SOUTH TAHOE PUBLIC UTILITY DISTRICT

RECYCLED WATER FACILITIES MASTER PLAN

ENVIRONMENTAL IMPACT REPORT

FINAL - NOVEMBER 2009

California State Clearing House Number 2007042116

HAUGE BRUECK ASSOCIATES

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1 Introduction and Summary

1 Introduction and Summary

Pursuant to the California Environmental Quality Act (CEQA), discretionary decisions by public agencies regarding public projects are subject to environmental review. The purpose of an environmental impact report (EIR) is to identify the significant environmental effects of a project, to identify alternatives to the project, and to indicate the manner in which those significant effects can be mitigated or avoided (§21002.1(a)). When feasible, the public agency is required to mitigate or avoid a projects significant environmental impacts.

The South Tahoe Public Utility District (District) proposes to adopt the Recycled Water Facilities Master Plan (Project) and approve four Master Plan projects for implementation. The Project identifies facilities, improvements, and operations necessary to provide for the reliable reuse and disposal of recycled water generated by the District's wastewater treatment operations located in South Lake Tahoe, CA.

This EIR has been prepared by the District as the lead agency for the Project in compliance with CEQA and the CEQA Guidelines (California Administrative Code §1500 et seq.). Environmental effects of the Project that are addressed include the significant adverse effects of the project, growth-inducing effects and significant cumulative effects of past, present, and reasonably anticipated future projects.

This is the Final Environmental Impact Report (FEIR) for the Recycled Water Facilities Master Plan which incorporates modifications to the July 2009 Draft EIR for the Recycled Water Facilities Master Plan, presented in legislative format to display the changes made in response to comments received during the circulation period. The new text has been underlined and deleted text has been ~~struck out~~.

A total of 27 comments were received on the Draft EIR. The comments are provided in their entirety in Appendix O. Responses to the comments are provided in Appendix P.

Modification of 5 Chapters of the EIR and 6 new appendices are included in this document as listed below:

1 - Summary and Introduction

Chapter 1 was updated to reflect the most recent Public and Agency Involvement. The Significant and Unavoidable Impacts were modified to reflect changes made in subsequent chapters.

7 - Groundwater

Chapter 7 was updated to reflect the changes to the modified Nutrient Management Plan generated for Component 11 and to modify the groundwater impacts.

11 - Biological Resources

Chapter 11 was updated to clarify impacts to migratory birds, deer migration and to update impacts based on modifications to mitigation measures.

13 - Air Quality

Chapter 13 was modified to clarify statements regarding odor problems and sensitive receptors.

15 - Historical and Archaeological Resources and Paleontology

Chapter 15 was modified to reflect the most recent record search.

Appendix I-a -– Investigations of Increasing Nitrate to Groundwater in Alpine County, California
Appendix I-b -– Memorandum, Phase 1 Irrigation Fields Monitoring Well Installations, Diamond Valley, Alpine County, CA
Appendix I-c -– Memorandum, Diamond Valley Temporary Containment Fields Nitrate Evaluation, Alpine County, CA

Site specific soil conditions and groundwater monitoring results in the vicinity of Project Component 11 is provided in the Farr Report and Memorandum.

Appendix M - List of Migratory Birds in the Project Area

Appendix N - Component 11, 12, 18 and 19 Project Level Environmental Analysis

Appendix O - Comments Received on Draft EIR

Appendix P - Response to Comments Received on Draft EIR

Appendix Q - CEQA-Plus Form

Appendix R - Correspondence

1.1 Project and Alternatives

The Project, two Project alternatives, and the No Project alternative are evaluated in this EIR. A description of the Project and the alternatives, including detailed descriptions of the four Master Plan projects to be implemented, are provided in Chapter 2. Analysis of the alternatives is provided in Chapter 19.

1.1.1 Overview of Project Location and District Operations

The District's existing fresh water and recycled water facilities are located in northeastern Alpine County on the eastern slope of the Sierra Nevada. Although operations are within Alpine County, CA, the closest urban areas are the towns of Minden and Gardnerville located 20 miles north of Alpine County in Douglas County, NV. The District's service area is 25 miles away in El Dorado County, CA. The Project vicinity is illustrated in Figure 1-1. The existing recycled water system begins at the District's wastewater treatment plant (WWTP) in South Lake Tahoe where recycled water is pumped out of the Lake Tahoe Basin along State Route (SR) 89 over Luther Pass to SR 88 in Hope Valley, and then along the West Fork of the Carson River to Harvey Place Reservoir (HPR) southeast of Woodfords, CA. Existing operations are detailed in Chapter 2, section 2.8, No Project (Alternative 1).

The project area encompasses portions of Alpine County, CA and Douglas County, NV. As shown in Figure 2-1 in Chapter 2, the Project area is comprised of lands of the West Fork of the Carson River watershed and the Indian Creek watershed. The project area extends from south of Woodfords in Alpine County to a portion north of the Carson Valley in Douglas County.

1.1.2 Project Background

The District is the wastewater service provider for the South Lake Tahoe, CA area. Wastewater generated within the District service area is treated at its wastewater treatment facilities in South Lake Tahoe and exported to Alpine County, CA where the recycled water has been used to irrigate ranch lands since the 1960's. The District manages the use of the recycled water and a freshwater systems in support of Indian Creek Reservoir (ICR) and HPR located in Alpine County. The Recycled Water Facilities Master Plan has been prepared to assure the continued reliable operation of the recycled water and freshwater systems.

Figure 1-1 Project Vicinity (8.5X11)

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The District embarked on the Recycled Water Facilities Master Plan in 2000. A Draft EIR was circulated and hearings held on the Master Plan and Draft EIR. The project was suspended pending the purchase of the Heise Ranch. In 2007, after completion of the purchase of the Heise Ranch, the District restarted the master plan update and environmental review process.

To ensure that a reasonable range of alternatives are considered as required by CEQA, the District identified 28 facility and operational components designed to meet the District's need to manage their recycled water and freshwater systems. These 28 Master Plan components were refined through the planning and environmental review process. The Master Plan assembles sets of components into Master Plan projects to identify the group of components necessary to implement each project. Individual components may be in one or more of the Master Plan projects. The EIR analyzes each of the 28 components individually and cumulatively. The Master Plan projects impacts are disclosed from the individual and cumulative impacts of the components included in each project.

During the development of the Master Plan, six components were determined to not be included in the Master Plan. The six components have been retained for future consideration in an appendix to the Master Plan because these may be needed in the future in response to changes in land ownership, law, or the economy.

1.1.3 Project Objectives

The District requires a reliable recycled water reuse and emergency storage system that accommodates the flows generated by the residents and visitors within the Lake Tahoe Basin of El Dorado County, CA and recycled by the District wastewater treatment facility located in South Lake Tahoe, CA.

The District utilized the following objectives for selection of the Master Plan components and projects:

1. Establish a plan for recycled water and freshwater management for operation through the year 2028;
2. Assure regulatory compliance for the District's recycled water and freshwater operations;
3. Protect and enhance the environment in Alpine County;
4. Continue cooperation with Alpine County stakeholders; and
5. Preserve agricultural practices in Alpine County.

1.1.4 No Project Alternative (Alternative 1)

Alternative 1 consists of the existing District Recycled Water and freshwater facilities in Alpine County, CA as of April 19, 2007 (see Figure 2-3). These facilities include: ditches and pipelines to convey freshwater to ICR, ditches and pipelines to convey recycled water for storage to HPR and the Diamond Ditch system to convey recycled water to current ranch users. Sections 3 and 4 of the Master Plan provide a description of these facilities. Table 2-3 provides a summary of the existing facilities and operations in Alpine County.

1.1.5 Project (Alternative 2)

The Project is the implementation of the Recycled Water Facilities Master Plan. The Master Plan includes 20 projects that implement one or more of the 28 components. A list of the Master Plan projects and the individual Project Components that comprise each project are included in Table 2-2.

Chapter 13 of the Master Plan (Stantec 2008) details the Master Plan implementation and summarizes the process the District follow to decide which projects to implement as based on future triggers.

Because implementation of every component may not be necessary to meet the District's objectives based on future conditions, components are analyzed individually in this EIR to allow for the best combination to be selected by the District in response to future freshwater and recycled water triggers and contingencies.

1.1.6 Master Plan Recommended Projects (Alternative 3)

The Master Plan recommends nine Project Components for implementation based on the need to address infrastructure and management inadequacies and compliance with State of California waste discharge requirements (WDR) during temporary discharge situations. The following is a list of components that comprise Alternative 3:

- 3 – Capacity and conveyance improvements in the Diamond Ditch system
- 4 – Provide pressurized recycled water to the Fredericksburg system
- 6 – Provide pressurized recycled water to the Ranchettes
- 11 – Construct irrigation fields with pumping back to Harvey Place Reservoir
- 18 – Optimize application rate on existing irrigated lands
- 19 – Pursue permitting of more land in Alpine County
- 22 – Parallel recycled water pipeline along existing Diamond Ditch
- 29 – Irrigate the District Pasture
- 30 – Irrigate the Jungle with Recycled Water

Alternative 3 is considered the minimum action alternative, as this alternative includes the least number of Project Components that can be implemented to meet the District's objectives. This alternative does not allow for future implementation of the Project Components that could become necessary due to changing land use patterns, economic conditions or regulations.

1.1.7 Master Plan Trigger Projects (Alternative 4)

Alternative 4 is composed of Project Components that can be implemented in the future to allow the District greater flexibility to respond to changing conditions. As the Master Plan is a 20-year document, there may be unforeseen changes that the District may face in response to: future land uses on the existing irrigated ranches; changes in requirements for discharge of recycled water; changes in total volume of recycled water to be managed; and economic shifts. These triggers could have an impact on the District's ability to dispose of recycled water. Alternative 4 allows the District flexibility in choosing and implementing select Project Components. Alternative 4 allows for the analysis of a reduced project scenario that meets the District's objectives. The following is a list of components that comprise Alternative 4:

- 1 – Provide recycled water to new non-irrigated, permitted land
- 2 – Make recycled water available to irrigators in Nevada

- 3 – Capacity and conveyance improvements in the Diamond Ditch system
- 4 – Provide pressurized recycled water to the Fredericksburg system
- 6 – Provide pressurized recycled water to the Ranchettes
- 7 – Non-flood irrigation application system
- 11 – Construct irrigation fields with pumping back to Harvey Place Reservoir
- 14 – Pipe recycled water systems to minimize setbacks and human contact
- 16 – Subsurface recycled water irrigation in public contact of buffer areas
- 17 – Increase Snowshoe Thompson No. 1 conveyance capacity
- 18 – Optimize application rate on existing irrigated lands
- 19 – Pursue permitting of more land in Alpine County
- 22 – Parallel recycled water pipeline along existing Diamond Ditch
- 23 – Route Mud Lake winter flows through Indian Creek Reservoir
- 24 – Transfer additional water rights to storage in Indian Creek Reservoir
- 29 – Irrigate the District Pasture
- 30 – Irrigate the Jungle with Recycled Water
- 31 – Divert Stormwater Flow away from Harvey Place Reservoir and to Indian Creek Reservoir

1.2 Environmental Review – CEQA

This EIR is both a Program EIR and a Project EIR based on the level of detail provided for each Project Component. The Project Components evaluated at a project level in the EIR are:

- 11 – Construct irrigation fields with pumping back to Harvey Place Reservoir
- 18 – Optimize application rate on existing irrigated lands
- 19 – Pursue permitting of more land in Alpine County

The remaining 25 Project Components are evaluated at a program level in the EIR.

A Program EIR under the provisions of CEQA Guidelines §15168 evaluates the impacts of a series of actions that can be characterized as one large project and are related either:

(1) Geographically;

(2) As logical parts in a chain of contemplated actions;

(3) Are connected with issuances of rules, regulations, plans or other general criteria to govern the conduct of a continuing program; or

(4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

For Project Components evaluated at a program level in this EIR, additional environmental review may be required to address details of each component not evaluated in this EIR. As Project Components are designed for implementation, the District will conduct the appropriate level of environmental review prior to component implementation.

A Project EIR, as defined by CEQA Guidelines §15161, is an EIR that examines the environmental impacts of a specific development project. The Project EIR evaluates the detailed project including planning, construction, and operation.

1.3 Environmental Review – NEPA

The National Environmental Policy Act (NEPA) applies to projects that are carried out, financed, or approved in whole or in part by federal agencies. The Project does not involve a federal action, and therefore NEPA environmental analysis is not required. If implementation of the Master Plan requires a federal action, such as issuance of a Section 404 permit by the Corps of Engineers under the Clean Water Act, the District will initiate environmental review through a designated NEPA lead agency.

1.4 Public and Agency Involvement

The environmental review process complies with the CEQA requirements for public notice and review of environmental documentation for the Project, thus assuring that interested parties have the opportunity to review and comment on the implementation of the Master Plan components.

A Notice of Preparation (NOP) prepared for this EIR started circulation on April 20, 2007 and ended on May 21, 2007. Two scoping meetings were held: the first on May 16, 2007 at Turtle Rock Park in Alpine County and the second on May 17, 2007 at the South Tahoe Public Utility District Board Room in South Lake Tahoe.

A revised NOP was prepared and circulated on January 5, 2009 and ended on February 6, 2009. The revised NOP included the addition of four components to the project description and the addition of two new alternatives; Alternative 3 and Alternative 4.

The Draft EIR circulation started on July 23, and ended on September 7, 2009. A Notice of Completion (NOC) was submitted to the California State Clearinghouse on July 23. Two public meetings were held to take comments on the Draft EIR: September 2, 2009 at Turtle Rock Park in Markleeville, CA and September 3, 2009 at the South Tahoe Public Utility District Board of Directors Meeting in South Lake Tahoe, CA.

The Final EIR will be circulated starting November 20, 2009 for review by the individuals and agencies who commented on the Draft EIR for 10 days ending November 30, 2009. The Final EIR will be available for review at these locations: The South Tahoe Public Utility District 1275 Meadow Crest Drive, South Lake Tahoe, CA 96150; the South Lake Tahoe Library. 1000 Rufus Allen Blvd. South Lake Tahoe, CA 96150; and the Alpine County Library 270 Laramie St. Markleeville, CA 96120.

1.5 EIR Recirculation Discussion

Section 15088.5 of the CEQA Guidelines governs recirculation of a Draft EIR prior to certification. Recirculation is required when "significant new information" is included in the Final EIR, such as information showing that:

- A new significant environmental impact would result from the project or from a new mitigation measure proposed to be implemented.
- A substantial increase in the severity of an environmental impact would result unless mitigation measures are adopted to reduce the impact to a level of insignificance.
- A feasible project alternative or mitigation measure considerably different from others previously analyzed would clearly lessen the significant environmental impacts of the project, but the project's proponents declined to adopt it.

The minor changes and clarifications to the EIR's analysis do not significantly alter the Project or the analysis presented in the Draft EIR nor do they result in new significant impacts or a substantial increase in less-than-significant impacts. Instead, these minor changes merely "make insignificant modifications" in the Project and EIR, as is permitted by State CEQA Guidelines section 15088.5.

Accordingly, these minor changes and the EIR analysis for the Project do not "deprive the public of a meaningful opportunity to comment upon a substantial adverse environmental effect on the [P]roject or a feasible way to mitigate or avoid such an effect (including a feasible [P]roject alternative) that the Project's proponents have declined to implement." (State CEQA Guidelines, §15088.5(a).) Further, these minor changes are not "significant new information" within the meaning of CEQA. In summary, "significant new information" consists of: 1) a disclosure of a new significant impact; 2) a disclosure of a substantial increase in the severity of an environmental impact; 3) a disclosure of feasible project alternative or mitigation measure considerably different from the others previously analyzed that would clearly lessen the environmental impacts of the project but the project proponent declines to adopt it; or 4) where the Draft EIR was so fundamentally and basically inadequate and conclusory in nature that meaningful public review and comment were precluded. (State CEQA Guidelines, §15088.5.) Accordingly, neither these minor changes nor the minor clarifications made to the Draft EIR require recirculation of the Draft EIR, and there is substantial evidence support the District's determination that recirculation of the Draft EIR is not required under CEQA.

Changes were made to the Draft EIR in response to comments. These corrections and clarifications represent additional information or clarifications represent additional information or clarifications that do not significantly alter the Project, change the EIR's significance conclusions, or result in a conclusion that significantly more severe environmental impacts will result from the Project. Instead, the errata and the revisions made to the EIR merely "clarifies or amplifies or makes insignificant modifications" in the already adequate Draft EIR, as permitted by State CEQA Guidelines, section 15088.5(b). Specifically, CEQA Guideline section 15088.5, requires the lead agency to recirculate an EIR only when significant new information is added to the EIR after public notice is given of the availability of the Draft EIR for public review. New information added to an EIR is not significant unless the EIR has changed in a way that deprives the public of a meaningful opportunity to comment upon substantial adverse, environmental effect of the project or a feasible way to mitigate or avoid such an effect that the project's proponent's have declined to implement. (State CEQA Guidelines, §15088.5.)

The errata present information that expands upon the Project and the analysis of the Project's impacts, but does not change the overall significance conclusions presented in the Draft EIR circulated for public review. Additionally, the errata present supplemental information and analysis in response to requests from the commenters. This analysis, however, merely supplements, expands upon, and provide further details on the analysis already provided in the EIR. Accordingly, the information presented in these errata merely "clarifies" or "amplifies" the analysis provided in the Draft EIR, and recirculation is not required.

Additionally, the errata includes the imposition of further mitigation measures. These mitigation measures were proposed by commenters, and pursuant to CEQA, the District imposed those measures to mitigate for potentially significant impacts wherever feasible or imposed the measures to further reduce already insignificant impacts. These mitigation measures, however, are not required to reduce significant impacts to a less than significant level, nor are they imposed due to discovery of new significant impacts. Moreover, and because these mitigation measures address ways to implement the proposed Project but do not propose the construction of new facilities, none of these new mitigation measures will result in any potentially significant impacts of their own.

Accordingly, neither the errata, nor the clarifications to the Draft EIR, nor the supplemental analysis provided in Chapters 1, 7, 11, 13, 15 and Appendices I-a, I-b, I-c, M, N, O, P, Q, and R nor the addition of further mitigation measures results in any changes to the EIR "that deprive[d] the public of meaningful opportunity to comment upon a substantial adverse environmental effect of the [P]roject or a feasible way to mitigate or avoid such an effect (including a feasible [P]roject alternative) that the Project's proponents have declined to implement." (State CEQA Guidelines, §15088.5.(a).) Thus, there is substantial evidence supporting the District's determination that neither the errata nor the new mitigation measures require recirculation of the EIR under CEQA. (State CEQA Guidelines, §15088.5.)

