or the substantial diminution of the supply of water. Specifically, "safe yield" is the amount of water which can be withdrawn without:

(1) Exceeding in any calendar year the long-term mean annual water supply of the basin (considering all sources of recharge and withdrawal);

(2) Lowering water levels so as to make further drilling of water wells uneconomical;

(3) Causing water pumped from the basin to deteriorate below drinking water standards;

(4) Violating water rights or restrictions in pumpage in the groundwater basin as established by court adjudication or application of state or federal law;

(5) Other observable environmental damage.

(r) "Specific Capacity" means the volume of water pumped from a well in -gallons per minute per foot of drawdown.

(s) "Spreading Water" means discharging native or imported water to a permeable area for the purpose of allowing it to percolate to the zone of saturation. Spreading, artificial recharge and replenishment all refer to operations used to place water in a groundwater table.

(t) "Transmissivity" means the rate of flow of water through an aquifer.

(u) "Usable Storage Capacity" means the quantity of groundwater of acceptable quality that can be economically withdrawn from storage.

(v) "Water Table" means the surface or level where groundwater is encountered in a well in an unconfined aquifer.

(w) "Water Year" means the year beginning March 1 and ending the last day of the following February.

(x) "Zone of Saturation" means the area below the earth surface in which the soil is completely saturated with groundwater.

(y) "Export" means exportation via a pipeline, and/or natural or artificial water channel.

ARTICLE 8 . PERMIT PROCESS.

Section 1. Permit Required for Export for Use Outside County.

It shall be unlawful to extract groundwater underlying County, directly or indirectly, for use of that groundwater so extracted, outside County boundaries, without first obtaining a Permit as provided in this Chapter. The extraction of groundwater to replace a surface water supply to be transferred for use outside County boundaries shall be considered an indirect extraction of groundwater for purposes of this section, which shall require a Permit. This Chapter shall not apply for the extraction of groundwater (1) to prevent the flood of lands or (2) prevent the saturation of the root zone of farm land, or (3) for use within the District boundaries of a District which is in part located within County and in part in another County(s) where such extraction quantities and use are consistent with historical practices of the District. The applicant shall have the burden of supporting an assertion of an historical practice with competent evidence.

Section 2. Application for a Permit; Fees.

An application for a Permit shall be filed with the Director and shall contain all information required by the Director. Concurrently, a request for environmental review shall be filed as required by applicable County guidelines. The application for a permit and request for environmental review shall be accompanied by the fees which shall be established from time to time by Board Resolution. The applicant shall bear the burden of proof in this process.

Section 3. Procedures for Processing.

(a) The Director shall review the application to determine whether it is complete for purposes of proceeding pursuant to the California Environmental Quality Act requirements. Within ten (10) calendar days of filing of the permit application, the Director shall post a notice on the County's public bulletin boards that an application has been filed, shall send a copy of the notice to the Districts within the County which have lands overlying or adjacent to the location of the extraction and to any interested party who has made a written request to the Director for such notice within the last twelve (12) calendar months.

(b) The Director may review the matter of the application with the affected County departments, with the staff of the State Department of Water Resources, with the staff of the respective Regional Water Quality Board - Lahontan Region or Central Valley Region, and with any interested local water agency within whose boundary the proposed activity will occur. If the applicant is applying to pump groundwater from a District, or the unincorporated territory in which a groundwater management plan has been adopted pursuant to the Groundwater Management Act, the Director shall consider a groundwater management plan or any other relevant information provided by the District, or other local agency. Any interested person or agency may provide comments relevant to the matter of the extraction of groundwater. Comments shall be submitted within thirty (30) days of the date of mailing the notice of filing the permit application.

(c) The environmental review shall be undertaken in accordance with the California Environmental Quality Act and County guidelines. All costs of the environmental review shall be the responsibility of the applicant, as shall the cost of any technical or consulting services required for application review under Section 5 (b) above.

(d) Upon completion of the environmental review, the Director shall forward the application together with any written comments received, environmental documentation and the Director's recommendations, to the Commission. Upon receipt of the Director's recommendation, the Commission shall schedule a public review on the issuance of the permit which shall be noticed pursuant to Government Code §6061 and may not be held within fifteen (15) days of the time that the Commission receives the recommendation from the Director.

(e) The Commission shall hear the application in accordance with the provisions for public review and shall make recommendations to the Board. The scope of the recommendations extends to any relevant matter that may be considered by the Board, including but not limited to, the effects that granting the permit application would have on the affected aquifer, each of the findings required of the Board, any appropriate conditions to be imposed, and any mitigation offsetting any adverse effect.

(f) Upon receipt of the Commission's recommendation, the Clerk of the Board shall schedule a public review on issuance of the permit which shall be noticed pursuant to Government Code §6061. The Board shall hear the application in accordance with the provisions for public review and shall consider matters required to be considered during public review, including but not limited to the effects that granting the permit application would have on the affected aquifer, make each of the findings on matters required for granting a permit, any appropriate conditions to be imposed, and any mitigation offsetting any adverse effect.

Section 4. Review Concerning Issuance of Permit.

The hearing bodies, whether Commission or Board, shall conduct the public review in

accordance with this section.

(a) Formal rules of evidence shall not apply to the public review of the application, but the hearing body may establish such rules as will enable the expeditious presentation of the matter and relevant information thereto. At the public review, the applicant shall be entitled to present any oral or documentary evidence relevant to the application, and the applicant shall have the burden of proof of establishing the facts necessary for the required findings. The hearing body may request any additional information it deems necessary for its decision, the cost of which, if any, shall be borne by the Applicant. The hearing body shall also hear relevant evidence presented by other interested persons and entities, the Director, other County staff, and the public. The hearing body shall consider all effects that the granting of the permit application would have on the affected aquifer including, but not limited to, the hydraulic gradient, hydrology, percolation, permeability, piezometric surface, porosity, recharge, safe yield, specific capacity, spreading water, transmissivity, usable storage capacity, water table and zone of saturation.

Section 5. Granting of Permit.

The Permit may only be granted if the Board finds and determines that the extraction will not cause or increase an overdraft of the groundwater underlying the County, will not adversely affect the long term ability for storage or transmission of groundwaters within the aquifer, will not (together with other extractions) exceed the safe yield of the groundwater underlying the County and will not otherwise operate to the injury of the reasonable and beneficial uses of overlying groundwater users, or will not result in an injury to a water replenishment, storage, or restoration project operating in accordance with statutory authorization. If the Permit is to be granted, the Board shall impose appropriate conditions upon the Permit so as to prohibit overdraft or other adverse conditions, and may impose other conditions that it deems necessary for the health, safety and welfare of the people of the county. Upon granting of a permit an economic severance fee shall be imposed, the purpose of which is to replace the economic loss to the citizens of Alpine County of the revenue lost from all activities which are discontinued or precluded by water export.

Other conditions in the permit shall include, but are not limited to, requirements for observation and/or monitoring wells. Notwithstanding the foregoing, the Board may issue the Permit if the Board finds that the applicant has provided for mitigation which will offset any adverse effect that is determined to exist.

Section 6. Reapplication After Denial.

Reapplication for a permit which has been denied by the Board may not be filed with the Director until the following Water Year and must be accompanied with information that demonstrates a significant change in conditions in the groundwater and/or change in the proposed extraction.

Section 7. Challenge to Approved Permit.

(a) Any interested party or public entity may challenge the continuation of an Approved Permit during the term of the Permit when information exists that:

(1) there is a violation of the conditions of the Permit, or

(2) the Permit was not issued in accordance with the procedural requirements of this Chapter, or

(3) extraction of groundwater pursuant to the permit:

i) causes or increases an overdraft in the basin or

ii) brings about or increases salt water intrusion, or

iii) adversely affects the long-term ability for storage or transmission of groundwaters, or

iv) exceeds the safe yield of the groundwaters, or

v) operates to the injury of the reasonable beneficial uses of overlying groundwater users, or

vi) results in an injury to a water replenishment, storage, or restoration project operating in accordance with statutory authorization.

(b) A challenge pursuant to this section is commenced by filing a written request with the Director which alleges any of the above situations and generally describes

the supporting facts for such allegation. In such event, the Director shall within ten (10) days of receipt of such challenge, give notice of the challenge to the Commission, the Permittee, Appellant, to any interested party who filed a written request for such notice within the past 12 months, and the Districts, within the County, which have boundaries overlying or immediately adjacent to the location of the Permitted extraction. Commission and Board reviews shall be held on the matter following the procedures set forth above. The recommendations and decision may be to deny the challenge, grant the challenge and terminate the Permit, or to establish modified conditions to the Permit.

(c) The standard for review shall be substantial evidence. The burden of proof is upon the person or entity filing the challenge.

Section 8. Duration of Permit.

All Permits shall be valid for a term set by the Board, not to exceed five (5) Water Years from the date of the issuance of the Permit. For purpose of calculation; the Water Year in which the Permit is granted shall not be counted in determining the five year time period if less than four months remain in the then Water Year. Provided, however, nothing contained in this Ordinance nor in the conditions of the Permit shall be construed as to give exclusive right to groundwater to Permittee nor establish a compensable right in the event that the Permit is subsequently discontinued or modified by the Board after a hearing on a challenge to the Permit.

Section 9. Limitation of Permit.

The Permit process of this Chapter is not to be construed as a grant of any right or entitlement but rather the Permit evidences that the health, welfare, and safety of the residents of the County will not be harmed by the extraction and exportation of groundwater outside the County boundaries. The Permit in no way exempts, supersedes, or replaces any other provisions of federal, state, and district or local laws and regulations.

ARTICLE 4. INSPECTION.

The Director, together with any other persons reasonably required for the conduct of the inspection, and with good cause, may at any and all reasonable times enter any and all places, property, enclosures and structures, for the purposes of making examinations and investigations to determine whether any provision of this Chapter is violated.

ARTICLE 5. VIOLATIONS.

The County may elect to proceed with any and all available legal remedies, including but not limited to a civil action against a violator, including injunctive relief. Any person or entity who violates this Chapter shall be subject to fines of up to $5,000 per separate violation. A person shall be deemed to have committed separate violations for each and every day or portion thereof during which any such violation is committed, continued, or permitted as well as for and each and every separate groundwater well with which any such violation is committed, continued, or permitted. Any violation of this ordinance shall also be considered a public nuisance, which may be abated by any means authorized by law.

ARTICLE 6. SEVERABILITY.

If any section, subsection, sentence, clause or phrase of this Chapter is for any reasons held illegal, invalid or unconstitutional by the decision of any court of competent jurisdiction, such decision shall not affect the validity of the remaining portions hereof. The Board hereby declares that it would have passed this Chapter and each section, subsection, sentence, clause, or phrase hereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses, or phrases be declared illegal, invalid or unconstitutional.

ARTICLE 7. EFFECTIVE DATE

This Ordinance shall take effect and be in force thirty (30) days after its passage, and prior to the expiration of fifteen (15) days from the passage thereof, shall be posted as required by law, with the names of the members of the Board of Supervisors voting for and against the same.

PASSED and ADOPTED this 7th day of January, 2008 by the Board of Supervisors of the County of Alpine, State of California by the following vote of said Board:

AYES: Supervisors Herman Zellmer, Katherine Walker, Terry Woodrow, Chris H. Gansberg, Jr.

NOES: None

ABSENT: Supervisor Donald M. Jardine

VACANT: None

Herman Zellmer, Chair, Board of Supervisors,
County of Alpine, State of California

ATTEST:

Barbara K. Jones, County Clerk and
ex Officio Clerk of the Board of Supervisors
By: Barbara Howard, Deputy Clerk

APPROVED AS TO FORM

J. Dennis Crabb, County Counsel

Appendix E.

Alpine County *AC Code 8.36 Ord. 364 § 1, 1976 – Wells*; Alpine County Ordinance 521-91, *Chapter 13.08 Sewage Disposal System*; and the Permit Conditions for Construction and Approval of a Domestic Water Well.

Chapter 8.36

WELLS

Sections:

8.36.010	Purpose of provisions.
8.36.020	Definitions.
8.36.030	Standards for work.
8.36.040	Permit—Required when.
8.36.050	Permit—Application.
8.36.060	Permit—Fees.
8.36.070	Permit—Bond or deposit required.
8.36.080	Permit—Issuance conditions.
8.36.090	Permit—Denial when—Exceptions.
8.36.100	Permit—Appeal procedure.
8.36.110	Destruction of abandoned wells.
8.36.120	Completion of work—Notice to county.
8.36.130	Report of completion, abandonment or destruction.
8.36.140	Inspection requirements.
8.36.150	Enforcement—Notice to comply.
8.36.160	Enforcement—Stop order issuance.
8.36.170	Abatement by county authorized when.
8.36.180	Violation—Penalty.