1.6 Uses of the EIR

The District, as lead agency, must consider the information in this EIR to make its decision on the Project. The District may approve, approve with conditions, or deny the Project. The EIRs conclusions do not control the District's decision. The lead agency may approve a project despite significant adverse impacts if it issues two sets of findings. The first set of findings must state how the lead agency has responded to the significant effects identified in the EIR. The second set of findings must include a "statement of overriding considerations" which states the specific reasons the agency has approved the project despite significant environmental effects. After the District has certified the EIR and issued the appropriate findings, the District may make a decision on the Project. The District will use the EIR for approval of projects and operations pursuant to the Master Plan.

Other agencies have discretionary authority to approve part or all of the Project and will rely on the District to produce an EIR adequate for their needs. These agencies must use the EIR as the basis for their permit approvals. The District must confer with other interested public agencies that do not have approval authority over the Project, but which have expertise with regard to the Project or have responsibility for resources affected by the Project.

The following agencies may be Responsible Agencies under CEQA and may need to issue approvals for the Project:

- South Tahoe Public Utility District - The District Board must approve the Recycled Water Master Plan and must approve the four Master Plan projects (Master Plan Projects 1, 2, 11 and 12) for implementation. The District will use the EIR in the review of future approvals of projects identified in the Master Plan.

- U.S. Army Corps of Engineers - Fill in wetlands or waters of the U.S. requires a Section 404 permit under the Clean Water Act.

- U.S. Fish and Wildlife Service - Impacts to Threatened or Endangered species will require Section 7 consultation with U.S. Fish and Wildlife Service.

- Lahontan Regional Water Quality Control Board (Lahontan) - Lahontan will issue new Water Quality Certifications for the projects (Section 401) and update the Waste Discharge Requirements (NO.R6T-2004-0010) including monitoring and reporting requirements. All construction projects that disturb greater than one acre of land must apply for a National Pollutant Discharge Elimination System (NPDES) Permit Order No. 99-08-DWQ, which requires the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

1.7 Areas of Controversy and Issues to be Resolved

The CEQA Guidelines (Section 15123(b)(2)) require the EIR to identify areas of controversy or expressed concern known to the Lead Agency, including issues raised by agencies and the public. Issues of concern raised by regional and local agencies and the public in written comments received on the January 8, 2009 NOP and through comments made at the scoping meetings include:

- Direct and indirect impacts to waters of the state as defined by the California Water Code (CWC) section 13050(e) and delineated on the Diamond Valley Ranch;

- Impacts to wetlands as defined in the Water Quality Control Plan Report for the North Lahontan Basin (Basin Plan) standards and requirements (pp 4.9-8 through 4.9-14);

- Determination of the presence or absence of state waters in the portion of the project area referred to as the Jungle absent of ongoing influence of human water manipulations;

- Impacts to channel morphology and riparian habitat caused by diversion of storm water away from storage in HPR and into Indian Creek;

- Impacts from erosion and soil loss; and

- Impacts to surface water and groundwater interactions from misapplication or over use of recycled water, including water quality, recharge, flooding and beneficial uses.

1.8 Summary of CEQA Required Sections

1.8.1 Growth-Inducing Impacts

The Project (Alternative 2) and action alternatives (Alternatives 3 and 4) will not result in the removal of obstacles to growth. The Recycled Water Facilities Master Plan is the District's implementation program for expanding the reuse and/or application of recycled water to 5.8 million gallons per day (mgd). The Project does not require expansion of the District's treatment plant, which has a capacity of 7.7 mgd. The impacts of the plant's capacity and the District's plan for accepting new sewer connections have been evaluated in prior environmental documents. The Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the District Future Sewer Connections Plan concludes that growth-inducing impacts of that project were less than significant. The District Recycled Water Facilities Master Plan will not allow additional growth beyond that projected in the EIR/EIS for the District Future Sewer Connections Plan. Future development ultimately will be determined through the Tahoe Regional Planning Agency (TRPA) planning process.

1.8.2 Significant and Unavoidable Adverse Impacts

Section 2100(b)(2)(A) of CEQA requires that an EIR identify any significant environmental effects that cannot be avoided if the project were implemented. Significant unavoidable impacts are summarized in Chapter 1 and discussed in detail in Chapters 4 through 18 and summarized in Chapter 19. Significant unavoidable impacts are those impacts that remain significant after implementation of proposed mitigation measures. Although the Project Components have the potential to result in a number of significant environmental impacts, most of these can be avoided through the adoption of appropriate mitigation measures that reduce those effects to a less than significant level.

Table 1-1

Summary of Significant Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measure
GEO 2. Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 ●	No additional mitigation is possible.
GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade and Diamond Valleys?	1, 2, 3, 4, 5, 6, ~~11~~ 14, 21, 22, 30 ●	**SW-33.** Surface and Groundwater Protection Plan **GW-1A.** ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water **GW-1B.** ~~Determine Maximum Duration for Temporary Containment~~ Do Not Exceed a Maximum Duration of Temporary Containment (100 Days)
SW-3. Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	30 ●	**SW-3.** Develop Project-specific Nutrient Management Plan for the Jungle
BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**BIO-1**. Conduct Biological Resource Assessments **SP-25.** Sensitive Resource Program
BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**SP-26.** Sensitive Plant Protection Program
BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**SP-30.** Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries

Table 1-1

Summary of Significant Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measure
BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11 (HPR Bypass Pipeline, A, B, C), 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32 ⦿ ●	**SP-23.** Delineate Wetlands, Waters of the United States, and Riparian Habitat **SP-24.** Prepare Wetland And Riparian Mitigation And Monitoring Plan **SP-27.** Avoid Impacts to Wetland and Riparian Areas **SP-32.** Pre-construction Marking and Fencing of Wetlands and Riparian Habitat **BIO-7.** Monitor Wetland And Riparian Mitigation Sites
ARCH-1. Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/ traditional heritage resources?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⦿ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources
ARCH-2. Will the Project Components disturb unknown archaeological resources?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⦿ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources **ARCH-2.** Protect Undiscovered Cultural Resource Sites

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⦿	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

1.8.3 Environmentally Superior Alternative

Alternative 3 Master Plan Recommended Projects is the Environmentally Superior Alternative. Typically Alternative 1, No Project, would be considered environmentally superior because no action is required. The analysis in Chapters 4 through 18 demonstrate Alternative 1 has four significant and unavoidable impacts. The Master Plan has been prepared to mitigate the impacts of the No Project alternative.

Alternative 3 meets the purpose, need, and objectives of the District and has a reduced footprint of activities by implementing nine components in comparison to Alternative 2 which implements 28 components and Alternative 4 which implements 18 components.

1.9 Impact and Mitigation Summary

Table 1-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
1	8 – West Fork Pipeline 9 – On-Farm Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
2	13 – make Recycled Water Available to Irrigators in Nevada	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
3	5 – Diamond Ditch Conveyance Improvements 6 – Waterfall Pipeline Forebay and Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
4	6 – Waterfall Pipeline Forebay and Pipeline 8 – West Fork Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
5	10 – Wade Valley Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
6	6 – Waterfall Pipeline Forebay and Pipeline 9 – On-Farm Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites

Table 1-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
7	7 – District Pasture Subsurface Irrigation Pilot Project 8 – West Fork Pipeline 9 – On-Farm Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
8	26 – Injection Well Program	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
9		GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ <u>Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water</u> BIO-1. Conduct Biological Resource Assessments BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
10	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ <u>Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water</u> BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
11	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch 2 – Harvey Place Reservoir Bypass System Pipelines and Ditches 3 – Diamond Valley Ranch Irrigation Fields Pump Back System	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ <u>Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water</u> GW-1B. ~~Determine Maximum Duration for Temporary Containment~~ <u>Do Not Exceed a Maximum Duration of Temporary Containment (100 Days)</u> BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
12	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
13	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ <u>Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water</u> BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites

Table 1-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
14	7 – District Pasture Subsurface Irrigation Pilot Project 8 – West Fork Pipeline 9 – On-Farm Pipeline 10 – Wade Valley Pipeline	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
15		GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
16	7 – District Pasture Subsurface Irrigation Pilot Project	BIO-7. Monitor Wetland and Riparian Mitigation Sites GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water BIO-1. Conduct Biological Resource Assessments BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
17	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
18	11 – Prepare Nutrient Management Plan	ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
19	12 – Permitting for Recycled Water Use in Diamond Valley	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
20	13 – Make Recycled Water Available to irrigators in Nevada	BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites

Table 1-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
21		BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
22	6 – Waterfall Pipeline Forebay and Pipeline 10 – Wade Valley Pipeline	BIO-1. Conduct Biological Resource Assessments BIO-4A. Fish Passage Structures and Deer Migration Corridors BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B. Monitor Habitat Restoration and Revegetation Sites BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
23	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements 15 – Upper Dressler Ditch Conveyance Improvements 16 – Indian Creek Treatment Wetlands 19 – use Mud Lake Winter Flows for Indian Creek Reservoir Flushing	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites
24	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements 15 – Upper Dressler Ditch Conveyance Improvements 16 – Indian Creek Treatment Wetlands 20 – Storage of Water for Downstream Users	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites
25	21- Develop Recycled Water Wholesale Program	Future Project Component - not analyzed in this EIR
26	22 – Biosolids Composting	Future Project Component - not analyzed in this EIR
27	23 – Become a Water Rights Buyer/Broker to Maintain the Value of Recycled Water	Future Project Component - not analyzed in this EIR
28	24 – Power Generation	Future Project Component - not analyzed in this EIR

Table 1-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
29	4 – Diamond Valley Freshwater/Recycled Water Irrigation System	GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
30	4 – Diamond Valley Freshwater/Recycled Water Irrigation System	BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
31	17 – Diversion Ditch for Stormwater Flow Away from Harvey Place Reservoir and to Indian Creek Reservoir	SW-4. Develop Erosion Control Methods for ICR SW-5. Implement Component 15 Prior to Component 32 BIO-1. Conduct Biological Resource Assessment BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
32	18 – Indian Creek Reservoir Spillway Channel	SW-5. Implement Component 15 Prior to Component 32 BIO-1. Conduct Biological Resource Assessments BIO-7. Monitor Wetland and Riparian Mitigation Sites ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources ARCH-2. Protect Undiscovered Cultural Resource Sites
33	25 – Extend the C-Line to the State Line	Future Project Component - not analyzed in this EIR
34	26 – Injection Well Program	Future Project Component - not analyzed in this EIR

2 Project Description

2 Project Description

Chapter 2 provides a description of the Project and the three alternatives analyzed in this EIR. The Project is made up of Master Plan components that include facilities or management procedures that meet the District's recycled water discharge needs and the needs of the District's recycled water and freshwater operations in Alpine County, CA. The alternatives group the Master Plan components based on the No Project alternative and three action alternatives.

This chapter presents a description of the full range of alternatives considered in developing the Project. This range of alternatives includes the Recommended Alternative and the No Project Alternative as required under CEQA. This chapter provides an overview of the alternatives eliminated from further consideration, along with the reasons for their dismissal. To the extent feasible, the alternatives analyzed in the EIR are described at a level of detail equal to that provided for the Project. A summary of the fully analyzed alternatives is presented in Chapter 19.

This chapter presents a description of the full range of alternatives considered in developing the Project. This range of alternatives includes the Proposed Recommended Alternative and the No Project Alternative as required under both NEPA and CEQA. This chapter also provides an overview of the alternatives eliminated from further consideration, along with the reasons for their dismissal. To the extent feasible, the alternatives analyzed in this EIR are described at a level of detail equal to that provided for the Project, as NEPA requires. A summary of the fully analyzed alternatives is presented in Chapter 19.

Even though NEPA analysis is not being accomplished now, setting the framework for future tiering of the later components, (Pub.Res. Code section 21166) is useful and sets the framework for what actions intend to be accomplished with the future Project Components.

Because this is a Programmatic-level EIR and a Project-level EIR, descriptions of each Project Component whether it is considered under a current (project-level) or future (programmatic-level) project, are set forth in Chapter 2, to minimize future environmental analysis. Refer to Section 2.6 "Description of Programatic-Level (Future) Project Components" for programmatic-level descriptions and see section 2.12 "Project-Level (Current) Descriptions" for additional details concerning Project Components 11, 18 and 19. Section 2.4 "Development of Project Components" provides definitions for Project Components, projects, and alternatives along with a roadmap to the reader for navigating the EIR.

2.1 Project Area

The Master Plan components (referred to as Project Components throughout the EIR) encompass portions of Alpine County, CA and Douglas County, NV. The Project Vicinity is discussed in Chapter 1 and illustrated in Figure 1-1. The project area, as shown in Figure 2-2, is comprised of lands of the West Fork of the Carson River watershed and the Indian Creek watershed. The project area extends from south of Woodfords in Alpine County to a portion north of the Carson Valley in Douglas County.

2.2 Purpose and Need

The District requires a reliable recycled water reuse and emergency storage system that accommodates the flows generated by the residents and visitors within the Lake Tahoe Basin of El Dorado County, CA and recycled by the District wastewater treatment facility located in South Lake Tahoe, CA.

The District's Mission Statement for the Master Plan is:

> "Furnish our customers with reliable water and wastewater services, and provide these services safely, efficiently, and cost effectively."

The existing District reuse and application system facilities are approaching their capacity and with other operational constraints, the need for an updated Master Plan is evident. The Master Plan outlines a summary of operational constraints in the following purpose and need statements:

- The existing On-Farm emergency disposal site for recycled water does not adequately serve its intended purpose prompting the need to plan a replacement emergency disposal facility;
- The District wants to identify improvements needed in recycled water and freshwater operations in Alpine County;
- The District is concerned about the loss of existing lands that are irrigated with recycled water due to subdivision of the land or other causes;
- The District wants to manage recycled water in conformance with applicable regulations and reduce potential effects on the environment;
- The District desires to improve operational control of their recycled water and freshwater systems in Alpine County; and
- The District needs planning to assure conformance with their obligations regarding water quality and minimum water surface elevations in the Indian Creek Reservoir (ICR).

Figure 2-1 Project Location (11X17)

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Figure 2-2 Project Area Map (11X17)

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The Master Plan is the District's implementation program for the reuse and/or application of 6,498 acre-feet (AF) of recycled water per year (5.8 mgd of recycled water) anticipated by the year 2027. Recycled water will be reused and/or applied in a reliable, practicable manner that provides the best use of water resources, while protecting public health and the environment.

2.3 Project Objectives

The following objectives were utilized by the District to select the Master Plan Project Components and Projects:

1. Establish a plan for recycled water and freshwater management for operation through the year 2028;

2. Assure regulatory compliance for the District's recycled water and freshwater operations;

3. Protect and enhance the environment in Alpine County;

4. Continue cooperation with Alpine County stakeholders; and

5. Preserve agricultural practices in Alpine County.

2.4 Development of the Project

Early in the development of the Master Plan and scoping for the Master Plan EIR, the District assembled a list of actions (operations and physical projects) for consideration to be included in the Master Plan. These actions were identified as Project Components. The list of Project Components were screened to assure compliance with the Master Plan purpose, need, and objectives. These Project Components (including Project Components that had been set aside by the District as not feasible) were reviewed by the District's Board at a series of workshops held in 2001. Based on the Board's review, 49 components were carried forward for public review and comment at Master Plan Open Houses held in South Lake Tahoe, Alpine County and Douglas County. Following the Open Houses, the potential Project Components were further refined as part of the Master Plan Update process conducted in 2007 into a list of 28 Project Components that meet the Master Plan's Purpose, Needs and Objectives. Project Components considered but rejected are discussed in Section 2.5. The Project Components included in the Master Plan are described in Section 2.6.

The Master Plan assembles the 28 Project Components into Master Plan Projects reflecting the need to implement certain Project Components at the same time and to reflect the varying purposes of each project. Projects include conveyance system improvements, application improvements, temporary containment improvements, and water management components as shown on Table 2-1.

This EIR evaluates the Project Components individually in each resource Chapter (Chapters 4 through 18) and evaluates and compares Alternatives in Chapter 19. The Alternatives include Alternative 1-No Project Alternative described in Section 2.8, Alternative 2-Master Plan Projects described in Section 2.9, Alternative 3-Master Plan Recommended Projects described in Section 2.10, and Alternative 4-Master Plan Trigger Projects described in Section 2.11. These alternative descriptions include compliance with Federal, State, local, and District regulation and policies, as outlined in Appendix D, Table D-1.

The District has determined that four Master Plan Projects need to be implemented to address current issues with the On-Farm emergency disposal system. Master Plan Projects 1, 2, 11, and 12 (comprised of Project Components 11, 18 and 19) are evaluated at the project-level of detail (Project Level) in this EIR as described in Section 2.12. The remaining Project Components (Project Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 29, 30, 31, and 32) are evaluated as future projects

(Programmatic Level). At the time the District determines that a future project will be implemented, an appropriate level of environmental documentation will be completed prior to project approval.

2.5 Project Components Considered but Rejected

During the evaluation of potential Master Plan Project Components, a range of reuse options were considered that could reliably reuse and dispose of recycled water generated by the District's wastewater treatment facilities. A number of potential Project Components were not carried forward for further evaluation. The primary criterion used to evaluate Project Components was the ability to accomplish the purpose and need of the Project. After a Project Component was determined to be consistent with the Project's purpose and need, the practicability and reliability of the Project Component, along with physical and environmental constraints were considered. The following Project Components were not carried forward as part of the Master Plan and are not be included for analysis in this EIR:

- Trade Non-Useable District Land Near ICR for More Useable Bureau of Land Management Land;
- Hydroelectric Generation at ICR;
- Develop Fresh Water and Recycled Water Wholesale Program;
- Construct Best Management Practice (BMP) Wetlands Using Freshwater from Snowshoe Thompson No. 1;
- Golf Course Irrigation and Proactive Management of Water Quality in Harvey Place Reservoir (HPR);
- Forestry Nursery;
- Habitat Enhancements to Promote Spawning in ICR;
- Expand HPR;
- Fish Hatchery for Sale and Stocking Commercial Fish Farm;
- Regulation Pond To Impound Irrigation Water;
- Reduce Ditch System Conveyance Efficiency to Promote Ditch Losses;
- Recreational Facilities (Campground, Bike Trails);
- Hunting Club;
- Wildlife Viewing;
- Dredging the Sediments from ICR;
- Chemically “Fix” the Phosphorus in ICR;
- Repair/Replace Aeration System in HPR;
- Educational Experimentation Farm; Lease Land to Universities;
- Resource Conservation Groups; Nursery, Arboretum;

- Wetlands in Nevada; and
- Improve Emergency Storage on the On-Farm System.