8.36.010 Purpose of provisions.

It is the purpose of this chapter to regulate the construction, modification or repair, abandonment or destruction of wells in such a manner that the groundwater of the county will not be contaminated or polluted, and that water obtained from wells will be suitable for beneficial use and will not jeopardize the health, safety or welfare of the people of this county. (Ord. 364 § 1, 1976)

8.36.020 Definitions.

As used in this chapter:

1. a. "Abandoned" or "abandonment" means a well which has not been used for a period of one year, unless the owner declares his intention to use the well again for supplying water or other associated purposes (such as an observation well or injection well). As evidence of his intentions for continued use, the owner shall properly maintain the well in such a way that:

i. The well has no defects which will facilitate the impairment of quality of water in the well or in the water-bearing formations penetrated;

ii. The well is covered with an appropriate locked cap;

iii. The well is marked so that it can be clearly seen;

iv. The area surrounding the well is kept clear of brush or debris.

b. If the pump has been removed for repair or replacement, the well shall not be considered abandoned, provided that evidence of repair can be shown. During the repair period, the well shall be adequately covered to prevent injury to people and to prevent the entrance of undesirable water or foreign matter.

c. Observation wells used in the investigation or management of groundwater basins by governmental agencies or other appropriate engineering or research organizations are not considered "abandoned" so long as they are maintained for this purpose. However, such wells

shall be covered with an appropriate cap, bearing the label "Observation Well" and the name of the agency or organization, and preferably shall be locked when measurements are not being made. When these wells are no longer used for this purpose or for supplying water, they shall be considered abandoned.

2. "Agricultural well" means a well used to supply water for irrigation or other agricultural purposes, including stock wells.

3. "Aquifer" means a formation or group of formations or part of a formation that is water-bearing and which transmits water in sufficient quantity to supply pumping wells.

4. "Cathodic protection well" means any artificial excavation in an aquifer, or in excess of fifty feet constructed by any method for the purpose of installing equipment or facilities for the protection electrically of metallic equipment in contact with the ground, commonly referred to as cathodic protection.

5. "Community water supply well" means a water well for domestic purposes in systems subject to Chapter 7 of Part I of Division 5 of the California Health and Safety Code (commencing with Section 4010).

6. "Completion" or "completion operation" means any work conducted after artificial excavation, to include:

a. Placement of well casing;

b. Gravel packing;

c. Sealing;

d. Casing perforation; or

e. Other operations deemed necessary by the health officer.

7. "Contamination" means an impairment of the quality of water to a degree which creates a hazard, or may create a hazard, to the public health through poisoning or through spread of disease.

8. "Department" means the health department of the county.

9. "Destruction" or "destroy" means the complete filling of a well in such a manner that it will not produce water or act as a conduit for the interchange of water, when such interchange will result in deterioration of the quality of water in any waterbearing formations penetrated.

10. "Electrical grounding well" means any artificial excavation in an aquifer or in excess of fifty feet constructed by any method for the purpose of establishing an electrical ground.

11. "Health officer" means the health officer of Alpine County, or that person's duly authorized representative.

12. "Individual domestic well" means a water well used to supply water for domestic needs of an individual residence or commercial establishment.

13. "Industrial well" means a water well used to supply industry on an individual basis.

14. "Modification or repair" means the deepening of a well, reperforation, sealing, or replacement of a well casing.

15. "Observation well" means a well used for monitoring or sampling conditions of a water-bearing aquifer, such as water pressure, depth, movement or quality.

16. "Person" means and includes special districts formed under the laws of the state of California.

17. "Pollution" means an alteration of the quality of water to a degree which unreasonably affects:

a. Such waters for beneficial uses; or

b. Facilities which serve such beneficial uses.

Pollution may include contamination.

18. "Public nuisance," when applied to a well, means any well which threatens to impair the quality of groundwater or otherwise jeopardize the health and safety of the public.

19. "Salt water (hydraulic) barrier well" means a well constructed to extract or introduce water into the ground as a means of preventing intrusion of salt water into a freshwater-bearing aquifer.

20. "Sealing" means closing the upper annular space (the space between the well casing and the wall of the drilled hole) by a method approved by the health department, in order to effectively protect groundwaters from infiltration by surface and/or shallow subsurface waters.

21. "Test or exploratory hole" means an excavation used for determining the nature of underground geological or hydrological conditions, whether by seismic investigation, direct observation, or any other means.

22. "Well" means any artificial excavation constructed by any method for the purpose of extracting water from or injecting water into the underground, or for providing cathodic protection or electrical grounding of equipment, or for making tests or observations of underground conditions, or for any other similar purpose. Wells shall include, but shall not be limited to, community water supply wells, individual domestic wells, industrial wells, agricultural wells, cathodic protection wells, electrical grounding wells, test and exploratory holes, observation wells and salt water (hydraulic) barrier wells, as defined herein, and other wells whose regulation is necessary to fulfill the purpose of this chapter. Wells shall not include:

a. Oil and gas wells or geothermal wells constructed under the jurisdiction of the State Department of Conservation, except those wells converted to use as water wells; or

b. Wells used for the purpose of:

i. Dewatering excavations during construction, or

ii. Stabilizing hillsides or earth embankments;

c. The following artificial excavations:

i. Drill holes for soil testing purposes, when such holes are less than twenty-five feet in depth,

ii. Holes or excavations for soil percolation tests,

iii. Drill holes for seismic exploration where such drill holes are less than twenty-five feet in depth,

iv. Excavations for drainage percolation ponds or spreading basins.

23. "Well-drilling contractor" means a contractor licensed in accordance with the provisions of the Contractors' License Law, Chapter 9 of Division 3 of the Business and Professions Code (commencing with Section 7000). (Ord. 364 § 2, 1976)

8.36.030 Standards for work.

Standards for the construction, repair, modification or destruction of wells shall be as set forth in Chapter II of the California Department of Water Resources Bulletin No. 74, "Water Well Standards," state of California, with the following exceptions:

A. All community water supply wells and individual domestic wells shall be provided with a pipe or other effective means through which chlorine or other disinfecting agents may be introduced directly into the well. The pipe, if provided, shall be installed at a height equal to the pump slab or at least six inches above the finished grade, shall be kept sealed, and shall be provided with a threaded or equivalently secure cap (in a well pit, the pipe shall be twelve inches above the floor of the pit). Equivalent protection for excluding contamination from the well shall be provided for subsurface pump discharge installations. If an air relief vent is used, it shall terminate downward twelve inches above ground level and be screened and protected against contamination material entering the vent (sixteen-mesh screen).