Six (6) Project Components meet the purpose, need and objectives of the Project but are not required at this time. These Project Components are to be evaluated for feasibility in future Master Plan updates. These Project Components are not evaluated in this EIR. The Project Components for future, potential consideration include:

- Develop Recycled Water Wholesale Program;
- Biosolids Composting;
- Become a Water Rights Buyer;
- Power Generation;
- Extend the C-Line to the Nevada State Line; and
- Injection Well Program.

2.6 Description of Programatic-Level (Future) Project Components

Project Components are the individual elements or building blocks that accomplish the Master Plan objectives. In addition to Project Components that provide for the application of recycled water, Project Components, such as conveyance facilities and temporary containment facilities, are necessary for the operation of the recycled water system. Project Components are described in the following sections and Table 2-1 identifies the Project Components by type.

The analysis of environmental consequences (impacts) contained in each chapter is organized by Project Component to facilitate the comparison of impacts by Project Component and by resource. This organization and structure of EIR analysis recognizes that, in the selection of a final Master Plan, there may be options available to exclude Project Components based on number and type of impacts. The analysis by individual Project Component allows the environmental impacts to be analyzed collectively during project selection.

Project Components are required to comply with standard practices for engineering and design. The District commits to compliance through inclusion of the following standard practices as part of the Project. The standard practices are based on existing and ongoing District policies and programs or are required by law. The standard practices are detailed in Appendix D, Mitigation and Monitoring Program. Project Components are required to comply with federal, State and local regulations and permits as listed in Appendix D in Table D-1.

SP-1 Dam Safety

SP-2 Standard Traffic Control Procedures

SP-3 Emergency Response Vehicles Will Not be Impeded

SP-4 Maintain Maximum Number of Open Lanes on Roadways

SP-5 Avoid Traffic Disruption on Major Highways

SP-6 Fence or Cover Trenches

SP-7 Access to Businesses and Residences

SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Areas

SP-9 Park Within Construction Easements

SP-10 Limit Ingress/Egress of Construction Equipment

SP-11 Erosion Control/Storm Water Pollution Prevention Plan

SP-12 Standard Noise Control Practices - Construction Phase

SP-13 Standard Noise Control Practices - Operation Phase

SP-14 Standard Air Quality Control Practices - Construction Phase

SP-15 Standard Air Quality Control Practices - Operation Phase

SP-16 Slope Stabilization Design

SP-17 Pipeline Design Features in Active Fault Zones

SP-18 Liquefaction Stabilization Design

SP-19 Standard Engineering Methods for Expansive Soils

SP-20 Standard Engineering Methods for Corrosive Soils

SP-21 Temporary Containment and Impoundment Siting and Design

SP-22 Mosquito Prevention

SP-23 Delineate Wetlands, Waters of the United States, and Riparian Habitat

SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan

SP-25 Sensitive Resource Program

SP-26 Sensitive Plant Protection Program

SP-27 Avoid Impacts to Wetland and Riparian Areas

SP-28 Remove Weak Surficial Deposits from Basin Footprints

SP-29 Management of Hazardous Materials/Waste During Construction

SP-30 Pre-construction Surveys for Nesting Raptors and Wildlife Nurseries

SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities

SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat

SP-33 Surface and Ground Water Protection Plan

SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring

SP-35 Conveyance Infrastructure Maintenance Plan

2.6.1 Project Component Definitions

The recycled water facilities that make up the No Project Alternative are described under the description of alternatives in section 2.8. The Project Components that make up the action alternatives are described below. The physical facilities are described in bulleted format for each component type, followed by an individual component description.

Conveyance Components – These are Project Components that involve the ditches and pipelines that will be constructed or improved as transmission facilities to convey water to other components of the system. Improvements to the existing Snowshoe Thompson Ditch No. 1 and a proposed pipeline to convey water to the Fredericksburg irrigation area are examples of conveyance components.

Application Components – These are Project Components that involve the application of recycled water, although some application components may involve the incidental construction of local pipelines or other recycled water conveyance or distribution facilities. The optimization of the recycled water application rate on irrigated land and construction of zero discharge artificial wetlands that use recycled water are examples of application components.

Temporary Containment Components – These are Project Components that provide capacity for storage of excess and emergency flows of recycled water from the C-line export pipeline, which brings the recycled water into the project area. The creation of irrigation fields with pumping back to HPR is an example of a temporary containment component.

Water Management Components – These are Project Components that involve managing the flow or quality of water (either fresh or recycled) as part of operating the District's facilities, and do not directly involve the conveyance or application of recycled water. Development of a fresh and recycled water wholesale program is an example of a water management component.

Table 2-1 identifies the Master Plan Project Components sorted by component type.

Table 2-1	
Master Plan Project Components	
Conveyance Components	
2.	Make recycled water available to irrigators in Nevada
3.	Capacity and conveyance improvements in the Diamond Ditch system
4.	Provide pressurized recycled water to Fredericksburg system
5.	Provide pressurized recycled water through Wade Valley
6.	Provide pressurized recycled water to the Ranchettes
14.	Piping recycled water systems to minimize setbacks and human contact
17.	Increase Snowshoe Thompson No. 1 conveyance capacity
20.	Improve operation of the Diamond Ditch system to meet District and user needs
22.	Parallel recycled water pipeline along existing Diamond Ditch
31.	Divert Stormwater Flow Away From Harvey Place Reservoir to Indian Creek Reservoir
32.	Indian Creek Reservoir Spillway Channel
Application Components	
1.	Provide recycled water to new non-irrigated, permitted land

7.	Non-flood Irrigation application system
9.	Groundwater recharge using infiltration basins
10.	Construct zero-discharge basins
12.	Grow biomass crops for pulp production using recycled water
13.	Wetland sod and seed production
15.	Mitigation wetland creation using freshwater
16.	Subsurface recycled water irrigation in public contact or buffer areas
18.	Optimize application rate on existing irrigated lands
19.	Pursue permitting of more land in Alpine County
21.	Develop tailwater control system
29.	Irrigate the District Pasture Land
30.	Irrigate the "Jungle" with Recycled Water
Temporary Containment Components	
11.	Construct irrigation fields with pumping back to Harvey Place Reservoir
Water Management Components	
8.	Improve recycled water quality
23.	Route Mud Lake winter flows through Indian Creek Reservoir
24.	Transfer additional water rights to storage in Indian Creek Reservoir

Source: Hauge Brueck Assoc. 2009

2.6.2 Project Component 1 through 32 Descriptions

Descriptions for the individual Project Components are described below. Please note that component 25, 26, 27, 28, 33 and 34 are listed under 2.6.3, Potential Master Plan Component Descriptions, and are described for disclosure purposes but are not included in the scope of analysis for this EIR.

1. Provide Recycled Water to New Non-irrigated, Permitted Land

Currently, 1,883 acres are permitted by Lahontan to receive recycled water. Of the 1,883 permitted acres, roughly 75 percent (1,411 acres) use recycled water for irrigation purposes. Recycled water is not currently applied to the remaining 472 acres partially due to the lack of infrastructure to convey water or the permitted acreage is non-pasture/agricultural land. Portions of the permitted 472 acres on the Fredericksburg system, between the Fredericksburg Ditch and Fredericksburg Road in Wade Valley and along the east side of the West Fork of the Carson River have the potential to receive recycled water but additional infrastructure needs to be constructed. The recycled water currently produced and the recycled water projected to be produced by the year 2028 will be applied if currently permitted acreage were irrigated with recycled water.

2. Make Recycled Water Available to Irrigators in Nevada

Nevada irrigators downstream of Alpine County do not have access to sufficient volumes of water to divert to irrigation in an average or below average precipitation year. Because of a lack of reliable freshwater sources, Nevada irrigators perceive recycled water as a desired commodity. Currently the District's recycled water is not permitted for land application in Nevada. This component will pursue the permitting of land in Nevada by the Nevada Division of Environmental Protection (NDEP) to receive direct application of recycled water from HPR. Tailwater agreements are currently in place.

3. Capacity and Conveyance Improvements in the Diamond Ditch System

Improvements to the Diamond Ditch System result in increasing the capacity of the system to transport higher volumes of recycled water and in stabilizing segments of the system that are subject to erosion and/or flooding. The increase in system capacity will allow the District to manage the anticipated increases in the volume of recycled water from future growth in the service area. The stability improvements permit the District to provide uninterrupted flows of recycled water.

Lining or piping the unlined reaches upstream and downstream of Snowshoe Thompson No. 2 diversion structure in Wade Valley will increase system capacity and will alleviate erosion and stability concerns. Replacing the Snowshoe Thompson No. 2 Ditch/Diamond Ditch flow control structure will increase system capacity and alleviate the flooding and erosion problems associated with this structure.

4. Provide Pressurized Recycled Water to the Fredericksburg System

A portion of the permitted land on the Fredericksburg system, between the Fredericksburg Ditch and Fredericksburg Road, cannot receive recycled water because the infrastructure necessary for delivery of the water has not been constructed. The construction of an inverted siphon from Wade Valley to the Fredericksburg system will allow the District to deliver pressurized recycled water to these permitted lands. Installation of the siphon will provide the District the opportunity to deliver water to additional acreage that is not permitted in this area. The inverted siphon will transport water across the West Fork of the Carson River at the Paynesville Bridge, allowing land above the existing Fredericksburg system to be irrigated with recycled water.

5. Provide Pressurized Recycled Water Through Wade Valley

Land above the Upper Fredericksburg Ditch is currently permitted for irrigation with recycled water but is irrigated with fresh water because no recycled water conveyance system is available. Implementation of this component will provide recycled water to these lands and potentially to lands currently not under cultivation by the installation of a pipeline from HPR to Wade Valley upstream of the Fredericksburg system. The pipeline will cross Indian Creek near HPR dam and extend north to the Paynesville Bridge, located at the north end of Wade Valley. By providing recycled water under pressure through the pipeline, irrigators could apply the water using sprinkler systems rather than flood irrigation methods. Sprinkler irrigation is efficient and effective at controlling the volume of water applied.

6. Provide Pressurized Recycled Water to the Ranchettes

A recycled water pipeline may be constructed from HPR to the area between the Lower Fredericksburg and Dressler On-Farm systems. The recycled water will be sold to landowners for the irrigation of smaller ranches (Ranchettes). The acreage to be cultivated is 150 acres with an annual irrigation budget of approximately 500 AF. The areas to be irrigated are smaller than the parcels currently under irrigation, sprinkler systems will be required.

7. Non-Flood Irrigation Application System

This component encourages irrigators to use either sprinkler irrigation or other application methods in lieu of flood irrigation when using recycled water. Both sprinkler and sub-surface irrigation are more efficient than flood irrigation and greater control is available to the irrigator to determine the amount of water applied. This will help the District monitor the application rate of recycled water and will maximize the beneficial use of the recycled water and reduce the likelihood of tailwater flowing off the intended reuse area.

8. Improve Recycled Water Quality

The District will implement a program to improve the quality of the recycled water that flows from the South Tahoe Wastewater Treatment Plant (WWTP). Water quality improvements may be accomplished by upgrading the existing plant so that it is capable of producing tertiary-treated effluent.

9. Groundwater Recharge Using Infiltration Basins

Implementation of this component entails construction of one or more rapid infiltration basins (RIB) for the disposal of some or all of the recycled water from HPR. Recycled water that is routed to the RIB(s) will percolate through underlying soil and recharge the groundwater in Diamond Valley. The RIB(s) will augment the storage capacity of HPR, which is anticipated to be exceeded as recycled water volumes increase.

10. Construct Zero-Discharge Basins

The District will construct a zero-discharge irrigation field for the dispersal of recycled water in Alpine County. The recycled water will be dispersed in the field by evaporation, transpiration, and percolation. The size of the field will be based on the volume of recycled water requiring dispersal. The vegetation in the field will assimilate (or uptake and metabolize) nitrogen, phosphorous and water while the short duration of flooding of the area would minimize percolation of the recycled water into groundwater. The vegetation and soil in the irrigation fields may require periodic replacement as salt concentrations in the soil exceed plant tolerance.

11. Construct Irrigation Fields With Pumping Back to HPR

The District will construct seven irrigation fields, two to contain excess and emergency flows from HPR and five to irrigate with both fresh and recycled water. The two containment fields will be constructed so that the temporarily contained recycled water could be pumped back to HPR when desired and returned to the irrigation distribution system. A new pump station and associated pipeline will be required adjacent to the irrigated area to pump the water back to HPR. The remaining five fields will be irrigated with a central pivot irrigation system that will allow the use of both fresh and recycled water.

Recycled water and freshwater will be dedicated to maintain the fields during non-emergency periods. A levee will surround the containment fields to allow for its deliberate flooding. The volume of recycled water that could be temporarily contained in the fields during an emergency event will depend on the containment area and the height of the levee. A 50-acre field with a one-foot levee could contain over 16 million gallons, or slightly less than four days of discharge from the treatment plant at current flows. The other fields irrigated with central pivot systems will regulate the volume of water applied in accordance with the nutrient management plan. See sub-section 2.12.1 for project-level details.

The irrigation area will consist of two separately diked containment fields, 24 and 25 acres in size, and seven fields, ranging in size from 47 to 120 acres, irrigated by central pivot irrigation systems. Management of the water will comply with the nutrient management plan generated for the Diamond Valley Ranch.

12. Growing Biomass Crops for Pulp Production Using Recycled Water

Recycled water will be used for growing biomass crops (e.g. poplar, willow) to be used for pulp wood production. The crops could be harvested every four to six years depending on species and growth characteristics. The District could potentially produce 20 tons of biomass per acre every four to six years. Biomass production will use about four to four and a half AF of recycled water per acre of land. Biomass production on 250 acres of District-owned land could dispose of approximately 1,000 acre-feet per year (AF/yr) of recycled water.

13. Basin Sod and Seed Production

The District will generate revenue from the production and sale of sod and seed. Recycled water will be used to grow wetland species sod for transplantation to mitigation sites in the area. Seeds will be harvested from mature wetland and sold for wetland habitat projects. Sod harvesting will potentially occur every three to four years and seed harvesting will occur every other year.

14. Pipe Recycled Water Systems to Minimize Setbacks and Human Contact

This component will convert open channel flow in Upper and Lower Fredericksburg and Diamond Ditch systems to a buried pipe distribution system. A closed pipe network reduces the possibility of human contact with recycled water and reduces mandated setback requirements from water supply wells. Piping the delivery ditch will give the District increased control of the volume of water distributed to each application area and reduce losses in the distribution system. Supplying recycled water under pressure will support ranches using sprinkler irrigation.

15. Mitigation Wetland Creation Using Freshwater

Mitigation wetlands are wetland habitats that are constructed in response to development impacts on natural wetland systems in the area. The concept of mitigation banking is the creation of mitigation wetlands prior to the taking of natural wetlands, and then selling credits to entities required to mitigate the wetland impacts from their projects. Mitigation wetlands generally have stipulations requiring support in perpetuity. This component will create a mitigation wetland bank, supported with recycled and/or freshwater, for sale of mitigation credits to private or public organizations in need of wetland mitigation.

16. Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas

Title 22 of the California Code of Regulations restricts irrigation on, or directly adjacent to, public areas. No spray irrigation of recycled water, as treated by the District's facilities, may take place within 100 feet of a residence or a place where public exposure could occur.

The District's pasture property is not irrigated with recycled water because of its close proximity to Alpine County's school complex. This component proposes to irrigate the approximately 200-acre property using subsurface irrigation methods. A shallow underground network of perforated pipe will be installed on the property for the distribution of recycled water. The subsurface application of recycled water on the Swake property is anticipated to consume approximately 600 AF/yr of recycled water.

17. Increase Snowshoe Thompson No. 1 Conveyance Capacity

Increasing the capacity of the Snowshoe Thompson No. 1 ditch will allow the District to convey its full entitlement of water diverted from the West Fork of the Carson River. Increasing the conveyance capacity of the ditch can be accomplished by replacing the open channel with a pipeline or by making improvements to the existing open channel system. Increased conveyance capacity will result in an increase in the volume of water that is routed to ICR. Increasing the volume of freshwater that flows to ICR will accelerate the improvement in water quality in the reservoir. The replacement of the open channel with a pipeline could result in improved water quality in the reservoir by reducing the current sediment loading that occurs from ditch erosion and runoff entering the ditch.

18. Optimize Application Rate on Existing Irrigated Lands

The application rate for recycled water used for irrigation on existing permitted lands is based on the hydraulic loading rate and nutrient needs of the combinations of soil and crop types. Optimization of the application rate is required to protect groundwater and surface water resources in the region from possible contamination by nitrogen or other nutrients present in the recycled water and to avoid generating tailwater. This optimization ensures no loses other than those intended (that is, evapotranspiration and some percolation). The application rate is controlled by soil permeability and the nutrient requirements of the irrigated crops.

To develop a recycled water allocation system that maximizes the volume of applied recycled water and minimizes the threat to groundwater and surface water, the soil and crop types in the irrigated areas will be assessed and mapped. These data will be used to develop recycled water application rates that meet crop nutrient needs and protect groundwater and surface water resources. The volume of recycled water that is currently applied exceeds the hydraulic loading rate of available permitted lands resulting in runoff and tailwater discharges. Implementation of this component will result in a reduction in the volume of recycled water that is applied.

19. Pursue the Permitting of More Land in Alpine County

The ability to use recycled water as a source of irrigation water is an asset to agricultural production. Currently, 1,883 acres are permitted to receive recycled water in Alpine County. Of the 1,833 permitted acres, roughly 75 percent (1,411 acres) use recycled water for irrigation. This acreage is not adequate to receive the 5,200 AF/yr of recycled water currently generated, and less than the 6,400 AF/yr estimated to be generated by the year 2020. Development of non agricultural uses or the reduction in size of available agricultural irrigation land in areas currently receiving recycled water will result in the loss of permitted acreage. Additional lands will need to be permitted for the application of recycled water if other alternative recycled water uses are not implemented.

20. Improve Operation of the Diamond Ditch System to Meet District and User Needs

The Diamond Ditch Association owns the Diamond Ditch system. The District performs the operation and maintenance of the system. The costs associated with system operation and maintenance are not reimbursed by the Association to the District. The irrigators have the right to call for water, limiting the control the District can exercise over the delivery schedule. This affects the District's ability to control system operations, provide recycled water to others, and manage the level of HPR. Under this component, the District will determine whether ownership of portions of the ditch and appurtenances or modifications of existing easements best supports the District's interests.

21. Develop Tailwater Control System

The District will assist irrigators with tailwater control. The development of tailwater detention ponds will reduce the potential of tailwater flowing off permitted lands thereby ensuring the permitted irrigators and the District remain in compliance with applicable tailwater regulations.

The tailwater will either percolate and evaporate from detention ponds or be pumped back to the irrigation ditches for re-application.

22. Parallel Recycled Water Pipeline Along Existing Diamond Ditch

The District will install a recycled water pipeline generally along the current route of the Diamond Ditch. By piping the recycled water, the District will have greater control over the quantity of water delivered to irrigation sites. The recycled water will be delivered to users under pressure allowing the irrigators to use sprinkler irrigation, which is more efficient than flood irrigation. Diamond Ditch may be used as a fresh water delivery system.

23. Route Mud Lake Winter Flows through Indian Creek Reservoir

The 5,000 AF Mud Lake Reservoir is located in Douglas County, NV between the West and East Forks of the Carson River. The reservoir is supplied by Alpine Decree water right entitlements that are diverted from the West Fork of the Carson River in Alpine County. Winter flows to Mud Lake are conveyed from the West Fork, through the Millich Ditch to Indian Creek below HPR. The water flows into Nevada in the Indian Creek drainage to a diversion structure where it is routed to Mud Lake.

This component is to negotiate an agreement with owners of the Alpine Decree water rights stored in Mud Lake to route this water through ICR. Implementation of this component will result in conveying Mud Lake winter flows from the West Fork of the Carson through Snowshoe Thompson No.1 Ditch and the Upper Dressler Ditch to ICR. Increased flows of water through ICR will increase dissolved oxygen concentrations in the reservoir and will transport phosphorus from the reservoir. The Mud Lake water right entitlements could not be stored in ICR; therefore, an equal flow from the ICR outlet structure will be released into Indian Creek below HPR.

24. Transfer Additional Water Rights to Storage in Indian Creek Reservoir

Additional water rights will be transferred to storage in ICR by the District or by other water right owners. Increased flows of fresh water through ICR will increase dissolved oxygen concentrations in the reservoir to result in improved water quality and fish habitat.

29. Irrigate the District Pasture

This component will irrigate the District Pasture using recycled water. The amount of land is approximately 150 acres. Recycled water will be supplied either from a branch off the existing C-Line or from a new pipeline leading from the existing C-Line to the Diamond Valley Ranch. Minor grading will occur to the District Pasture to prevent recycled water from entering the Upper and Lower Harvey Channels. The primary use of the Upper Harvey Channel and the Lower Harvey Channel is to direct Indian Creek flows (exceeding the conveyance capacity of the Upper Dressler Ditch) around the HPR. The Upper and Lower Harvey Channels carry freshwater only and enter Indian Creek below the dam of the HPR.

The configuration of the irrigation and associated minor grading will need to include a means of continuing the ability to spill high flow rates (induced by flood or snowmelt) out of the Harvey Channel. Alternatively, the Upper Harvey Channel could be enlarged to contain the peak flow rate induced by a 100-year storm event with berms to prevent recycled water from entering the channel. A variation on this Project Component will be to irrigate the District Pasture with freshwater if the Diamond Valley Ranch is irrigated with recycled water. In this case, the water rights from the District Pasture will be used to resume irrigating the District Pasture and a portion of the water rights of Diamond Valley Ranch will be used for storage in ICR. The basis of this variation is that the original water rights for irrigating the District Pasture were transferred to storage in ICR. Since the District Pasture is no longer irrigated, it may be desirable to resume irrigating to restore the land as a pasture.

30. Irrigate the "Jungle" with Recycled Water

The District obtained land known as the "Jungle" with its purchase of the Diamond Valley Ranch. The jungle is located northwest of the Snowshoe Thompson No. 2 Ditch and north of the Millich Ditch. At its nearest point, the jungle is approximately 1,100 feet from the West Fork of the Carson River. The jungle is not irrigated and is characterized as sloping and bottom valley land. There are approximately 150 acres that will be irrigated with recycled water once infrastructure is constructed to convey water to this area. The need for additional lands may arise from loss of lands currently irrigated with recycled water due to subdivision or some other cause, or by increased annual volume of recycled water resulting from growth in the District's service territory. Spray irrigation methods will be utilized as the irrigation method. Water will be supplied under pressure from a pipeline branching off the existing C-Line or from the proposed pressurized line that would pump water back to HPR (Component 11).

31. Divert Stormwater Flow Away from Harvey Place Reservoir to Indian Creek Reservoir

This Project Component constructs a ditch near the southeast corner of the HPR to intercept stormwater and drainage flows that currently flow into the HPR and divert them to pass through ICR. The purpose will be to reduce stormwater flow into the HPR thereby increasing the available recycled water storage volume of the HPR. Another benefit of this Project Component will be to increase the amount of freshwater entering ICR. A method of sediment control may be necessary to reduce sediment loading in ICR. This component will be implemented only if recycled water volume increases and additional storage volume for recycled water in HPR is needed. The disadvantages of this Project Component include capital cost expenditure and additional operation and maintenance responsibilities.

32. Indian Creek Reservoir Spillway Channel

The ICR spillway originally discharged recycled water to Indian Creek in the event the reservoir filled beyond capacity. This was permissible when the District utilized tertiary treatment at its wastewater treatment plant in South Lake Tahoe. With the construction of HPR (to serve as the District's recycled water storage reservoir), ICR was converted to a fresh water reservoir. The construction of HPR resulted in an ICR spillway configuration which discharges to HPR. This component will construct a spillway channel for ICR that conveys reservoir spillage around HPR to Indian Creek. The component has an added benefit of intercepting stormwater flow entering the east side of the HPR, thereby increasing storage capacity in this reservoir for recycled water. This component will reduce the potential of emergency spills from HPR.

The implementation of this component is contingent upon the District's desire to reduce their liability of unauthorized releases of recycled water from HPR due to large flood events. Considerations for this component involve the likelihood of a spill from HPR. The 1997 flood event created operational problems for the District that required approval by the Lahontan Regional Water Quality Control Board to land-apply recycled water from HPR outside of the normal irrigation season. Component implementation is a question of the likelihood of large flood events and the District's tolerance for risk.

2.6.3 Potential Master Plan Project Component Descriptions

The following components are not included in the Master Plan or alternatives considered in this EIR. The District has included these potential Project Components in an appendix for consideration in response to future actions, regulations and decisions.

25. Develop Recycled Water Wholesale Program

Implementation of a recycled water wholesale program will provide revenue to the District and offset the District's costs associated with recycled water infrastructure improvements and system operation and maintenance. The recycled water will be sold by the District and to each rancher, or the District will wholesale the water to parties who in turn will distribute the water to each individual rancher.

26. Biosolids Composting

The district may convert some District-owned or leased lands in Alpine County to a biosolids composting facility. Solid waste from the district wastewater treatment plant along with recycled water and wood chips (or other source of carbon) can be applied to land to compost the District's solid waste. This will allow the District to dispose of their solid waste, which is presently shipped and disposed of by another party. The use of land in Alpine County for biosolids composting raises several environmental concerns. Biosolids composting may contaminate the groundwater and odor control will likely be a problem.

27. Become a Water Rights Buyer

If the District assumed the role of a water rights buyer/broker on the West Fork of the Carson River, it will have the ability to acquire surface water right entitlements for support of ICR. This gives the District the ability to sell or lease recycled or freshwater to offset or minimize operational costs of reservoirs.

28. Power Generation

Three sites in the Alpine County area suitable for hydroelectric energy recovery are discussed here: the spillways from HPR and ICR dams, and the proposed Diamond Ditch Pipeline (Component 22).

The spillways from HPR and ICR dams are suitable for low-head impact turbines for recovery of the gravitational energy in the water. The turbines will produce single-phase electrical power. The HPR option has the ability to recover energy from the water and then sell the water to an end user, thus this is not mutually exclusive with the bulk sales of water baseline.

The ability to recover energy from the Diamond Valley Ditch option prior to selling the water will depend on the point of transfer of the water from the ditch to the end user. Because ICR water is controlled by the water master, the District will not have control over the water after it leaves the reservoir.

Energy recovery from C-Line flows could be achieved by placing a single power generation facility at the bottom of the C-Line or multiple smaller facilities along the steep vertical portion of the pipeline, with pressure in individual segments not to exceed pipeline pressure specifications in pounds per square inch (psi).

33. Extend the C-Line to the Nevada State Line

This component involves extending the existing C-Line from Woodfords to the Nevada State Line potentially aligned along Old CA-88 and portions of the existing Highway 88. This Project Component will provide additional lands for irrigation with recycled water if needed. The need for additional lands may arise from loss of lands currently irrigated with recycled water due to subdivision or some other cause, or by increased annual recycled water volume resulting from growth in the District's service territory. The C-Line extension will be constructed if the District cannot secure permission from the Diamond Ditch owners to use the Diamond Ditch to convey recycled water to Nevada irrigators, or if the Diamond Ditch conveyance capacity is insufficient, or if the District cannot secure outright ownership of the Diamond Ditch. Disadvantages of this component include the capital expenditure required, but the capital cost could be offset by investment from the Nevada users to pay for pipeline construction.

34. Injection Well Program

In water resource management, an injection well is a well used to inject water into the groundwater aquifer as opposed to extracting water from the aquifer. Injection wells provide artificial recharge of the groundwater aquifer. Treated surface water and recycled water are typically used as the source waters for injection wells. The injected water must not biologically, chemically or physically degrade the existing water quality of the aquifer. The injection location and depth determine the functionality and usefulness of the injection well from a hydrogeologic perspective.

This future master plan component will implement an injection well program for the District's recycled water. Implementation depends on various factors including insufficient sites for land application of the recycled water, the quality of the recycled water discharged from the District's treatment facility, and cost/benefit considerations. The Diamond Valley Ranch is a candidate for injection well sites. A pipeline extending from the existing C-Line will be needed to convey water to injection well site(s). Improvement of the quality of the recycled water is necessary to implement an injection well program. The program will have to be permitted by Lahontan. Groundwater transmission studies will be necessary to evaluate, design and estimate the effectiveness of an injection well program.

2.7 Development of Alternatives

CEQA requires that an EIR "describe a range of reasonable alternatives to the Project, or to the location of the project, which feasibly attain most of the basic objectives of the Project, but would avoid or substantially lessen any of the significant effects of the Project, and evaluate the comparative merits of the alternatives" (Guidelines §15126.6(a)). If a project alternative would substantially lessen the significant environmental effects of a project, the decision maker should not approve the project unless it determines that specific technological, economic, social, or other considerations make the project alternatives infeasible (PRC §21002, Guidelines Section 15091 (a)(3)). The EIR must identify alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and should briefly explain the reasons underlying the lead agency's determination (Guidelines §15126.6(c)).

One of the alternatives analyzed must be the No Project alternative. The No Project analysis must discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the Project were not approved and development continued to occur in accordance with existing plans and consistent with available infrastructure and community services (CEQA Guidelines §15126.6(e)(2)). CEQA Guidelines §15126.6(e)(2) require that reasonably foreseeable projects must be based on available infrastructure and community services, for the purpose of defining the No Project alternative.

The project alternatives are selected based upon rule of reason as being feasible projects that meet the project objectives. The Master Plan Project Alternative (Alternative 2) includes the 28 Project Components, as described above for Project Components numbered 1-24 and 29-32. Action alternatives were developed for analysis of two reduced project scenarios. Alternative 3, the Master Plan Recommended Projects Alternative, proposes a subset of the Project Components that compose the eight capital projects recommended in the Master Plan for implementation in the near term (5 to 8 years). This recommendation status is based on immediate need to resolve system inadequacies and comply with State regulations. Alternative 4, the Master Plan Trigger Projects Alternative, proposes a subset of Project Components that compose the nine capital projects determined to be contingent upon various trigger mechanisms in addition to those Project Components analyzed under Alternative 3.

Alternatives 1, 2, 3 and 4 are detailed below. Table 2-2 provides the crosswalk between the Project Components analyzed in the EIR and the capital projects described in Section 9 of the Master Plan. Some capital projects are comprised of more than one Project Component and at times a single Project Component may be included in more than one capital project.

In addition to the Project Components that were considered but rejected (see Section 2.5), an off-site alternative was considered but rejected from further analysis. The District considered off-site temporary containment areas during the Master Plan development process and eliminated the Gansberg property, Ace Hereford property and Swake property from further consideration. Criteria for the temporary containment site include:

- Proximity to Recycled Water Inflow Pipeline to Reservoir;
- Ability to receive waters from Harvey Place Reservoir; and
- Suitability of Soils and terrain.

The analysis of off-site alternatives prepared by Matthew Setty in a series of memorandums dated March 2001 is summarized as follows:

Land in Alpine County is suitable from a soil and land use perspective to be used as a temporary containment site for the District's recycled water. Few sites are located in areas that allow flexibility in the management of recycled water disposal and adaptability to emergency events. The feasibility of an effective recycled water disposal site, both for general disposal and temporary containment, is dependent on the ability to convey water from the inflow pipeline prior to the HPR and from the HPR outfall to the disposal site.

Potential areas include the Gansberg property along the Fredericksburg Ditch and the property south of Woodfords along Hwy 89, the Ace Hereford property in Wade Valley, and the Swake property owned by the District in the upper Diamond Valley. These properties have areas that meet at least one the recycled water disposal criteria. None of the properties satisfies all the criteria without major infrastructure modifications.

The soil, slope, and size of the Gansberg land is adequate for the District's temporary containment needs; however, the location of the land is a considerable distance from the C-line or HPR. To convey water to either of the Gansberg lands will require pumping and channel capacity improvements. The risk of excess recycled water reaching the West Fork of the Carson from the Gansberg property is significant. This potential for a permit violation makes the Gansberg property on the Fredericksburg system a very risky temporary containment site. The site does not meet the proximity to HPR or pipeline criteria. The upper Diamond Valley Gansberg property will require pumping of recycled water to the site in event of an emergency and does not meet the proximity criteria.

The Ace Hereford Ranch in Wade Valley contains suitable slopes, marginal soils, and is too small for the volume of recycled water required for temporary containment. A Wade Valley site will rely on the Diamond Ditch to convey the recycled water to the containment site. This reliance will limit the ability to convey water in event of an emergency. The proximity to the C-Line and HPR criteria is not met by this location. In addition to the suitability limitations mentioned above, the use of land that currently receives recycled water as a temporary containment site will reduce the area currently providing water disposal by means of irrigation.

The Swake property owned by the District is located in the upper (western) portion of Diamond Valley. This land is not large enough for the total temporary containment needs of the District if current disposal practices are applied. The land is located near the C-Line, but hydraulically above HPR, thereby requiring a pumping system to convey water to the site. The District owned property in Diamond Valley has land use restriction on recycled water application due to rural residential properties bordering the land near Woodfords.

Table 2-2

Master Plan Projects and Associated Components

Master Plan Projects	Master Plan Component Numbers
1 - Recycled Water irrigation Fields on Diamond Valley Ranch	11, 19
2 – Harvey Place Reservoir Bypass System Pipelines and Ditches	11
3 – Diamond Valley Ranch irrigation Fields Pump Back Station	11
4 – Diamond Valley Freshwater/Recycled Water Irrigation System	29, 30
5 – Diamond Ditch Conveyance Improvements	3
6 – Waterfall Pipeline Forebay and Pipeline	3, 4, 6, 22
7 – District Pasture Subsurface irrigation Pilot Project	7, 14, 16
8 – West Fork Pipeline	1, 2, 4, 7, 14
9 – On-Farm Pipeline	1, 6, 7, 14
10 – Wade Valley Pipeline	5, 14, 20, 22
11 – Prepare Nutrient Management Plan	18
12 – Permitting for Recycled Water Use in Diamond Valley	19
13 – Make Recycled Water Available to Irrigators in Nevada	2
14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements	17, 23, 24
15 – Upper Dressler Ditch Conveyance Improvements	23, 24
16 – Indian Creek Treatment Wetlands	23, 24
17 – Diversion Ditch for Stormwater Flow Away from HPR and to ICR	31
18 – Indian Creek Reservoir Spillway Channel	32
19 – Use Mud lake Winter Flows for Indian Creek Reservoir Flushing	23
20 – Storage of Water for Downstream Users	24

Four project alternatives are analyzed in this EIR, including the No Project Alternative and three action alternatives. The four alternatives are summarized below, described in the following sections, and illustrated in Figures 2-3 through 2-7.

- **Alternative 1:** The No Project Alternative maintains the existing recycled water and freshwater facilities and operations in Alpine County, CA as of April 19, 2007. Alternative 1 does not meet project objectives 1 through 5.

- **Alternative 2**: The Master Plan Projects Alternative includes the 28 components that are listed in the District's Master Plan. This alternative enables the District to meet project needs, including continued support of existing agricultural practices, through implementation of fresh and recycled water projects and management of fresh and recycled water. Alternative 2 meets project objectives 1 through 5; however, this alternative has additional environmental impacts that may result from implementing the maximum number of Project Components. The 28 Project Components are included in the alternative to provide the District the greatest flexibility to respond to catastrophic events, regulatory changes, changes in operations and changes in the economy.

- **Alternative 3:** The Master Plan Recommended Projects Alternative includes components 3, 4, 6, 11, 18, 19, 22, 29 and 30. The Master Plan states that these Project Components, at a minimum, should be implemented regardless of the future outcome of contingencies and project triggers that are identified in the Master Plan. Alternative 3 meets project objectives 1 through 5, but provides the District with the least flexibility to respond to catastrophic events, regulatory changes, changes in operations and changes in the economy.

- **Alternative 4:** The Master Plan Trigger Alternative includes components 1, 2, 7, 9, 14, 17, 23, 24 and 31 in addition to the nine components (3, 4, 6, 11, 18, 19, 22, 29 and 30) listed under Alternative 3. Implementation of these Project Components allow for the District to respond to future project triggers and contingencies as discussed in the Master Plan. Alternative 2 meets project objectives 1 through 5; however, this alternative has additional environmental impacts that may result from implementing a larger number of Project Components. The additional Project Components are included in the alternative to respond to catastrophic events, regulatory changes, changes in operations and changes in the economy.