B. Every new, repaired or modified community water supply well or domestic water well, after construction, modification or repair, and before being placed into service, shall be thoroughly cleaned of all foreign substance and shall be thoroughly disinfected. Procedures delineated in Appendix E of the aforementioned Department of Water Resources Bulletin No. 74, state of California, or equivalent, are required. (Ord. 364 § 7, 1976)

8.36.040 Permit—Required when.

No person shall, within the unincorporated area of the county, construct, repair, modify or destroy any well unless a written permit has first been obtained from the health officer as provided in this chapter. In case of emergency affecting life, health, crops or livestock, a licensed contractor may start work immediately, but shall notify the health department within seventy-two hours by telephone or in person of the work being done. (Ord. 364 § 3, 1976)

8.36.050 Permit—Application.

Applications for permits shall be made to the health officer, and shall include such information as may be required by the health officer to determine that the health and safety of the public will be protected. (Ord. 364 § 4 (A), 1976)

8.36.060 Permit—Fees.

There may be a permit fee for construction of all wells covered by this chapter. There shall be no permit fee for reconstruction, modification or abandonment of wells covered by this chapter. (Ord. 364 § 4 (B), 1976)

8.36.070 Permit—Bond or deposit required.

Prior to the issuance of a permit, the applicant shall post with the health officer a cash deposit or bond to guarantee compliance with the terms of this chapter and the applicable permit, such cash or bond to be in an amount deemed necessary by the health officer to remedy improper work, but not in excess of the total estimated cost of work. Such deposit or bond may be waived by the health officer where other assurances of compliance are found adequate by him. (Ord. 364 § 4 (E), 1976)

8.36.080 Permit—Issuance conditions.

Permits shall be issued subject to compliance with the standards provided in

this chapter, except that such standards shall be inapplicable or modified by the health officer when upon his finding inapplicability or modification will accomplish the purposes of this chapter. A permit, to be valid, must comply with all state and county laws, rules and regulations. (Ord. 364 § 4 (C), 1976)

8.36.090 Permit—Denial when—Exceptions.

No permit shall be issued to any person who is not a licensed well-drilling contractor; provided that a permit may be issued to an owner or occupant of property who does the work of construction, repair, modification or destruction of a well located on such property himself or through his own employees; and provided further, that a permit may be issued to any person exempt from the provisions of the Contractors' License Law, Chapter 9, Division 3, of the Business and Professions Code, commencing with Section 7000. (Ord. 364 § 4 (F), 1976)

8.36.100 Permit—Appeal procedure.

Any person aggrieved by the refusal of a permit or terms of the permit may request in writing that the matter be heard by the board of supervisors. If such request is made, the health officer shall schedule the matter for review by the board of supervisors, and shall give not less than ten days' written notice of the time and place thereof to the applicant. At the time and place of the hearing, the board of supervisors shall allow the applicant and other interested parties an adequate opportunity to present any facts pertinent to the matter at hand. The board of supervisors may place any person involved in the matter, including the applicant, under oath. The board of supervisors may, when it deems necessary, continue any hearing by giving notice to the applicant of such action. At the close of the hearing, or at any time within ten days thereafter, the board of supervisors shall order such disposition of the application or permit as it has determined is proper, and shall make such disposition known to the applicant. Determinations made by the health officer relating directly to the public health, or to Chapter 7 of Part I of Division 5 of the California Health and Safety Code, may not be overruled or modified by the board of supervisors. (Ord. 364 § 4 (G), 1976)

8.36.110 Destruction of abandoned wells.

A. Purpose of Destruction. Proper destruction of a well that is no longer useful serves two main purposes:

1. Assures that the groundwater supply is protected and preserved for further use;

2. Eliminates the potential physical hazard that exists.

B. All "abandoned" wells shall be destroyed in such a way that they will not produce water or act as a channel for the interchange of waters, when such interchange will result in significant deterioration of the quality of water in any or all waterbearing formations penetrated, or present a hazard to the safety and well-being of people and of animals.

C. Destruction of a well shall consist of the complete filling of the well in accordance with procedures designated by the health officer. (Ord. 364 § 9, 1976)

8.36.120 Completion of work—Notice to county.

The permittee shall complete work authorized by the permit prior to the expiration date set in the permit. The permittee shall notify the health officer in writing upon completion of the work, and work shall not be deemed to have been completed until such written notification has been received. (Ord. 364 § 4 (D), 1976)

8.36.130 Report of completion, abandonment or destruction.

A. Every person who hereafter digs, bores or drills a water well or cathodic protection well, or who abandons or destroys any such well, or who deepens or reperforates any such well, shall file with the health department a report of completion, abandonment or destruction of such well within thirty days after the construction or alteration has been completed. This report shall be considered privileged information (Section 13754, Division 7, California Water Code).

B. This report shall be made on forms furnished by the health department, and shall contain such information as the department may require, including but not limited to:

1. Description of the well site sufficiently exact to permit location and identification of the well;

2. Detailed log of the well;

3. Description of type of construction;

4. Details of perforation;

5. Static water level, well capacity and draw-down in feet per hour;

6. Methods used for sealing off surface or contaminated waters.

C. All domestic water supply wells shall be tested for chemical and bacterial analysis by a commercial laboratory approved by the health officer. In areas where insufficient subsurface information is available, the health officer may require inspection of the well log prior to any completion operation. (Ord. 364 § 5, 1976)

8.36.140 Inspection requirements.

In the case of emergency, the health officer and inspectors of the health department may, at reasonable times, enter all places, property, enclosures and structures for the purpose of making examinations and investigations to determine whether or not any provision of this chapter is being violated. When not a case of emergency, consent of the owner or occupant shall be obtained prior to entry. In either case, the health officer may require that each completion, modification, repair or destruction operation be inspected prior to any further work. (Ord. 364 § 6, 1976)

8.36.150 Enforcement—Notice to comply.

In the event a well subject to this chapter has been constructed, repaired, modified, destroyed, abandoned or operated contrary to the terms of this chapter, or a permit issued for such well pursuant to this chapter, the health officer may

mail written notice, postage prepaid, to the owner of the land, as shown upon the most recent equalized assessment roll or the permittee at his address listed upon the permit, which notice shall state:

A. The manner in which the well is in violation;

B. What corrective measures must be taken;

C. The time within which such corrections must be made, and that if the land owner or permittee fails to make corrections within the period provided, the corrections may be made by the county and the land owner or permittee shall be liable for the costs thereof. (Ord. 364 § 8 (B), 1976)

8.36.160 Enforcement—Stop order issuance.

In the event a well subject to the provisions of this chapter is being constructed, repaired, modified, destroyed or abandoned contrary to the terms of this chapter, the health officer shall order the work stopped by posting a stop order at the well site. No further work shall be done after the posting of the stop order until such time as the stop order is removed by the health officer. (Ord. 364 § 8, 1976)

8.36.170 Abatement by county authorized when.

If the corrections listed in the notice given pursuant to Section 8.36.150 above are not made as required in the notice, the health officer, with the approval of the board of supervisors, and after a reasonable opportunity for the person notified to be heard by the board of supervisors, may cause the condition to be abated, and the cost thereof shall be a charge against the person notified. A person wishing a hearing before the board of supervisors shall file a notice requesting hearing not more than fifteen days following the date of receipt of notice from the health officer as herein provided. (Ord. 364 § 8 (C), 1976)

8.36.180 Violation—Penalty.

Any person who does any work for which a permit is required by this chapter and who fails to apply for and pay the fee for a permit within five working days after notice from the health officer to do so, or who otherwise violates any other provision of this chapter, shall be guilty of a misdemeanor. (Ord. 364 § 10, 1976)

Chapter 13.08

SEWAGE DISPOSAL SYSTEMS

Sections:

13.08.010	Definitions.
13.08.020	Sanitary sewers.
13.08.030	Health hazards.
13.08.040	Building permit.
13.08.050	Permit required.
13.08.060	Correction notices.
13.08.070	Parcel size minimum on new divisions of land.
13.08.080	Alternative systems.
13.08.090	General criteria for sewage permit issuance.
13.08.100	General regulations respecting all conventional systems.
13.08.110	Application for sewage permit.
13.08.120	Health department review of application.
13.08.130	Special design and nonresidential systems.
13.08.140	Permits.
13.08.150	Extension of permits.
13.08.160	New land developments and new subdivisions.
13.08.170	New land developments and new subdivisions—Criteria for conventional systems.
13.08.180	Inspections.
13.08.190	Inspections prior to use.
13.08.200	Appeals.
13.08.210	Enforcement.
13.08.220	Penalty.

13.08.010 Definitions.

For the purposes of this chapter, certain words and phrases are defined as follows unless it is apparent from their context that a different meaning is intended.

A. "Alternative system" means an off-site sewage disposal system, such as mound absorption systems, evapotranspiration beds (ET), and aerobic systems, that treats sewage and may not ultimately dispose of sewage through leaching in a subsurface leach field or fields.

B. "Character of use" means the use that an on-site sewage disposal system will service, as, for example, single-family dwelling, retail store, restaurant, and so forth.

C. "Chemical toilet" means a receptacle for sewage that disposes of the sewage through reactions with chemicals that are artificially inserted into the receptacle.

D. "Construction" means and includes new construction or installation of an on-site sewage disposal system, as well as any repair of, alteration to, or relocation of an on-site sewage disposal system.

E. "Contractor" means a person who is licensed as a general engineering contractor (A) or as a sanitation systems contractor (C-42), such licensing pursuant to the provisions of the California Contractors Licensing Law (Section 7000, et seq., Chapter 9 Division 3, Business and Professions Code).

F. "Conventional system" means an on-site sewage disposal system that utilizes only a septic tank or tanks and a subsurface leach field or fields and appurtenances, such as distribution boxes.

G. "Drainage system" means all the piping within public or private premises that conveys sewage or other liquid wastes to a point of disposal or treatment, but does not

include the mains or laterals of a sanitary sewer.

H. "Engineer" means a civil engineer licensed to practice in the state of California or a certified engineering geologist.

I. "Gross" means total land area of the parcel.

J. "Health officer" means the health officer of the county or a duly designated representative of the health officer of the county.

K. "On-site sewage system" means a system for disposal or treatment of sewage or other liquid wastes discharged from a drainage system or part thereof, other than a sanitary sewer, including, but not limited to, conventional systems, special design systems, alternative systems, and chemical toilets.

L. "Percolation rate" means the time required for water to permeate through earth or ground. A percolation rate is expressed in the number of minutes required for water to fall one inch in a percolation hole.

M. "Net" means that land area exclusive of easements or similar restrictions on use.

N. "Sanitary sewer" means any community system for treatment and disposal of sewage that is operated and maintained by any municipality, district, or other public or private corporation.

O. "Septic tank" means a watertight receptacle that receives the discharge of a drainage system or part thereof, designed and constructed so as to retain solids and digest organic matter through a period of detention prior to discharge.

P. "Sewage" means liquid waste containing organic or inorganic waste of human origin that is in suspension or solution, or any other liquid waste.

Q. "Sewage permit" means a written permit issued by the health officer of the county permitting construction of an on-site sewage disposal system.

R. "Soil" means earth, rock permeable to effluent or ground suitable for treatment and disposal of sewage through subsurface techniques, as distinguished from rock or other impermeable material and from fissured material through which water may flow to groundwater.

S. "Special design system" means an on-site sewage disposal system that utilizes the components of a conventional system, but that modifies or supplements those components with a special design or designs, such as filters, pumping, and pressure distribution systems, that partially treat, transport, or hold the sewage prior to ultimate disposal by a subsurface technique, such as a leach field or fields.

T. "Subdivision" means the division of any unit or units of improved or unimproved land as defined in Section 19.04.800 of this code.

U. "Sump" means a tank or pit that receives sewage or liquid waste that must be emptied by mechanical means. (Ord. 521 §1 (part), 1991)

13.08.020 Sanitary sewers.

If and where the drainage system of a building is within two hundred feet of a sanitary sewer and the owner of the building may lawfully and feasibly connect to the sanitary sewer, then such connection shall be made in the most direct manner possible and in accordance with the rules and regulations of the operator of the sanitary sewer, and no on-site sewage disposal system shall be allowed. (Ord. 521 §1 (part), 1991)

13.08.030 Health hazards.

Notwithstanding any other provision of this chapter, and specifically whether or not a sewage disposal permit has been issued in connection with the on-site sewage disposal system involved, use or occupation of any residence, place of business, or other building or place where persons reside, congregate, or are employed is unlawful if and when the drainage system from the building or place discharges sewage in a manner that causes or threatens to become a health hazard or nuisance. (Ord. 521 §1 (part), 1991)

13.08.040 Building permit.

The building official shall not issue a permit for the construction of any building or structure in the county unless he shall have a statement issued and signed by the health officer that the water and sewage systems are installed and approved. (Ord. 521 §1 (part), 1991)