As stated above, the Master Plan includes a menu of Project Components that may be used in different combinations to meet the District's objectives. As such, this EIR is structured to allow the District to select a final Project that combines the individual Project Components analyzed in this EIR.

In the Master Plan, of the nine recommended projects, projects 1, 2, 11 and 12 are prioritized for expedited implementation (within the next 5-8 years) to resolve the issues of inadequacy with the On-Farm emergency disposal system (page 13-100, Stantec 2008). Project Components 11, 18 and 19 comprise Master Plan projects 1, 2, 11 and 12, the current projects that require project-level analysis in accordance with CEQA guidelines. The project-level details for these four current projects are described in section 2.12.

2.8 No Project (Alternative 1)

Alternative 1 evaluates impacts that will occur if the District does not adopt a new Master Plan. Alternative 1 consists of the existing District Recycled Water Facilities in Alpine County, CA as of April 19, 2007 (see Figure 2-3). These existing facilities include: ditches to convey freshwater to Indian Creek Reservoir, ditches to convey recycled water for storage to Harvey Place Reservoir and the Diamond Ditch system to convey recycled water to current ranch users. Sections 3 and 4 of the Master Plan provide a detailed description of the existing facilities. The existing facilities and operations include the freshwater system and recycled water system described in the Master Plan, listed in Table 2-3, and summarized below.

Existing irrigation areas will be retained, and no new conveyance, storage, irrigation, or other recycled water facilities will be provided. The District acquired the Heise Ranch property in Alpine County in 2006, now called the Diamond Valley Ranch, for use in recycled water disposal. This property acquisition, which underwent separate CEQA review, is considered part of the No Project Alternative.

Alternative 1 also assumes continuation of existing water conservation practices. Alternative 1 assumes that projected growth within the District's boundaries through the year 2028 will continue to occur as anticipated in the adopted General Plans of the City of South Lake Tahoe and El Dorado County, and in accordance with the ordinances of the City and County, as well as the TRPA Code of Ordinances and Plan Area Statements.

In 2006, the District's recycled water facilities disposed of 4,873 AF of recycled water. Including the recycled water that will come from the additional development anticipated through 2028, the amount of recycled water that must be applied through the District's recycled water facilities is approximated at 6,498 AF/yr. This is an increase of 26% from the 2006 volume of recycled water that was delivered to HPR. In order to dispose of this excess water, the application rate will need to be increased on the permitted lands.

Table 2-3
No Project Facilities and Operations
Freshwater System (Section 3 of the Master Plan) - NP-1
Snowshoe Thompson No. 1 Ditch
Indian Creek Diversion
Upper Dressler Ditch
Indian Creek Reservoir
Alpine Decree Surface Water Rights to Support ICR
Millich Ditch
Snowshoe Thompson No. 2 Ditch
Upper and Lower Harvey Channel
Recycled Water System (Section 4 of the Master Plan) - NP-2
Harvey Place Reservoir
Diamond Ditch System
Dressler On-Farm System
Recycled Water Irrigators
Bruns Ranch
Gansberg Ranch
Neddenriep Ranch Partnership
Bentley (Ace Hereford Ranch)
Celio Ranch
Scott Brooke

Figure 2-3 Existing Recycled Water Facilities (11X17)

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2.8.1 Existing Freshwater System Components - No Project 1 (NP-1)

The District operates and maintains freshwater conveyances for water from the West Fork of the Carson River and Indian Creek, as well as the ICR storage facility. The system includes the Snowshoe Thompson No. 1 Ditch, Indian Creek Diversion, Upper Dressler Ditch, and ICR.

2.8.1.1 Snowshoe Thompson No. 1 Ditch

Snowshoe Thompson No. 1 Ditch was constructed in the 1860's is approximately 5,000 feet long. This earthen ditch conveys Alpine Decree water rights from the West Fork of the Carson River to water righted lands in Diamond Valley. The upstream portion of the ditch is above and parallel to the Millich Ditch, with which the Snowshoe Thompson No. 1 Ditch shares a common diversion structure from the West Fork. The capacity of this reach varies greatly and is a limiting factor in diverting the full water right entitlement to irrigated lands and to Indian Creek Reservoir. The Snowshoe Thompson No. 1 Ditch intercepts minor flows from Scott Creek to a junction box in which the District can direct the flows through a pipeline under Harvey Channel to a Parshall flume, prior to emptying into the Upper Dressler Ditch. The District can also direct flows to Harvey Channel or other irrigation ditches.

2.8.1.2 Indian Creek Diversion

Indian Creek was re-routed around the Harvey Pasture drainage during the construction of Harvey Place Reservoir. Winter flows in Indian Creek are used as flushing flows to improve the water quality of Indian Creek Reservoir, as water is diverted from Indian Creek into the Upper Dressler Ditch and is passed through the reservoir back to Indian Creek. This diversion has a capacity limitation at the diversion structure. Diversions of water from Indian Creek to Indian Creek Reservoir can be measured with a flow recorder and a Parshall flume located in the Upper Dressler Ditch. Winter flows obtained from Fred Dressler's Indian Creek water rights are used as flushing flows through Indian Creek Reservoir. Dressler's water rights apply to Indian Creek flows received between 1 October through 31 March when Indian Creek is predominantly dry. Indian Creek flows received between 1 April and 30 September, up to 55 AF, are available for storage as part of the District's water rights acquired with the purchase of land for Harvey Place Reservoir.

2.8.1.3 Upper Dressler Ditch

The purpose of the Upper Dressler Ditch is to divert runoff water from the local Harvey Place watershed into ICR. The Ditch also serves as a means of delivering Indian Creek flushing water and makeup water from Indian Creek and the West Fork of the Carson River to ICR. The Ditch runs as a contour canal along the 5,640-5,620 foot contour lines. The length of the open portion is 5,170 feet. The earthen sections have very high transmission losses, making the conveyance efficiency of the ditch very poor.

2.8.1.4 Indian Creek Reservoir

ICR is a 2,800 AF freshwater storage reservoir constructed in 1967. ICR operations mandate that the maxim storage pool is at 6,600 feet above sea level or 56 feet on the reservoir stage height gauge. The minimum pool is approximately 1,515 AF at a gauge height of 45 feet. The District contract with Alpine County lists that 15 feet is the minimum level the reservoir may reach in dry years. In addition, the U.S. District Court Water Master requires the reservoir to be lowered to the 45 foot level by November first of each year. The District must pass through any water accumulated in ICR in excess of that necessary to maintain an elevation of 45 feet on the staff gauge corresponding to the storage of 1,515 AF. This elevation ensures the Water Master that no seasonal carryover of water has occurred.

2.8.1.5 Alpine Decree Surface Water Rights to Support ICR

The District has transferred surface water rights from lands adjudicated under the Alpine Decree into storage in ICR to support the minimum pool elevation and enhance the cold water fishery habitat. Currently, up to 555 AF per year could be transferred to storage in the reservoir, although the actual flow volumes are sometimes less as a result of operational issues and capacity limitation in the Snowshoe Thompson No. 1/Upper Dressler conveyance system. This volume offsets the water lost to evaporation and seepage. The direct transfer of water to storage reduces the amount of water that can be diverted from the West Fork of the Carson River to the consumptive use of the water right. As land is needed for recycled water application on the water-righted portions of Diamond Valley Ranch, the existing surface water right may be placed in storage in ICR.

2.8.1.6 Millich Ditch

The Millich Ditch is a part of the District's fresh water system. The ditch splits off of Snowshoes Thompson #1 Ditch approximately one-half mile down stream from the Snowshoe Thompson #1 Ditch West Fork of the Carson River Diversion. The Millich Ditch is a dirt constructed ditch that runs through Diamond Valley and then enters into Indian Creek. Millich Ditch provides irrigation water to the Districts Diamond Valley Ranch and down stream users. The Millich Ditch is also used in the winter months to transport water down stream to fill Mud Lake.

2.8.1.7 Showshoe Thompson #2

The Snowshoe Thompson #2 Ditch is diverted from the West Fork of the Carson River approximately 500 yards down stream from the intersection of Hwy 88 and Hwy 89. Snowshoe Thompson #2 Ditch is a dirt constructed ditch that runs through Diamond Valley and then enters into Indian Creek. Snowshoe Thompson #2 Ditch provides irrigation water to the District's Diamond Valley Ranch and down stream users. The Snowshoe Thompson #2 Ditch splits into two sections in Diamond Valley with one section of the ditch supplying water to Wade Valley.

2.8.1.8 Upper and Lower Harvey Channel

Harvey Channel is designed to reroute Indian Creek fresh water flows from entering HPR. Harvey Channel starts at the Indian Creek Diversion. The Indian Creek Diversion allows water to be diverted through Upper Dressler Ditch to ICR. Indian Creek Diversion also allows water to be diverted by way of Harvey Channel around HPR where it reenters Indian Creek below the Dam of HPR.

2.8.2 Existing Recycled Water System Components - No Project 2 (NP-2)

The recycled water facilities for the District's operations include the South Lake Tahoe WWTP, the A, B and C-Line Export Pipelines, the HPR, the Diamond Ditch, contract irrigator application sites, and the On Farm emergency disposal site.

The A-Line and B-Line export pipelines convey recycled water from the South Lake Tahoe WWTP to the top of Luther Pass. The C-Line extends from the top of Luther Pass to HPR located to the south of Diamond Valley in Alpine County. The Diamond Ditch carries recycled water from HPR to irrigated lands in Wade Valley and along HWY 88 west of the West Fork of the Carson River. Several irrigation laterals distribute the recycled water throughout the application areas. Although the recycled water conveyance and application areas extend to the Nevada Stateline, the District responsibilities and facilities end at the two junction boxes across Chambers Lane on the west side of the river at the Paynesville Bridge. From the Paynesville Bridge all recycled water is the responsibility of the various land applicators.

2.8.2.1 Harvey Place Reservoir

HPR, constructed in 1989, has an active storage capacity of approximately 3,800 AF. The District's normal operation is to fill the reservoir with recycled water from October 15 to April 1, without any discharge. After April 1, the District may begin drawing the reservoir to minimum pool before October 15 to allow for it to be filled again during the winter.

2.8.2.2 Diamond Ditch System

The Diamond Ditch system begins at the outlet works of HPR. The Ditch runs parallel to the HPR access road then crosses under Diamond Valley Road and Indian Creek in a double-barrel inverted siphon. The capacity of the Diamond Ditch and inverted siphon under Indian Creek, as reported in the District's Operation and Maintenance Manual, is 40 cubic feet per second (cfs); two choke points limit the capacity of the Diamond Ditch to approximately 20 cfs. One choke point is located at Bar Screen No. 3 near where Snowshoe Thompson No. 2 Ditch terminates at the Diamond Ditch, and the other choke point is located at Bar Screen No. 5 at the box where flow transitions from open channel to pipeline flow for the existing pipeline that leads to the Paynesville Bridge.

From the inverted siphon under Indian Creek, a concrete lined trapezoidal channel continues approximately 1,800 feet from the outlet of the siphon southwest towards Wade Valley. As the channel crosses a saddle and enters Wade Valley it flows in a short rip-rap lined channel section and then into a steep unlined section for a total of approximately 1,170 feet. At the base of the steep unlined channel, the gradient flattens and recycled water is routed to a 36-inch HDPE pipeline approximately 1,080 feet long. The pipeline discharges to another concrete lined trapezoidal channel in Wade Valley that is approximately 5,313 feet long. From the end of the concrete lined channel, flow is routed in an unlined channel for a total length of approximately 8,000 feet. From the Snowshoe Thompson No. 2 Ditch diversion structure, the gradient increases and the ditch winds downhill to the Upper Celio/On-Farm Ditch diversion structure. At this diversion structure flow can either be routed northward toward Diamond Valley Road in the unlined Diamond Ditch North, or into a 30-inch reinforced concrete pipe that conveys flows into the unlined Celio/On-Farm Ditch system. Numerous irrigation turnout structures and side channel spillways exist along the bank of the north section of the Diamond Ditch in Wade Valley.

The Diamond Ditch system continues from Wade Valley in a northerly direction, paralleling the West Fork of the Carson River to the Paynesville Bridge, where it crosses the river through a 20-inch diameter steel pipe. The contract irrigators combine with Diamond Ditch flows (recycled water) with the Fredricksburg Ditch flows (freshwater), which continue in a northwesterly direction for approximately 5 miles irrigating the Bruns, Neddenriep, and Gansberg fields. Blending of recycled water and freshwater is performed by the contract irrigators in an effort to increase irrigation flows across their ranches.

On the west side of the West Fork of the Carson River the District's control of the recycled water ends at the two concrete flow-control structures in the field across from Chambers Lane. On the east side of the West Fork, the District's control of the recycled water ends at the pipe inlet box for the pipeline leading down to Scott Brooke's ranch.

2.8.2.3 Dressler On-Farm System

In conjunction with the construction of HPR in 1988, the District built the On-Farm emergency disposal facility on lands north of Wade Valley. This 380-acre facility was designed to dispose of recycled water through miles of shallow infiltration ditches following the general contours of the land, each separated by a distance of approximately 200 feet. Several control structures with turnouts are used to control the placement of water. The On-Farm system is comprised of approximately 11.5 miles of unlined ditch, 2.6 miles of concrete-lined ditch, and 37 concrete turnout structures.

The most significant reason for the facility's inefficiency is the poor soil conditions present at the site. The entire area is underlain by a deep caliche hardpan that prohibits infiltration and promotes sheet flow runoff. The second reason the usefulness of the facility is limited is the extensive annual maintenance required to preserve the capacity of the infiltration ditches. The loose surface soils in the area are easily eroded into the infiltration ditches rendering them ineffective in an emergency event.

Both of these operational issues are compounded by the facility location being six ditch-miles below HPR. This means that all six miles of the Diamond Ditch and the On-Farm lateral must be intact to utilize the facility.

2.8.2.4 Recycled Water Irrigators

The District currently has contracts with several local landowners for direct land application of recycled water form HPR. As per the modified August 29, 1972 Diamond Ditch Agreement between the District and the Diamond Ditch Mutual Water Association, a minimum of 1,800 AF and a maximum of 2,600 AF/yr must be delivered for irrigation between April and the end of October. The December 4, 1983 Diamond Ditch Modification Agreement changed the allocation to a minimum of 2,000 AF and a maximum of 3,600 AF delivered annually. Under the Diamond Ditch Agreement this flow must be divided equally among the partners of the agreement.

Recycled water is applied directly to pasture crops in Wade Valley located to the east of the West Fork of the Carson River. The irrigation methods used are controlled flood irrigation, and center pivot sprinkler irrigation. West of the river, recycled water is blended by the contract irrigators with fresh water in the Fredericksburg system prior to the application on permitted lands. The diversion of fresh water is through the Upper and Lower Fredericksburg Ditch off the West Fork of the Carson River.

Agriculture practices are confined to meadow and hay pastures with some alfalfa crops being grown. Cattle are pastured for at least part of the year on recycled water application areas. Portions of the pastureland and alfalfa crops are cut for hay two or three times during the irrigation season. This requires the rotation of irrigation water to allow for the drying and bailing of the hay. Horses, sheep, and other domestic livestock grazing make up the balance of the agriculture uses. Each of the contract irrigator ranches has slightly different practices but all generally conform to this use pattern. The following descriptions of the contract ranches illustrate the similarities and diversity of the lands receiving recycled water.

2.8.2.5 Bruns Ranch

The Bruns ranch is flood irrigated by recycled water on 140 acres. This ranch has a total of 170 acres permitted for recycled water. The total amount of recycled water permitted to be supplied to the ranch under the Lahontan permit is 650 AF. This volume of recycled water is substantially higher than the recommended application rate. Irrigation of this land also occurs as blended water, when freshwater from the Fredericksburg diversion on the West Fork is combined with recycled water from the Diamond Ditch. This practice produces tailwater that contains some recycled water. The permitted land is used for grazing by the owner's livestock.

Recycled water application areas on the Bruns ranch are served by the upper and Lower Fredericksburg Ditches. The tailwater runoff from this area is collected and used on the Neddenriep and Gansberg ranches.

2.8.2.6 Gansberg Ranch

The Gansberg ranch uses recycled water on 505 acres of permitted land. The total amount of recycled water permitted by Lahontan to be supplied to the ranch is 650 AF. The cropland supports hay and alfalfa production. The owner's livestock also uses all pastures seasonally. The 505 acres of flood-irrigated crop land is served from the Upper Fredericksburg Ditch. Fresh water from the West Fork of the Carson River is mixed with the recycled water during the portion of the irrigation season.

2.8.2.7 Neddenriep Ranch Partnership

The Neddenriep Ranch Partnership irrigates all of its land using recycled water, a total of 454 acres, although its Lahontan permit is written for 458 acres. This land is used for hay production and livestock grazing. The Upper and Lower Fredericksburg Ditches serve the 458 acres of flood-irrigated property and fresh water is supplied from the West Fork of the Carson River.

2.8.2.8 Bently (Ace Hereford Ranch)

This ranch is permitted under the Lahontan permit to use 350 AF of recycled water on 250 acres of land. 130 acres is flood irrigated, while 60 acres uses a pivot irrigation system. The pastures are used primarily for livestock and some are leased to other parties.

Historically, this property was served by the Snowshoe Thompson No. 2 Ditch, which delivers water from the West Fork of the Carson River. a portion of this freshwater conveyance has been inoperable since the late 1990's and it is not expected to be put back in service. The Ace Hereford Ranch received recycled water directly from the Diamond Ditch. Tailwater runoff from Ace Hereford ranch is permitted for use on the Celio ranch.

2.8.2.9 Celio Ranch

The Celio ranch is permitted under the Lahontan permit to use 200 AF of recycled water on 100 acres. Currently 47 acres are irrigated. The irrigation is done primarily with flood-irrigation, and uses primarily tailwater from the Ace Hereford ranch. The tailwater from up gradient lands is adequate to irrigate all of the Celio land with primarily recycled water. The pastures are used mainly for grazing livestock. There are also 13 acres of irrigated wetlands on the property. Minimal freshwater irrigation application occurs as a normal irrigation practice. Currently, the freshwater conveyance to Wade Valley is inoperable.

2.8.2.10 Scott Brooke

The area is permitted under the Lahontan permit to use 800 to 2,000 AF of recycled water on 400 acres. The total area that is flood irrigated with recycled water is 120 acres. The primary use of this land is for cattle grazing. Runoff from these fields can reach the Falke-Tillman Ditch and travel to property in Nevada. Brooke's permitted lands include the On-Farm, which is not irrigated as a regular practice. Lands irrigated on the Brooke Ranch have the potential to be irrigated by blending water from the Falke-Tillman Ditch.