13.08.050 Permit required.

No on-site sewage disposal systems shall be constructed except in accordance with the required sewage disposal permit issued by the health officer. Use or occupation of any residence, place of business, or other building or place where persons reside, congregate, or are employed is unlawful without a valid sewage disposal system permit issued by the health officer after final inspection and approval of the system by the health department. The health officer shall not issue an on-site sewage disposal system permit except in response to a duly filed application as set forth in this chapter. When more than one on-site sewage disposal system is being installed on the same property, a separate sewage disposal permit is required for each system. (Ord. 521 §1 (part), 1991)

13.08.060 Correction notices.

The Health officer is empowered to order any owner of property to change an existing on-site sewage disposal system with respect to its method or location for the discharge, treatment or disposal of sewage where the change is necessary to prevent the system from being a health hazard or nuisance. Any correction notice shall designate a reasonable time within which the hazard or nuisance shall be abated. (Ord. 521 §1 (part), 1991)

13.08.070 Parcel size minimum on new divisions of land.

A. Notwithstanding any other provision of this code, no land division or subdivision shall be approved if the land division or subdivision, if approved, would create any parcel that would:

1. Be less than one-half acre (net) in size, unless each parcel is served by a sanitary sewer;

2. Be less than forty thousand square feet (gross) in size if the domestic water supply is from a private well, spring or other private water source and the method of sewage disposal is a private on-site sewage disposal system.

B. Exemptions may be granted on a case-by-case basis to the criteria in subsections (A)(1) and (2) of this section for approved planned developments where the average density of the entire project does not exceed the criteria in subsections (A)(1) and (2) of this section. Exemptions may require approval of the Regional Board. Exemptions violating the North Lahontan

Basin Plan must be approved by the Regional Board. (Ord. 521 §1 (part), 1991)

13.08.080 Alternative systems.

Requirements for construction of an alternative system are not set forth in this chapter. The health officer is authorized to adopt rules, regulations, or policies concerning the installation of alternative systems until such time as the board of supervisors may adopt a specific ordinance governing alternate systems. The health officer is directed to present to the board of supervisors information on any such rules, regulations, or policies concerning installation and maintenance of alternative systems. (Ord. 521 §1 (part), 1991)

13.08.090 General criteria for sewage permit issuance.

The health officer shall not issue a sewage disposal permit if the installation or proposed installation of the sewage disposal system will permit:

A. The escape of any noxious odors, vapors, or gases;

B. Ingress or egress of flies, rodents, or other insects or animals;

C. The sewage to empty, flow, drain, or otherwise enter and pollute any stream, river, lake, groundwater, or other waters that may be used or suitable for use for domestic, agricultural, or other beneficial purposes; or

D. Discharge of the sewage on the surface of the ground. (Ord. 521 §1 (part), 1991)

13.08.100 General regulations respecting all conventional systems.

The location, installation, and maintenance of a conventional system and every part thereof, no matter what the character of use, shall be such that it will function in a sanitary manner and will not create a nuisance, or endanger the safety of any water supply, groundwater, or surface water. In determining a suitable location for a conventional system, consideration shall be given to suitability of soil, size and shape of the lot, location of buildings, slope of ground surface, depth to groundwater, proximity of the system or future connection to a sanitary sewer. Based upon these general criteria, the following specific regulations apply:

A. Soil. The property must contain soil. The amount of soil must be adequate for the character of use. The criteria to determine whether or not soil is present may include its percolation rate (no less than five and no more than sixty minutes per inch), its susceptibility to extraction by pick and shovel, and its capacity for grain-to-grain flow of water, including no evidence of direct flow of water through it to the subsurface groundwater. This list of criteria for determining whether a substance is soil is not exhaustive and may include additional criteria; all such criteria, whether listed above or not, must be applied in each individual case with judgement based upon experience and the goals sought to be achieved by the decision, with some criteria given more weight than other criteria under different circumstances.

B. Lot Size. The size of the lot on which the conventional system is to be constructed shall be sufficient to permit proper location, installation, and operation of the conventional system. The average daily amount of sewage, the character of the soil, and the source of water supply will determine the necessary lot size. The mini-

mum lot size must be sufficient for compliance with all setback requirements of this chapter and for one hundred percent disposal area expansion or replacement.

C. Flooding and High Groundwater. Installation of leach lines in low areas subject to flooding or in areas where the ground water rises to within five feet of the bottom of the leach trench or leach field at the wettest time of a normal rainfall year is not acceptable.

D. Drainage System Discharge Only. A conventional system shall be designed to receive all domestic sewage from the drainage system. No basement, floating or surface drainage, or regeneration discharge from a water softener shall be permitted to enter any part of the system.

E. Leach Lines. A typical trench for a subsurface leach line shall be eighteen inches wide, four feet deep, and thirty-five feet long for each bedroom (in the case of single-family residences). The lengths, depths, and widths of any leach line installation may vary from the typical, depending upon soil types, soil depth, and other conditions. For example, trench depth may be as shallow as two feet where soil depth is as shallow as seven feet, and length of leach lines for each bedroom may increase accordingly.

F. Septic Tank Capacities. The following table shall be used for computing septic tank capacities for dwellings:

One, two or three bedrooms	1,000 gallons
Four bedrooms	1,200 gallons
Five bedrooms	1,500 gallons

(add 250 gallons for each additional bedroom)

G. Setback Requirements. Minimum horizontal setback requirements for construction of a conventional system shall be as follows:

	Septic Tank	Leach Field	Unlined Pond or Sump
Any private water supply well	100'	100'	150'
Any public water supply well	100'	150'	150'
Water supply pipe	10'	10'	10'
Flowing streams or waterways	50'	100'	100'
Lake or reservoir	50'	200'	200'
Property line	5'	10'	75'
Property line	25'	50'	50'[1]
Building, driveway, patio, deck, or other ground covering	10'	10'	10'
Distribution box	5'	5'	5'
Distribution field	5'	10'[2]	–
Ephemeral stream	50'	50'	50'
Drainage course	50'	50'	50'

1. When individual wells are used on the same lot. Distances are to those property lines contiguous with neighboring lots and not street easements.

2. When more than one sewage disposal system is installed on the same property.

H. Plumbing Code. Construction of a conventional system must comply with

Chapter 11, Building Sewers and Private Systems, and Appendix "I", Private Sewage Disposal Systems, of the 1988 Edition of the Uniform Plumbing Code or most recent edition adopted by the county.

I. Construction Dimensions. Disposal fields shall be constructed as follows:

Minimum soil depth below bottom of leaching	5 feet
Minimum number of drain lines per field	one
Maximum length of each line	100 feet (30.5 m)
Minimum bottom width of trench	18 inches (457.2 mm)
Maximum bottom width of trench	36 inches (914.4 mm)
Minimum spacing of lines, center to center	8 feet (2.4 m)
Minimum depth of earth cover over lines	12 inches (304.8 mm)
Preferred depth of cover lines	18 inches (457.2 mm)
Maximum grade of leach lines (2.5 mm/m)	3 inches per 100 ft.
Minimum grade of leach lines	level
Minimum filter material under drain lines	12 inches (304.8 mm)
Minimum filter material over drain lines	2 inches (50.8 mm)

Minimum spacing between trenches shall be eight feet.

When necessary on sloping ground to prevent excessive line slope, leach lines shall be stepped. The lines between each horizontal section shall be made with watertight joints and shall be designed so each horizontal leaching trench shall pass to the next lower line. The lines between each horizontal leaching section shall be made with approved watertight joints. (Ord. 521 §1 (part), 1991)

13.08.110 Application for sewage permit.

A. Application for a sewage disposal permit shall be made by the owner of the property or his authorized representative. All work to be performed under a sewage disposal permit shall be performed by the owner or by a licensed contractor (A or C-42). If the owner's representative is other than a contractor licensed by the state of California, and the representative is not exempt under Section 3800 of the California Labor Code, the application for the sewage disposal permit will not be accepted.

B. It is the responsibility of the property owner to ascertain that a valid sewage disposal permit has been issued by the health officer prior to commencement of construction. All on-site sewage disposal systems shall be installed as designed and approved. Variations from the approved design shall require approval of the health officer. Application for a sewage disposal permit shall be on a form provided by the health department and shall include a plot plan drawn to scale with the following minimum information:

1. Owner's name, mailing address, telephone number, and the assessor's parcel number for the property;

2. Names of streets or roads fronting the property;

3. Easements of record shall be shown on the plot plan;

4. Boundaries of property giving dimensions and north direction;

5. Dimensions and locations of all existing and proposed structures, including

hard surfaces such as patios, driveways, and walkways;

6. Location of outlet from drainage system and proposed location of septic tank and other parts of the on-site sewage disposal system;

7. Location and nature of any existing on-site sewage disposal systems on the property;

8. Location of any existing or proposed well, domestic or irrigation, in use or abandoned on the property or adjacent property and located within two hundred feet of the proposed on-site sewage disposal system;

9. Depth below the bottom of the leach lines to anticipated highest groundwater level during the wettest months of a normal rainfall year. This requirement may be waived by the health officer;

10. All streams and drainage courses located within three hundred feet of the proposed on-site sewage disposal system;

11. All sources of domestic water supply within three hundred feet of the proposed on-site sewage disposal system; and

12. General direction of slope of the land in disposal area. (Ord. 521 §1 (part), 1991)

13.08.120 Health department review of application.

Whenever an applicant has filed an application under Section 13.08.110, and has paid appropriate fees, and is not complying with Section 13.08.130, the health officer shall proceed as follows:

A. Make an inspection of the site to determine compliance with this chapter, including the requirements of Section 13.08.100. The eight-foot profile excavations and two percolation tests to verify presence of adequate soil shall be required on all lots. Percolation tests may be waived by the health officer if the health officer determines that the soil has adequate permeability;

B. Determine if on-site sewage system applied for can be considered a conventional system;

C. If the health officer determines that the on-site sewage disposal system is conventional and complies with this chapter, the health officer shall give notice to the property owner by first class mail that the permit application is approved;

D. If the health officer determines that a site is not suitable for a conventional system, the applicant may proceed with the process outlined in Section 13.08.130. Written notice of rejection shall be sent to the applicant together with an explanation of the factual reasons for the denial of the conventional system, including as appropriate, but not limited to, the results of profile excavations, percolation tests, or the soils evaluation made by the health officer, and any other factors and conditions which caused the health officer to reject the request for a conventional system; and

E. All applications will be processed, approved or rejected in writing, by the health officer within twenty working days. If the application is rejected, then the applicant may appeal to the board of supervisors or proceed under Section 13.08.130. (Ord. 521 §1 (part), 1991)

13.08.130 Special design and nonresidential systems.

A. When an application for a sewage disposal permit is filed in accordance with Section 13.08.110 of this chapter, and the on-site sewage disposal system described therein is a special design system or the

character of use is anything other than a single-family residence (such as a residential duplex or building, and so forth), then, and in either of those events, the applicant may be required to submit, at the discretion, of the health officer, the following:

1. A report by a civil engineer licensed to practice in the state that describes the proposed on-site sewage disposal system and the relevant physical conditions of the site, including all calculations; and

2. A written certification by the engineer as follows: "I hereby certify that I have designed the on-site sewage disposal system that is the subject of this application based upon inspection of the site, including all tests and analyses that in my professional judgement are necessary or appropriate to determine that the system will function properly and treat and dispose of sewage in the manner described."

B. Regardless of the character or use of the property, any property owner or the property owner's representative may elect to have an on-site sewage disposal system treated as a special design system by complying with all of the provisions of this section. Approval of the regional board may be required for special designs or alternative systems and any system intended for discharge of industrial waste. When such compliance occurs, all provisions of this chapter concerning special design systems shall become applicable to the system involved. (Ord. 521 §1 (part), 1991)

13.08.140 Permits.

A sewage disposal system permit shall be valid for a period of one year from the date of its issuance. Within said period the owner must complete construction of the system and obtain the health officer's final inspection and final approval of the system or the permit shall automatically lapse and be void. If a permit lapses before the health officer gives final approval of the system, no person may work on or use the system for which the permit was issued until the owner obtains a new sewage disposal system construction permit. Transfer of ownership does not invalidate a permit for that parcel. (Ord. 521 §1 (part), 1991)

13.08.150 Extension of permits.

If an owner submits to the health officer an application for a permit extension for a sewage disposal system while the permit is still valid, the health officer shall grant one extension of the permit for a period of one hundred eighty days for the sole purpose of allowing the owner to complete construction and obtain final approval of the system. (Ord. 521 §1 (part), 1991)

13.08.160 New land developments and new subdivisions.

The California Regional Water Quality Control Board - Lahonton Region (the "Regional Board" hereinafter) may pursue the following course of action for discharges from new subdivisions, conventional systems or special design systems:

A. Land developments and subdivisions consisting of less than one hundred lots may be processed entirely by the health officer. Tentative maps for land developments or subdivisions involving five or more lots shall be transmitted to the Regional Board or the health officer along with sufficient information to determine that the proposed subdivision meets the requirements of this chapter. The Regional Board or the health officer may require a maintenance entity, if potential water quality or public health problems are anticipated.