The On-Farm Emergency Disposal site is located on this permitted land. Recycled water flows through the On-Farm Emergency Disposal site prior to its application on the Brookes' irrigated land.

2.9 Alternative 2 – Master Plan Projects

Alternative 2 recommends the implementation of the 28 Project Components listed in the Master Plan (see Figure 2-4). Alternative 2 enables the District to meet the Master Plan's stated purpose and need through the implementation of fresh and recycled water projects and management of fresh and recycled water.

The following list outlines the Project Components, identified by Project Component number and component title:

1 – Provide recycled water to new non-irrigated, permitted land

2 – Make recycled water available to irrigators in Nevada

3 – Capacity and conveyance improvements in the Diamond Ditch system

4 – Provide pressurized recycled water to the Fredericksburg system

5 – Provide pressurized recycled water through Wade Valley

6 – Provide pressurized recycled water to the Ranchettes

7 – Non-flood irrigation application system

8 – Improve recycled water quality

9 – Groundwater recharge using infiltration basins

10 – Construct zero-discharge basins

11 – Construct irrigation fields with pumping back to HPR

12 – Grow biomass crops for pulp production using recycled water

13 – Wetland sod and seed production

14 – Pipe recycled water systems to minimize setbacks and human contact

15 – Mitigation wetland creation using freshwater

16 – Subsurface recycled water irrigation in public contact of buffer areas

17 – Increase Snowshoe Thompson No. 1 conveyance capacity

18 – Optimize application rate on existing irrigated lands

19 – Pursue permitting of more land in Alpine County

20 – Improve operation of the Diamond Ditch system to meet District and user needs

21 – Develop tailwater control system

22 – Parallel recycled water pipeline along existing Diamond Ditch

23 – Route Mud Lake winter flows through ICR

24 – Transfer additional water rights to storage in ICR

29 – Irrigate the District Pasture

30 – Irrigate the Jungle with Recycled Water

31 – Divert Stormwater Flow away from HPR and to ICR

32 – ICR Spillway Channel

NOTE: Components 25-28 and 33-34 are potential future Project Components and are described below, but are not included in the scope of analysis of this EIR.

Alternative 2 is designed to accommodate a base volume of 6,400 AF of recycled water per year in 2028, along with 20% of additional capacity to ensure system reliability for a total volume of 7,680 AF. As with Alternative 1, Alternative 2 assumes that projected growth within the District's boundaries through the year 2028 will continue to occur as anticipated in the adopted General Plans of the City of South Lake Tahoe and El Dorado County, and in accordance with the ordinances of the City and County, as well as the TRPA Code of Ordinances and Plan Area Statements.

Alternative 2 will provide for capacity to accommodate the District's need for reuse of recycled water in the event that other willing irrigators are not available to provide adequate capacity for the District's reuse requirements. Under this alternative, the District will reuse the recycled water on District and contracted property through constructed basins and more efficient application methods.

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Figure 2-4 Alternative 2 (11X17)

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2.10 Alternative 3 – Master Plan Recommended Projects

Alternative 3 recommends nine Project Components for implementation based on the need to address infrastructure and management inadequacies and compliance with State of California WDR during temporary containment situations. The following is a list of the recommended Project Components that comprise Alternative 3:

3 – Capacity and conveyance improvements in the Diamond Ditch system

4 – Provide pressurized recycled water to the Fredericksburg system

6 – Provide pressurized recycled water to the Ranchettes

11 – Construct irrigation fields with pumping back to HPR

18 – Optimize application rate on existing irrigated lands

19 – Pursue permitting of more land in Alpine County

22 – Parallel recycled water pipeline along existing Diamond Ditch

29 – Irrigate the District Pasture

30 – Irrigate the Jungle with Recycled Water

Alternative 3 is considered the minimum action alternative, as this alternative includes the least number of Project Components that can be implemented in order to meet the District's objectives. This alternative does not allow for future implementation of the Project Components that could become necessary due to changing economic or environmental climates.

Of the nine recommended Project Components, Project Components 11, 18 and 19 are analyzed at the project-level to expedite implementation. Project Components 11, 18 and 19 comprise Mater Plan projects 1, 2, 11 and 12 and are further detailed in Section 2.12 Project-Level (Current Projects) Descriptions.

2.11 Alternative 4 – Master Plan Trigger Projects

The Master Plan Trigger Projects, Alternative 4, is composed of Project Components that can be implemented in the future to allow the District greater flexibility to respond to a changing environment. As the Master Plan is a 20-year document, there may be unforeseen changes that the District may face in response to: future land uses on the existing irrigated ranches; changes in jurisdictional requirements for discharge of recycled water; changes in total volume of recycled water to be managed; and climatic changes. These triggers could have an impact on the District's ability to dispose of recycled water. Alternative 4 allows the District flexibility in choosing and implementing select Project Components but does not include some Project Components that are listed in Alternative 2. Alternative 4 allows for the analysis of a reduced project scenario that will still meet the District's objectives The following is a list of Project Components that comprise Alternative 4:

1 – Provide recycled water to new non-irrigated, permitted land

2 – Make recycled water available to irrigators in Nevada

3 – Capacity and conveyance improvements in the Diamond Ditch system

4 – Provide pressurized recycled water to the Fredericksburg system

6 – Provide pressurized recycled water to the Ranchettes

7 – Non-flood irrigation application system

11 – Construct irrigation fields with pumping back to HPR

14 – Pipe recycled water systems to minimize setbacks and human contact

16 – Subsurface recycled water irrigation in public contact of buffer areas

17 – Increase Snowshoe Thompson No. 1 conveyance capacity

18 – Optimize application rate on existing irrigated lands

19 – Pursue permitting of more land in Alpine County

22 – Parallel recycled water pipeline along existing Diamond Ditch

23 – Route Mud Lake winter flows through ICR

24 – Transfer additional water rights to storage in ICR

29 – Irrigate the District Pasture

30 – Irrigate the Jungle with Recycled Water

31 – Divert Stormwater Flow away from HPR and to ICR

2.12 Project-Level (Current Projects) Descriptions

In the Master Plan, of the nine recommended projects, projects 1, 2, 11 and 12 are prioritized for expedited implementation (within the next 5-8 years) to resolve the issues of inadequacy with the On-Farm emergency disposal system (page 13-100, Stantec 2008). Project Components 11, 18 and 19 comprise Master Plan projects 1, 2, 11 and 12, the current projects that require project-level analysis in accordance with CEQA guidelines. These four projects are described in sections 2.12.1, 2.12.2 and 2.12.3 below.

2.12.1 Master Plan Project 1 – Recycled Water Irrigation Fields on Diamond Valley Ranch and Master Plan Project 2 – HPR Bypass System Pipelines and Ditches

2.12.1.1 Master Plan Project 1

<u>Projec</u>t Components 11 and 19 will be implemented as part of Master Plan Project 1, Recycled Water Irrigation Fields on Diamond Valley Ranch. <u>Project Component 11 constructs irrigation fields with pumping back to Harvey Place Reservoir and Project Component 19 pursues the permitting of more land in Alpine County to receive recycled water.</u> With completion of Project 1, an additional 904 acres of direct land application of recycled water becomes possible. The irrigation fields will normally be used for surface and aerial irrigation of alfalfa or native pasture grasses as identified in the Diamond Valley Ranch Nutrient Management Plan (Appendix F). Figure 2-6 shows the location of the irrigation fields within the project area. A total of seven irrigation fields are proposed. Five of the seven irrigation fields,

approximately 393 acres, will be central pivot irrigation fields. Two other two fields will serve 49 acres of temporary containment area. The remaining approximately 511 acres of water-righted lands will continue to be flood irrigated with fresh water.

An evaluation of the existing recycled water emergency containment facility (On-Farm) determined the need for a new facility that can be utilized in a variety of scenarios and hydrologic conditions. Two of the seven irrigation fields will also function as temporary containment fields or basins. For ~~emergency impoundment~~ temporary containment, the impoundment of water could be between one to 60 days in duration. Based on the District's last 20 years of application history, the ~~emergency~~ use of these containment basins would not have been necessary under normal operations, but the January 1997 flood event presented a volume of recycled water that could have resulted in non-compliance with Lahontan water discharge requirements (WDRs) ~~WDR~~ because of inadequate system capacities. Construction of temporary containment ~~basins~~ will provide the District flexibility to better respond to future temporary containment situations, which generally will be a flood event.

~~The five~~ Five of the seven fields will be irrigated with central pivot irrigation ~~fields~~ and will vary in size from 47 acres to 120 acres. Each central pivot irrigation field is composed of a central hub where the pivot assembly is connected to the irrigation spans. The spans are composed of several segments of pipe joined together and supported by trusses mounted on wheeled towers with sprinklers positioned along its length. The water source is connected to the central hub of the irrigation system thereby allowing the spans to rotate around the pivot point administering the water for irrigation. Different nozzles are available for the controlled release of the water application/irrigation. Nozzle types vary from aerial spray, rotary sprinkler head to drip systems. Initially, the freshwater irrigation will be used to irrigate the existing native grasses present within the Diamond Valley Ranch.

In order to irrigate the central pivot irrigation fields with freshwater, a new pipeline will be required to be installed from the existing freshwater pipeline outfall from ICR located below the Harvey Place Dam, or from the existing pond located behind and west of the ranch house. The pipeline will then be connected to the five central pivot hubs as shown on Figure 2-6. Irrigation of the fields with recycled water will require additional pipeline connections from the proposed HPR bypass pipeline as described below. Alfalfa production will be introduced during recycled water application within the central pivot irrigation fields (see Phase 1B below). Use of the central pivot system on the five irrigation fields will allow for better recovery and management of tailwater. Figure 2-7 depicts the slight relocation and reconfiguration of fields 6 and 7. The fields were reconfigured to protect a cultural resource site identified during site-specific cultural resource investigations. ~~Cattle grazing occurs on the Diamond Valley Ranch. Continuation of grazing activities during application of recycled water on the irrigation fields will comply with the Nutrient Management Plan as outlined in Appendix F.~~

Two of the seven irrigation fields will be surface irrigated with fresh and recycled waters and will also serve as temporary containment fields for recycled water during times of emergency. Field 1 is 24 acres and Field 2 is 25 acres in size. The fields will be developed on the Diamond Valley Ranch adjacent to Diamond Valley Road. The irrigation fields will slope less than 2 percent~~%~~ to accommodate surface irrigation practices and ~~to~~ will have a common sump pump to facilitate draining and water management. The irrigation area and locations are illustrated in Figure 2-5. The irrigation area consists of two separately diked fields. ~~Crops will uptake and metabolize nutrients, salts and water.~~ The fields will be surrounded by a six-foot high berm and diked. Field One will impound 74.6 AF, while Field Two will impound 79.3 AF. Pasture grass or alfalfa will be grown to uptake and metabolize nutrients, salts and water.

Recycled and freshwater water will be dedicated to maintaining the fields during non-emergency periods. The six foot high berm will surround the irrigated area to allow for ~~deliberate flooding~~ surface irrigation. The volume of recycled water that can be temporarily contained ~~during an emergency event~~ depends on the containment area and the height of the levee. A 49-acre field with a six-foot levee can contain ~~over~~ close to 96 million gallons or 24 days of discharge from the WWTP at current flows.

Project 1 allows for ~~flood and sprinkler~~ surface and aerial irrigation that can function in all seasons. Initially the fields ~~facility~~ will be irrigated with existing freshwater rights diverted from the West Fork of the Carson River and Indian Creek. Recycled water will be used for irrigation as demand for application increases. In practice, Fields 1 and 2 will only hold recycled water in times of temporary containment. During normal operations, the ~~facility~~ fields provides alternative uses such as alfalfa and pasture grass production. To move temporarily contained water from ~~the Irrigation~~ Fields 1 and 2 to the outlet of HPR for redistribution, a pump-back system is necessary (see Master Plan Project 2).

A Nutrient Management Plan (NMP – Appendix F) was prepared for the Diamond Valley Ranch. The recommended crop types are alfalfa and pasture grass and the application rates are 5.99 and 3.03 AF/yr of surface irrigation, respectively. Areas disturbed by trenching will be revegetated as outlined in standard practice SP-8, Repair Road Damage and Revegetate Temporarily Disturbed Sites.

The land is currently not permitted to receive recycled water. Recycled water direct land application permits from Lahontan are required prior to construction of the irrigation fields. Restrictions on the duration of storage may be imposed for groundwater protection, which will affect the required pumping capacity of the irrigation fields pump back station. Irrigation areas will require signage and public notification of the application of recycled water.

Implementation of Project 1 will enable the District to address the need for adequate temporary containment facilities for recycled water and increased operational flexibility for recycled water systems.

Figure 2-5 HPR Bypass Pipeline and Irrigation Fields (11X17)

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Figure 2-6 Irrigation Field Locations (11X17)

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Figure 2-7 Recycled Water Irrigation Fields Study Area (11X17)

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2.12.1.2 Master Plan Project 2

Master Plan Project 2, HPR Bypass System Pipelines and Ditches, will also implement Project C~~c~~omponent 11, t~~he construction of irrigation fields as described above under Master Plan Project 1 and includes temporary~~ This part of Project Component 11 will construct pipelines for pumping impounded recycled water back to HPR. The District will construct irrigation fields (Fields 1 and 2 discussed above) ~~to contain excess and emergency flows from HPR. The fields will be constructed~~ so that the temporarily contained recycled water can be pumped back to HPR or the Diamond Ditch ~~when desired~~ and returned to the irrigation distribution system. A new pump station and associated pipeline ~~may be required~~ adjacent to the irrigated area in order to pump the water back to HPR.

One of the concerns of the existing recycled water C-line conveyance system is the inability to bypass recycled flows around HPR for maintenance or temporary containment purposes. The new pipelines for the HPR Bypass System include: the HPR Bypass Pipeline, the District Pasture Pipeline, and the HPR/ Irrigation Field Connector Pipeline. The HPR Bypass Pipeline will connect to C-Line near the District Pasture at the Millich Ditch crossing and extend to the Irrigation Fields. The HPR Bypass Pipeline will connect to the HPR through the Irrigation Field Connector pipeline ~~allowing~~ to allow for a secondary method of routing flows to HPR or Diamond Ditch.

The general positioning of the three feasible pipeline alignments A, B and C are illustrated in Figure 2-5. Temporary pumps will be installed at the eastern end of the fields. The pipeline installed under alignments A, B, ~~and~~ or C will be a pressure-rated, gravity flow, 18-inch diameter pipe to match the existing C-Line and will be buried to a depth of at least 3.5 feet. Pipeline alignment A is 10,180 linear feet and will required 5,279 cubic yards (yds$^{3)}$ of excavation. Alignment B is 9,050 linear feet and will require 4,693 yds^3 of excavation. Alignment C is 9,645 linear feet and will require 5,001 yds^3 of excavation. The temporary containment fields will be surrounded by a six-foot high berm and diked.

The HPR/Irrigation Fields Connector pipeline is approximately 2,100 feet in length and is planned as 24-inch diameter bidirectional pipeline to connect to the Diamond Valley Ranch Pipeline, an existing 24-inch steel pipeline that provides a method of directing flow from the HPR outlet facility to Diamond Ditch. From the outlet facility recycled water and freshwater can be directed to the Diamond Ditch and to Indian Creek, respectively. The HPR Bypass Pipeline working in conjunction with the HPR/Irrigation Fields Connector, the existing Diamond Valley Ranch Pipeline, and the HPR Outlet Facility will allow recycled water flow to completely bypass HPR and flow into Diamond Ditch. Through implementation of Master Plan Project 2, the District ~~addresses~~ will provide for adequate ~~emergency~~ temporary containment needs and ~~provides~~ sufficient operational control of the distribution systems.

~~1~~2.12.1.3 Project Phasing

Master Plan Projects 1 and 2 will be implemented in three phases: Phase 1A, Phase 1B, and Phase 2. Phase 1A (Master Plan Project 1) will ~~include~~ install~~ation of~~ the five central pivot irrigation sites, along with the freshwater pipeline connections. Phase 1B (Master Plan Project 1) will ~~be the~~ install~~ation of~~ the HPR bypass pipeline and connect~~ing~~ pipelines to the central pivot irrigation sites ~~for~~ to allow for application of recycled water. Phase 2 (remaining portions of Master Plan Projects 1 and 2) will ~~be the~~ construct~~ion of~~ the ~~remaining~~ two ~~irrigation~~ temporary containment fields (Field 1 and Field 2) and ~~the~~ connect~~ion~~ the pipeline to the HPR bypass pipeline to allow for pumping back to HPR.

2.12.2 Master Plan Project 11 – Prepare Nutrient Management Plans

Master Plan Project 11 will implement nutrient management plans that will be developed for all portions of the project area ~~areas~~ receiving recycled water exceeding Total Nitrogen concentrations of 3 mg/L, as ~~will be~~ required by the California State Water Resources Control Board's (State Board) ~~forthcoming~~ Recycled Water Policy (adopted February 2009). Master Plan Project 11 is accomplished through implementation of Project C~~c~~omponent 18, Optimize Application Rate on Existing Irrigated Lands. NMPs will be developed in accordance with requirements set forth in the State of California Recycled Water Policy~~, once adopted.~~ The NMP recycled water irrigation application rate information will be used to modify the "effluent contract" for each contract irrigator and in turn the Regional Water Quality Control Board - Lahontan Region (Lahontan) permits. The application rate for recycled water used for irrigation on existing permitted lands is based on topography, hydraulic loading rate and nutrient needs of the various combinations of soil and crop types. Optimization of the application rate is required to protect groundwater and surface water resources in the region from possible contamination by nitrogen or other nutrients and salts present in the recycled water. Optimization of application rates also helps avoid generation of tailwater. This optimization ensures there are no loses other than those intended (that is, evapotranspiration and some percolation). The application rate is controlled by soil permeability and the nutrient requirements of the irrigated crops.

To develop a recycled water allocation system that will both maximize the volume of applied recycled water and minimize the threat to groundwater and surface water, the soil and crop types in the irrigated areas must be assessed and mapped. These data are used to develop recycled water application rates that meet crop nutrient needs and protect groundwater and surface water resources. The application rates are detailed in Appendix K of the Master Plan. The volume of recycled water that is currently applied exceeds the hydraulic loading rate of available permitted lands resulting in runoff and tailwater discharges. Implementation of this component will likely result in a reduction in the volume of recycled water that is applied. A groundwater monitoring system to detect nitrogen in the shallow groundwater during temporary containment may be necessary. Implementation of Master Plan Project 11 allows the District to address the potential for nitrate accumulation in groundwater through regulating recycled water application rates.