B. Tentative maps for subdivisions containing one hundred lots or more shall be transmitted to the Regional Board. The map shall be accompanied by a report of waste discharge and sufficient information to demonstrate that the proposed subdivision will meet the requirements of this chapter. A maintenance entity may be required prior to any discharge of waste. (Ord. 521 §1 (part), 1991)

13.08.170 New land developments and new subdivisions—Criteria for conventional systems.

The health officer shall recommend to the Regional Board, to the county planning commission, or to the board of supervisors, approval of any lot within a new land development or subdivision for a conventional system if the subdivider proves to the satisfaction of the health officer that the lot will comply with the following criteria:

A. The percolation rate in the disposal area is no slower than sixty minutes per inch and no faster than five minutes per inch unless it can be shown that a sufficient distance of soil is available to assure proper filtration.

B. Soil depth below the bottom of the leaching trench shall not be less than five feet.

C. Depth to anticipated highest level of groundwater below the bottom to the leaching trench shall not be less than five feet. Greater depths are required if soils do not provide adequate filtration.

D. Ground slope in the disposal area shall not be greater than thirty percent.

E. Areas that are within the minimum distances that are necessary to provide protection to water quality and public health shall not be used for waste disposal. The following areas are also considered unsuitable for the location of sewage disposal systems or replacement areas:

1. Areas within any easement that is dedicated for surface improvement;

2. Paved areas, driveways, or parking areas;

3. Areas not owned or controlled by property owners unless the area is perpetually available for waste disposal purposes; and

4. Areas occupied or to be occupied by structures.

F. The lot must comply with the following minimum distances in order to provide protection to water quality and public health:

Drainage Cut (in feet)

	Domestic Well	Public Well	Flowing Stream [1]	Course of Ephemeral Stream [2]	Fill Bank	Property Line [3]	Lake Reservoir.[4]
Septic tank or sewer line	100	100	50	50	10	25	50
Leaching field	100	100	100	50	4h*	50	200

* Distance in feet equals four times the vertical height of the cut or fill bank. Distance is measured from the top edge of the bank.

1—As measured from the line which defines the limit of a one-hundred-year frequency flood.

2—As measured from the edge of the drainage course or stream.

3—This distance shall be maintained when individual wells are to be installed and the minimum distance between waste and wells cannot be assured.

4—As measured from the high water line.

If requested by the health officer, the subdivider shall prepare for the health officer a map showing approved locations for conventional systems on each lot and identify locations of systems on each parcel. (Ord. 521 §1 (part), 1991)

13.08.180 Inspections.

The health officer is authorized to make such inspections as are necessary to determine compliance with this chapter. Owners or occupants of real property shall give the health officer access to their property at reasonable times for the purpose of making such inspections as are necessary to determine compliance herewith. (Ord. 521 §1 (part), 1991)

13.08.190 Inspections prior to use.

No work done under any sewage permit shall be covered, concealed, or put into use before it has been inspected and approved by the health officer. (Ord. 521 §1 (part), 1991)

13.08.200 Appeals.

Any person whose application for a sewage disposal permit has been denied may, within thirty calendar days from the date of such denial, appeal such denial to the board of supervisors by filing written notice of appeal with the clerk to the board and with the health department. Such appeal shall be heard by the board within fourteen days of the filing of the notice of appeal. At the board hearing, the board may sustain or overrule the denial and may make such orders as are necessary to protect the public health. (Ord. 521 §1 (part), 1991)

13.08.210 Enforcement.

The health officer is authorized to enforce the provisions of this chapter. (Ord. 521 §1 (part), 1991)

13.08.220 Penalty.

A. Any person violating the provisions of this chapter shall be guilty of a misdemeanor and upon conviction thereof shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding six months, or by both such fine and imprisonment.

B. In addition, any violation of any provision of this chapter is a public nuisance subject to abatement in accordance with law. (Ord. 521 §1 (part), 1991)

CONDITIONS FOR CONSTRUCTION AND APPROVAL OF A DOMESTIC WATER WELL

DATE:	**May 9, 2005**
OWNER:	[redacted]
WELL DRILLER:	[redacted]
COMPANY:	[redacted]
APN:	**01 150 47**
PERMIT NO.:	**02 2005 04**

1. The construction, repair, modification or destruction of a water well shall meet the requirements set forth in Chapter II of the California Department of Water Resources Bulleting 74, "Water Well Standards".

2. A copy of this well permit shall be maintained onsite by the well driller during construction of the well. This permit shall be valid for a period of one year from date of issuance.

3. A copy of the well permit shall be on the premises during the drilling process.

4. The well shall be drilled as sited on the approved plot plan.

5. Maintain a minimum distance of 50 feet from the well to the property line.

6. Maintain a minimum of 100 feet from the well to any septic tank and leach field.

7. All drilling fluids shall be contained in a pit dug on the property. The pit shall be buried before the drilling rig leaves the property.

8. The well annular space shall be sealed to a minimum dept of 26 feet. The owner or well driller shall call the Alpine County Health Department at 1 800 292 2156 for approval and inspection a minimum of 48 hours prior to sealing the well.

9. Upon completion of the well, the well driller shall submit a copy of the completed State Department of Water Resources "Water Well Drillers Report" to the Alpine County Health Department.

10. After the well is constructed, the contractor shall complete the following:

    a. Pour an elevated concrete pad around the well casing continuous with the annular seal. The thickness of the pad shall be at least 4 inches and should be approximately 4 foot square, sloping away from the well casing.

b. After the pump and distribution piping are installed, disinfect the well and piping system with a minimum concentration of 100 parts per million chlorine for a period of 24 hours.

c. After disinfection and before the well is placed into use, a water sample shall be collected at the well and a coliform analysis conducted by a State approved laboratory. The results of the test shall be submitted to the Alpine County Health Department, 75 B Diamond Valley Drive, Markleeville, CA 96120. The sample should be collected three to seven days after the chlorine has dissipated from the system. Water sample containers and procedures are available from this office upon request.

d. After completion of these requirements, contact the Alpine County Health Department at 800 292 2156 for final inspection and certification.

Should you have any questions or need any assistance, please contact the Health Department at 800 292 2156.