Wood Rodgers completed the Draft NMP for the Diamond Valley Ranch portion of the project area in March 2009. The purpose of the Draft NMP is to determined the best combination of crop and irrigation methods to maximize recycled water reuse and nutrient uptake while also protecting groundwater and surface water resources. Wood Rodgers initial calculations consider crop consumptive use or irrigation demand, crop capacity for nitrogen uptake and soil permeability to determine the maximum volume of recycled water that can be applied within the Diamond Valley Ranch. The results of the analyses determined that growing alfalfa with surface (flood/furrow) irrigation will maximize recycled water reuse and nutrient uptake. Growing alfalfa with spray irrigation methods will yield a similar application rate with reduced risk of tailwater.

The technical report addressing Assimilative Capacity of the Diamond Valley Ranch is found in Appendix 4 of the NMP. The complete NMP is included in this EIR as Appendix F. Lahontan defines assimilative capacity as "the ability of a [ground] water body to receive and accommodate natural and anthropogenic sources (non-point and point sources), while maintaining water quality standards that are protective of beneficial uses of the water resource"(Lahontan Assimilative Staff Report).

The initially calculated maximum recycled water application rate is 71.89 in/yr, which equates to 5.99 AF/yr for 904 irrigable acres or a total flow of 1,765 Mgal/year or 4.8 MGD. This maximum allowable application rate exceeds the current average discharge from the Districts WWTP. The crop requirements as well as the District's objective to maximize recycled water for irrigation purposes can be met given the site-conditions on the Diamond Valley Ranch portion of the project area. Tailwater management controls are necessary and are outlined in Section 7.0 of the Diamond Valley Ranch NMP and included as part of SP-33, Surface and Ground Water Protection Program.

Based on the assumption that the District intends to reuse the entire annual volume of recycled water, the recommended application rate calculated for growing alfalfa with surface irrigation is 66.80 in/yr or 5.57 AF/yr for the 904 irrigable acres. If the District chooses to be more conservative, aerial irrigation methods for growing alfalfa with spray irrigation methods will be a maximum application rate of 66.75 in/yr or 5.57 AF/yr with minimal resulting tailwater.

Grazing is not recommended under a recycled water regime because of nutrient inputs from manure. As stated in the Grazing Options Tech Memo of the NMP: “Under a treated effluent irrigation regime, irrigating fifteen days per month for eight months, grass hay pasture, with no livestock grazing the [Diamond Valley Ranch] results in an estimated deficit of all major nutrients Nitrogen, Phosphorus and Potassium” (page 6).

2.12.3 Master Plan Project 12 – Permitting for Recycled Water Use in Diamond Valley

Master Plan Project 12 requires the implementation of Project C~~c~~omponent 19, the permitting of more land in Alpine County, mainly for use of recycled water in the Diamond Valley. The Irrigation Fields described under Master Plan Project 1 must be permitted to receive recycled water both as irrigation application and as recycled water temporary containment. Implementation of Master Plan Project 12 allows the District to ensure adequate land for future recycled water application even if residential development continues to encroach and if application contracts expire.

The ability to use recycled water as a source of irrigation water is an asset to any production system. Currently, 1,883 acres are permitted to receive recycled water in Alpine County. Of the 1,833 permitted acres, roughly 75 percent (1,411 acres) use recycled water for irrigation. This amount of acreage is not adequate to receive the 5,200 AF/yr of recycled water that is currently generated, much less the 6,498 AF/yr estimated to be generated by the year 2028. Development in areas currently receiving recycled water will likely result in the loss of permitted acreage. Additional lands will need to be permitted for the application of recycled water if other alternative recycled water uses are not implemented.

3 Environmental Analysis Introduction

3 Environmental Analysis Introduction

Chapters 4 through 18 provide the analyses of Project Components for each environmental topic. Chapters 19 and 20 provide the analysis of Project Alternatives and the CEQA required sections. These chapters are organized in the following format:

3.1 Environmental Setting

The Environmental Setting describes the existing conditions as they relate to the attributes of the environment that may be affected by the Project as of February 2009. Pursuant to Section 15125 of the CEQA Guidelines, the environmental settings have been prepared at a level of detail necessary to provide an understanding of the significant effects of the Project and its alternatives.

3.2 Evaluation Criteria with Threshold of Significance

The Governor's Office of Planning and Research has published a guide to developing thresholds of significance to assist in determining whether a project may result in a significant environmental effect (OPR, 1994). A "threshold of significance" is the level at which the Lead Agency finds the effects of a project to be significant. It is a qualitative or quantitative standard based on health based standards, service capacity standards, ecological tolerance, or other standards relating to environmental quality issues such as those listed in the Initial Study checklist, agency regulatory standards, consultation with other agencies, and the Lead Agency's specific thresholds of significance. This section identifies the applicable state, federal, and local environmental standards (e.g., water quality standards, air quality standards, zoning provisions) and other criteria by which a significant change in the environment is assessed.

3.3 Impacts and Mitigation Measures

The impact analyses describe anticipated changes in the environment due to the Project. The impact analyses have been prepared to comply with Section 15143 of the CEQA Guidelines, which states that "significant effects should be discussed with emphasis in proportion to their severity and probability of occurrence." The level of significance is identified for each impact based on a comparison with the impact evaluation criteria. Where the Project results in impacts that are considered significant with respect to the impact evaluation criteria, mitigation measures are proposed to avoid or minimize the impact where feasible. If impacts cannot be reduced to a level that is less than significant, the impact is identified as significant and unavoidable.

3.4 Alternatives Analysis

The analysis of impacts associated with the Project alternatives is presented in Chapter 19. For each significant impact associated with one or more of the alternatives, the analysis identifies if mitigation measures recommended for the Project would reduce impacts of the alternative to a level that is less than significant.

3.5 Cumulative Impacts

As stated in Section 15130 of the CEQA Guidelines, cumulative effects are discussed for each topic section when the Project's incremental effect is "cumulatively considerable," as defined in section 15065 (c) of the CEQA Guidelines. "Cumulatively considerable" means that the incremental effects of the Project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. A cumulative impact consists of an impact that results from the combination of the Project together with other related projects.

Chapter 18 of this EIR explains the approach used to analyze cumulative impacts. Analysis on specific environmental topics can be found at the end of each environmental impact chapter (e.g., cumulative impacts analysis on Groundwater Resources is found at the end of Chapter 7). Per communications with Brian Peters, the Planning and Public Works Director for Alpine County, the County has no planned or foreseeable future projects within or in the vicinity of the project area. As a result, there is no cumulative project list to present at this time.

4 Land Use

4 Land Use

This chapter discusses the consistency of the Project Components with existing and planned land uses and existing zoning, and mineral, aggregate, and geothermal resources in the project area. To provide a basis for this evaluation, the Setting chapter provides information on regional land use patterns: the General Plan for Alpine County, CA; the Master Plan for Douglas County, NV; and existing and planned land uses within the vicinity of Project Components.

4.1 Impacts Evaluated in Other Chapters

The Land Use chapter covers only issues specifically related to land use planning. It does not cover associated topics such as air quality, traffic, or visual impacts. The following items are related to the Land Use Chapter but are evaluated in other chapters of this document:

- Public Policies. This chapter evaluates consistency of the Project Components with General/Master Plans and other public policy documents regarding land use issues only. Public policies, including agriculture, are referenced in Chapter 5, Agriculture: biological and visual resources are referenced in Chapter 11, Biological Resources and Chapter 16, Visual Resources and Open Space.

- Agricultural Open Space. The impacts of the Project Components on agricultural operations and the preservation of agricultural open space are addressed in Chapter 16, Visual Resources and Open Space.

- Viewsheds and Scenic Corridors. Impacts of the Project Component facilities on visual resources are discussed in Chapter 16, Visual Resources and Open Space.

- Hazardous Waste. This is discussed in Chapter 10, Public Health and Safety.

- Use of Recycled Water near Residential Areas. Use of recycled water in proximity to residential areas and public use areas is discussed in Chapter 10, Public Health and Safety. Requirements for separation of irrigation areas from such uses are discussed in Chapter 10, Public Health and Safety.

- Air Quality and Odor. Chapter 13, Air Quality, includes discussion on impacts related to odor, as well as other construction impacts.

- Growth Inducement. The issue of growth inducement resulting from the Project Components is addressed in Chapter 20 of this document.

4.2 Affected Environment (Setting)

Jurisdictions potentially affected by the Project Components include the Counties of Alpine, CA, and Douglas, NV, and the Washoe Tribe Lands located in both California and Nevada.

4.2.1 Regional Land Use Patterns

4.2.1.1 Existing Land Use

Existing land use patterns in Alpine and Douglas Counties are characterized by rural community-centered growth, with areas of agricultural use and other open space separating the communities. The Project area includes the Alpine County areas of Woodfords and Wade Valley. The project area in Douglas County is within the Carson Valley, which includes Centerville and the area south of the Minden-Gardnerville community. These areas consist of rural residential development intermixed with grazing, farming, and other agricultural activities. The Woodfords community has small commercial centers and an elementary school providing services for the local area.

Agriculture is an important land use in both counties, with a diversity of agricultural operations, including alfalfa, hay, pastures for grazing, and livestock (cattle). Other natural resource uses such as State parkland are important elements of the overall land use patterns in portions of Alpine County. The transportation corridor, State Highway 88, an Alpine County designated scenic route, is a significant recreation (bicycling) and tourism area. Agricultural and natural resource related uses predominate within the project area.

4.2.1.2 Planned Land Use

Planned land uses potentially affected by the Project Components are those designated in the adopted Alpine County General Plan and the Master Plan of Douglas County. Generally, the planned land use patterns at the countywide level reflect existing development patterns. In Alpine County, planned land uses are based upon focused growth within relatively compact rural areas. Outside the Planned Development growth areas, land uses within the County are planned to be of low intensity, with emphasis upon protection of agriculture and preservation of scenic or biotic resources. Planned land use in the Carson Valley Planning Area of southern Douglas County is predominantly agriculture or conservation.

4.2.2 Project Area Land Use

Within the project area, Open Space (OS) agriculture (See Figure 4-1) is the dominant Alpine County General Plan land use designation. This includes 172 acres devoted to agriculture Land Preserve (LP). This LP area is bordered on the west with Fredricksburg Road, on the east between California State Highway 88 and Chambers Lane, on the north by Emigrant Road, and on the south at the West Fork of the Carson River. A small portion of the project area, to the east of the LP zone, is devoted to Planned Development (PD), and encompasses 221 acres. Other land uses within the Project area include the Scenic Highway (SH) designation for State Highway 88, the designation for Rural Residential (RR) areas, and Residential Low (RL).

The portion of the project area located in Douglas Valley is within the Carson Valley Planning Area (see Figure 4-2). The community is comprised of agricultural open spaces with large distances between residences. The housing pattern consists of ranches, including housing and outbuildings scattered throughout the community. These ranch houses are placed among irrigated and non-irrigated fields.

4.2.3 Mineral, Aggregate, and Other Geothermal Resources

4.2.3.1 Alpine County

The California Surface Mining and Reclamation Act of 1975 (SMARA) requires the State Geologist to classify mineral areas in the State and the State Board of Mining and Geology to designate mineral deposits of regional and statewide significance. The mineral deposits thus far identified by the California Division of Mines and Geology do not represent completion of the State's responsibilities under the Act. Additional deposits that are not yet identified may exist.

Existing mineral deposits within the project area of Alpine County, as identified in the Alpine County General Plan, are limited to "rock products" in the following locations:

- West of Fredricksburg Road at the California/Nevada state line;

- Woodfords area west of the east junction of State Highways 88 and 89; and

- Indian Creek area south of Diamond Valley Road.

4.2.3.2 Douglas County

A large area with geothermal energy potential exists in Carson Valley. At Wally's Hot Springs, Hobo Hot Springs, and Saratoga Hot Springs, geothermal water reaches the surface. The lands between and around these springs are identified as having a non-electric geothermal energy potential.

4.3 Regulatory Setting

The Alpine County, Douglas County and Washoe Tribe jurisdictions potentially affected by the Project have adopted General/Master Plans, which include land use goals, objectives, and policies as well as land use plan maps showing land use designations (see Figures 4-1 and 4-2). The Project will comply with federal, state, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Land Use Chapter, the following subsections provide descriptions of applicable requirements.

4.3.1 Alpine County, California

The Alpine County General Plan (adopted April 2005) is applicable to the entirety of Alpine County and is intended to guide decisions regarding future growth, development, and conservation of resources. The General Plan is a 2005 update of the 1981 Plan. It was prepared to update statistics and information and to reflect changes in State Law and County Ordinances. The Plan contains the 1996 Regional Transportation Plan/Circulation Element Update.

4.3.2 Douglas County, Nevada

The Master Plan for Douglas County, NV (adopted April 18, 1996) applies to the entire County and is intended to define a countywide character and development pattern, and establish a framework for coordinated planning and growth management in the County. The Master Plan is divided into five regional planning areas, with more detailed objectives and policies for each area. The Carson Valley Planning Area includes the portion of the County potentially affected by the Project.

4.3.3 Washoe Tribe Lands

The Washoe Tribe completed a Comprehensive Master Plan in the mid-1990s. Washoe Tribal lands include 4,316 acres of tribal land that houses the Washoe colonies. The total population (1993) was 1,380, and the projected 2010 population for the Washoe Tribe is 1,634 with a two percent immigration forecast into the next century. Encroaching urban developments, water quantity and quality, lack of economic development, conservation of natural resources, and the survival of the culture are the problems facing the Washoe Tribe.

Increasing urban development of the surrounding communities leads to increased struggles over water and other natural resources. Currently, existing water resources are adequate for the Washoe Tribe, although future growth will pose a threat to the availability for this and other resources.

Figure 4-1. Alpine County Land Use (11X17)

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Figure 4-2. Douglas County Land Use (11X17)

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4.4 Land Use Goals, Objectives and Policies

Table 4-1 identifies goals, objectives, and policies that provide guidance for development in relation to land use in the project area. The table indicates which criteria in the Land Use Chapter are responsive to each set of policies.

Table 4-1

General Plan Goals, Objectives and Policies - Land Use

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Land Use Element:	Policy No. 2a	Existing mines and mineral deposits shall be protected from encroachment by incompatible land uses in accordance with California Public Resources Code 2710 et seq. (Surface Mining and Reclamation Act).	4
	Geology Goal No. 2:	Policy No. 2b	Maintain open space buffer zones around existing or possible future mining sites to prevent encroachment and help mitigate noise, dust, vibration, and visual impacts and protect public safety.	3
Douglas County Master Plan - Carson Valley Planning Area	Community Balance Goal 7.01:	Policy 7.01.01	Douglas County shall establish and maintain its land use plans to provide areas for different types of future land use and intensity and shall plan public services and facilities appropriate to the planned land uses.	1, 3
		Policy 7.01.02	Douglas County shall plan for areas identified as rural communities, urban communities, agricultural areas, and other non-urban areas. The policies in the Land Use Element and in the Community Plans shall pertain to these distinct areas of the County.	1, 2, 3
	Community Plans Goal 7.03:	Policy 7.03.01	Douglas County shall adopt Community and Regional Plans to establish the special goals and policies necessary to reflect and enhance each community's desired character. These plans shall be part of the Douglas County Master Plan.	1, 3
		Policy 7.03.02	The Land Use Map contained in each Regional and Community Plan shall be interpreted according to the policies set forth in this Land Use Element.	1, 3

Table 4-1

General Plan Goals, Objectives and Policies - Land Use

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
	Rural Area Community Goal 7.06:	Policy 7.06.01	In identified rural communities, the goals and policies of adopted Community Plans shall apply in addition to the policies contained in other sections of the Master Plan.	1, 2, 3
		Policy 7.06.02	Rural areas and communities are those areas where development of rural character exists or is developing. New development in these areas may be approved by Douglas County if it is consistent with the land use designations shown on the Land Use Map, if services are available at the appropriate rural levels, if other policies of the Community Plan and Master Plan have been met, and developed in accordance with the provisions of the Development Code.	1, 2, 3
		Policy 7.06.03	Rural Development, for the purposes of this Master Plan, shall include the residential land use designations of "Single Family Estates" and "Rural Residential," Rural development may include local serving commercial, limited industrial, public, recreational, or agricultural uses as are appropriate to the particular rural community.	1, 2
		Policy 7.06.04	Douglas County and/or other entities shall plan and provide for services to rural communities at established rural service levels.	1, 3
Master Plan - Washoe Tribe Lands	Land Use Element Goals and Policies		Actively seek to minimize or eliminate negative land uses within one mile of the Trust lands. Create partnerships or ally with others whose goals are similar to Tribal goals for Washoe lands. Insure that new, Tribal land uses being approved are harmonious with the Comprehensive Land Use Plan and Parcel Master Plan goals, policies, and objectives.	1, 3

Source: Hauge Brueck Assoc. 2009

[1] The land use evaluation criteria are provided in Table 4-2.

4.5 Evaluation Criteria with Points of Significance

The evaluation criteria for Land Use are presented in Table 4-2. These criteria are drawn primarily from local plans, adapted where necessary to reflect CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A land use impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 4-2.

Table 4-2

Evaluation Criteria with Points of Significance - Land Use

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project be inconsistent with the land use plan map of an adopted General Plan or Master Plan?	Acres of land	Greater than 0 acres of land	CEQA Checklist IX-b Alpine County General Plan Douglas County Master Plan Master Plan for Washoe Tribal Lands
2. Will the Project be inconsistent with zoning?	Acres of land	Greater than 0 acres of land	CEQA Checklist IX-a, b Zoning regulations of: Alpine County Douglas County
3. Will the Project increase potential for conflict as a result of incompatible land uses?	Acres of land	Greater than 0 acres of land	CEQA Checklist IX-c Alpine County General Plan Douglas County Master Plan Master Plan for Washoe Tribal Lands
4. Will the Project result in the loss of locally known and/or important mineral resources?	Type of mineral resource	Greater than 0 acres of land	CEQA Checklist X-a,b Alpine County General Plan Douglas County Master Plan California Surface Mining Reclamation Act of 1975 (SMARA)

Source: Hauge Brueck Assoc. 2009

The adopted Alpine County General Plan (April 2005) and Douglas County Master Plan (April 1996) land use maps for the respective jurisdictions are used to determine planned land uses, mineral resources, non-urban land, and public open space used as the basis for evaluation of impacts. Existing land uses are determined from aerial photographs, supplemented by field observations in areas adjacent to Project Component facilities. Zoning regulations used as the basis of evaluation of consistency with existing zoning were obtained from the affected jurisdictions. For purposes of land use impact analysis, a land use that results in a conflict with any of the jurisdictional plans has been considered. Also evaluated is the potential loss of any valuable or locally known minerals or geothermal resources.

4.6 Environmental Consequences (Impacts) and Recommended Mitigation

4.6.1 No Project Components

Table 4-3 presents potential impacts to land use resources, outlines the points of significance, level of impact and type of impact and ranks the level of significance for components of the No Project Components.

Table 4-3

Land Use Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
LU-1. Will the No Project Components be inconsistent with the land use plan map of an adopted General Plan or Master Plan?	Greater than 0 acres of land				NP-1, NP-2
LU-2. Will the No Project Components be inconsistent with zoning?	Greater than 0 acres of land				NP-1, NP-2
LU-3. Will the No Project Components increase potential for conflict as a result of incompatible land uses?	Greater than 0 acres of land				NP-1, NP-2
LU-4. Will the No Project Components result in the loss of locally known and/or important mineral resources?	Greater than 0 acres of land				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **LU-1, LU-2, LU-3, LU-4. Will the No Project Components impact land use and mineral resources based on evaluation criteria 1 through 4?**

Analysis: *No Impact; NP-1, NP-2*

Under the No Project Components there will be no land use changes resulting from new facilities. The existing facilities conform with existing land uses and zoning as mapped in Alpine County's General Plan, and no land use impacts are introduced as defined by the evaluation criteria. No mineral extraction or processing activities currently exist or are proposed under the No Project Components and no impact to mineral resources will occur.

Mitigation: *No mitigation is needed. NP-1, NP-2*

4.6.2 Project Components

Table 4-4 presents potential impacts to land use resources, outlines the points of significance, level of impact and type of impact and ranks the level of significance for the Project Components.

Table 4-4

Land Use Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
LU-1. Will the Project Components be inconsistent with the land use plan map of an adopted General Plan or Master Plan?	Greater than 0 acres of land				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
LU-2. Will the Project Components be inconsistent with zoning?	Greater than 0 acres of land				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
LU-3. Will the Project Components increase potential for conflict as a result of incompatible land uses?	Greater than 0 acres of land				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
LU-4. Will the Project Components result in the loss of locally known and/or important mineral resources?	Greater than 0 acres of land				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: **LU-1, LU-2, LU-3, LU-4. Will the Project Components impact land use and mineral resources based on evaluation criteria 1 through 4?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

The Project Components conform with the existing zoning, land use designations and allowable uses as defined in the Alpine County General Plan. The land use designations include: Open Space; Scenic Highway; Residential Low; Residential Rural; and Hazardous Waste Facility. Much of the project area is designated Open Space. The allowable use for Open Space in Alpine County include erection, construction, alteration of water and sewer treatment and disposal facilities (Alpine County General Plan page 37).

Each of the Project Components will be contained within existing public rights-of-way, District land or protected easements. Any modifications in siting of Project Components will require County approval.

The Project Components will not implement mineral extraction or processing activities, and there will be no loss of mineral or geothermal resources.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

4.7 Cumulative Impacts

No land use impacts are identified for the Project, and the Project will not contribute to cumulative land use impacts. There are no projects in Alpine County and within the project vicinity that are reasonably foreseeable (personal communication, Brian Peters, Alpine County Planning Director, April 2009).

4.8 Summary of Significant Impacts and Mitigation Measures

4.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant land use impacts are identified in the Land Use chapter.

4.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to land use are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

5 Agriculture

5 Agriculture

This chapter discusses Project impacts within the respective jurisdictions (Alpine County, CA and the Carson Valley Planning Area of Douglas County, NV) on agricultural lands, specifically on important agricultural lands and agricultural land under Williamson Act contracts. To provide a context for these analyses, the setting chapter provides information on current agricultural activity in the project area.

5.1 Impacts Evaluated in Other Chapters

The following items are related to the Agriculture chapter but are evaluated in other chapters of this document:

- Agricultural Land Use and Zoning Designations. The issues related to agricultural land use and zoning designations are discussed in Chapter 4, Land Use.

- Preservation of Agricultural Open Space. Impacts of the Project on preservation of agricultural open space due to potential changes in agricultural operations are discussed in Chapter 16, Visual Resources and Open Space.

- Soil Erosion. Erosion from construction activities is discussed in Chapter 6, Geology, Soils, and Seismicity. Sedimentation in waterways is evaluated in Chapter 8, Surface Water Quality.

- Water Quality Impacts. Water quality concerns associated with irrigation are addressed in Chapter 7, Groundwater and in 8, Surface Water Quality.

5.2 Affected Environment (Setting)

The crop diversity and application methods in the West Fork of the Carson River in California and Nevada watersheds are limited by topography, climate, infrastructure, and historic practices and beliefs.

The irrigation methods for recycled water include controlled flooding, natural flooding and sprinkler irrigation. The recycled water is applied directly to pasture and alfalfa crops in Wade Valley located to the east of the West Fork of the Carson River. West of the river, recycled water is mixed with fresh water in the Fredricksburg system prior to application on permitted lands. The diversion of fresh water is through the Snowshoe Thompson #2 Ditch, Upper Fredricksburg Ditch, and the Lower Fredricksburg Ditch. A portion of the Snowshoe Thompson #2 Ditch has been inoperable for several years and is likely to remain inoperable. The allocation of fresh water to the various users is in accordance with the Alpine Decree administered by the U.S. District Court Watermaster. Recycled water is not governed by the Alpine Decree. The use of recycled water does not affect the allocation, diversion, or priority of a freshwater right under the Alpine Decree. The District has transferred surface water rights from lands adjudicated in the Alpine Decree into storage in ICR to support minimum pool elevation and enhance the cold water fishery habitat. ICR is a freshwater reservoir and will not be impacted by application, conveyance, temporary containment or water management of recycled water.

The amount of fresh water that is applied to the agricultural areas that are served by recycled water varies from year to year, depending on the watershed yield. Recycled water has become an important resource to the users since the first deliveries in 1968, providing ranch owners access to stored recycled water generated by the District. Recycled water is a valuable resource in Alpine County, especially late in the irrigation season and in years when flow of the West Fork of the Carson River is low.

Irrigation of meadow pastures and hay pastures are the current agriculture uses in the project area. The fields defined as alfalfa by the users are most often a mixture of grasses and legumes. Cattle are pastured for at least part of the year on recycled water application areas. Portions of the pastureland and alfalfa crops are cut for hay once or twice during the irrigation season. This requires the rotation of irrigation water to allow for the drying and bailing of the hay. Horses, sheep, and other domestic livestock grazing make up the balance of the agriculture uses. The areas of use are primarily in long-term perennial crops and native pasture. The soils supporting production in much of the area are not easily tilled, because the landform is a mixture of consolidated and unconsolidated alluvial debris characterized by high granitic material, moderate drainage, and a seasonally influenced water table. As has been the practice for the last 150 years, the land receives heavy irrigation early in the season when water is available, and the irrigator then relies on the "sponge effect" of the agriculturally modified soils to support production in the drier period of late summer. During the irrigation of early spring, the tailwater runoff collects in small wetland basins within pastures where it percolates to groundwater. Users have sites within the application area that are either ephemeral or perennial wetland type habitats.

The permitted application areas are all in Alpine County, CA. Presently, there are no fail-safe measures to prevent recycled water from flowing directly down conveyance ditches into Nevada. This issue is under review by the Nevada ranchers benefiting from the water supply as well as NDEP, which is charged with enforcement of recycled water management statutes in Nevada.

New development in the south end of Carson Valley and northern end of Alpine County, close to the Nevada-California state line is changing the land use patterns in areas that receive recycled water from HPR. Population density is increasing. Some new landowners in the areas of use supplied by the Upper and Lower Fredricksburg ditches are not aware of recycled water issues and regulations.

The recycled water application areas east of the Carson River are not as impacted by development at this time. This area differs from the west side of the river because fields are smaller and irrigation systems are not as complex. This area includes the only recycled water sprinkler application in use in Alpine County. This type of application practice has limited potential due to topographic constraints, but provides a better system of recycled water tailwater control and application efficiency. Even though the lands east of the river receive undiluted recycled water, the potential for tailwater control is better through the use of sprinkler irrigation and the constrictive topography of the lower Wade Valley.

5.3 Regulatory Setting

The General Plans and implemented ordinances of Alpine County, CA and Douglas County, NV guide the use of agricultural lands in the project area. The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1.

5.4 Agriculture Goals, Objectives and Policies

Table 5-1 identifies goals, objectives, and policies that provide guidance for development in relation to agriculture in the project area. The table also indicates which criteria in the Agriculture Chapter are responsive to each set of policies.

Table 5-1

General Plan Goals, Objectives, and Policies – Agriculture

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Conservation Element	Goal No. 10	Preserve and Protect Agriculture Practices in Alpine County.	1, 2, 3
		Goal No. 11	Encourage clustering of development proposed for agricultural lands to minimize loss of productive lands to agriculturally uneconomical parcel sizes.	1, 2
Douglas County Master Plan	Land Use Element	Goal 7.04	To maintain agriculture as an important land use in the Carson Valley and retain the open rural character, cultural heritage and economic value created by this land use.	1, 2
		Policy 7.04.01	Douglas County shall plan for the continuation of agriculture as a distinct and significant land use in the County.	1, 2, 3
		Policy 7.04.02	Douglas County shall identify areas for future agricultural use on the Master Plan Land Use Map in general, irrigated agricultural lands shall be designated "Agriculture" while nonirrigated lands shall be designated "Forest/ Range"	1

Source: Hauge Brueck Assoc. 2009

[1] The agriculture evaluation criteria are provided in Table 5-2.

5.5 Evaluation Criteria with Points of Significance

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. An agricultural impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 5-2. CEQA Appendix G states that a project will have a significant impact on the environment if it will, convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land.

Potential agricultural impacts may occur if the Project results in:

- Loss of prime farmland as defined by the State Department of Conservation;
- Cancellation of any Williamson Act contract; or
- Involve other changes in the existing environment which, due to their locate or nature, could result in conversion of Farmland, to non-agricultural use.

The criteria of significance for loss of farmland and reduced soil productivity are presented in Table 5-2.

Table 5-2

Evaluation Criteria with Points of Significance – Agriculture

Evaluation Criteria	As Measured by	Point of Significance	Justification
AGR-1. Will the Project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use??	Acres of prime farmland lost	Greater than 0 acres	CEQA Checklist II-a Alpine County General Plan Douglas County Master Plan
AGR-2. Will the Project conflict with existing zoning for agricultural use or a Williamson Act contracts?	Number of remainder parcels under Williamson Act contract which are less than 10 acres of prime farmland due to purchase of land for the Project	Greater than 0 remainder parcels smaller than contract criteria	CEQA Checklist II-b California Land Conservation Act of 1965
AGR-3. Will the Project involve other changes in the existing environment which, due to their locate or nature, could result in conversion of Farmland, to non-agricultural use?	Acres of prime farmland lost	Greater than 0 acres	CEQA Checklist II-c Alpine County General Plan Douglas County Master Plan

Source: Hauge Brueck Assoc. 2009

The Conservation Element, Land Use Element and land use maps from the adopted Alpine County General Plan (April 2005) and Douglas County Master Plan (May 1999) were used to determine agriculture land use patterns. Applicable goals and policies were used as the basis for evaluation of impacts. Existing agricultural uses were determined from aerial photographs, supplemented by field observations in areas adjacent to Project facilities.

5.6 Environmental Consequences (Impacts) and Recommended Mitigation

5.6.1 No Project Components

Table 5-3 presents potential impacts to agriculture, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the components of the No Project Components.

Table 5-3

Agricultural Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component: Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AGR-1. Will the No Project Components convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	Greater than 0 acres				NP-1, NP-2
AGR-2. Will the No Project Components conflict with existing zoning for agricultural use or a Williamson Act contracts?	Greater than 0 remainder parcels smaller than contract criteria				NP-1, NP-2
AGR-3. Will the No Project Components involve other changes in the existing environment which, due to their locate or nature, could result in conversion of Farmland, to non-agricultural use?	Greater than 0 acres				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **AGR-1, AGR-2, and AGR-3. Will the No Project Components impact agricultural resources based on evaluation criteria 1, 2 and 3?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will continue the distribution of recycled water to existing contracted irrigators and allow for perpetuation of agricultural practices. Prime farmland will not be lost and the Williamson Act contract for APN 001-150-032 will not be altered. NP-1 and NP-2 will not involve construction or operation of new facilities and will have no impacts to agriculture and farmland.

Mitigation: *No mitigation is needed. NP-1, NP-2*

5.6.2 Project Components

Table 5-4 presents potential impacts to agriculture, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 5-4

Agricultural Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AGR-1. Will the Project Components convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	Greater than 0 acres				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
AGR-2. Will the Project Components conflict with existing zoning for agricultural use or a Williamson Act contracts?	Greater than 0 remainder parcels smaller than contract criteria				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
AGR-3. Will the Project Components involve other changes in the existing environment which, due to their locate or nature, could result in conversion of Farmland, to non-agricultural use?	Greater than 0 acres				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: **AGR-1, AGR-2 and AGR-3. Will the Project Components impact agricultural resources based on evaluation criteria 1, 2 and 3?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Farmland in Alpine County is rated Class III and is not considered prime farmlands. There is one parcel within the project area that is under Williamson Act contract - Alpine County APN 001-150-032. Construction and operation of conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will not result in a loss of acreage of prime farmlands in Alpine County.

Portions of Douglas County in the project area are identified as prime farmland in the Douglas County Master Plan. The provision of recycled water under component 2 will pursue permitting of recycled water application to irrigators in Nevada with the possibility of strengthening the agricultural viability of this prime farmland.

Application components 1, 7, 9, 10, 12, 13, 14, 15, 16, 18, 19, 21, 29 and 30 will enhance agricultural viability of land receiving recycled water in Alpine County and will not alter agricultural uses.

The water management components 8, 23 and 24 will not affect the amount of water available in Alpine County or Douglas County and will not affect the agricultural use.

The locations of Project Component 9, 10, 11, 12, 13 and 15 will be located on District-owned land and not prime farmland or lands under Williamson Act contract. Currently there are no agricultural uses on District land and no impacts to agricultural lands will occur.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

5.7 Cumulative Impacts

There are no Project impacts are identified on prime farmland or land under Williamson Act contracts, and the Project will not contribute to any cumulative impacts on these agricultural resources. Project Components will involve no changes in the existing environment which, due to their locate or nature, will result in conversion of farmland, to non-agricultural use.

5.8 Summary of Significant Impacts and Mitigation Measures

5.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant agricultural impacts are identified in this chapter.

5.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to agriculture are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

6 Geology, Soils, Seismicity

6 Geology, Soils, and Seismicity

The geologic, soils, and seismic constraints on improvements and construction of the Project are addressed in this chapter. The setting chapter provides information on the physical characteristics of the area, its geology, faults, and history of earthquakes. Geologic hazards in the Project area are described.

6.1 Impacts Evaluated in Other Chapters

The following items are related to the Geology, Soils and Seismicity chapter but are evaluated in other chapters of this document:

- Mineral Resources. Potential impacts to mineral resources are discussed in Chapter 4, Land Use.
- Flooding Hazards. Project facilities could include basins and embankments that would result in flood hazards. The issue of flood hazards is addressed in Chapter 9, Hydrology.
- Groundwater. Potential environmental impacts that could affect the quality and quantity of groundwater are addressed in Chapter 7, Groundwater.

6.2 Affected Environment (Setting)

6.2.1 Physiography

The project area is located in the Diamond Valley, Wade Valley and Upper Carson Valley in Alpine County, CA and Douglas County, NV. The site lies between the East and West Forks of the Carson River. The area is a zone of transition between two geologic zones, the Sierra Nevada Mountains and the Basin and Range province, and is separated from the Lake Tahoe Basin by the Carson Range.

The ground surface elevations in the project area start at 5,600 feet in the Diamond Valley near Woodfords and slope gently downward to the northeast. The West Fork of the Carson River flows into the Carson Valley at Paynesville at an elevation of about 5,100 feet and continues to drop in elevation to the north, reaching 4,800 feet at the state line, meeting the East Fork of the Carson River near Genoa in the northwest corner of the valley.

6.2.2 Geology

The Project area is spread across Diamond Valley, Wade Valley, and the south end of the Carson Valley over an area of about 10.5 miles. Armin and John mapped the surface geology in 1983. Geologic interpretations are taken from United States Geological Survey (USGS) Misc Inventory Series Map I-1424. Figure 2 in Appendix J, which is the March 5, 2009 Memorandum from the District to Lahontan regarding proposed changes to the Alpine County Groundwater Monitoring Program (ACGMP), depicts the consolidated bedrock areas consisting of plutonic and volcanic rocks that bound unconsolidated alluvial and glacial deposits through the project area. The plutonic rock outcrops along the west side of the project area generally consist of Jurassic and Triassic andesites and dacites and Creatceous granites and granodiorites. These consolidated rocks are typically impermeable to groundwater flow (Bergsohn 2009).

The Carson Valley was formed by land uplift and tilting in two periods. First, the Cretaceous granitic rocks that make up the current bedrock were formed. Later, faulting, tilting, volcanic eruptions, erosion, and glaciation took place. The Carson Range on the west was formed as a 4,000-foot degraded fault scarp. The hills west of the Diamond and Carson Valleys are Mesozoic granite and pre-Cretaceous metamorphic rock. The Pine Nut Mountains to the east were uplifted on their eastern flanks and tilted westward. The low rolling hills on the east of the valley are formed of Pliocene volcanic and Plio-Pleistocene non-marine sedimentary rock. The valley floor was created by stream deposits and outwash from the two mountain ranges. The average depth of these deposits is 1,200 feet (U.S. EPA 1979, Jones and Stokes 1978).

The Diamond Valley, at the southern end of the Project area, is composed of extrusive and intrusive igneous rock formations with overlying alluvial materials within the valley. The HPR is underlain by tertiary andesitic volcanic rocks and surficial deposits of Quaternary age. The eastern boundary of the project area follows the interconnected lobes of glacial till and volcanic breccias or mudflows, forming a base on which alluvial fan material has accumulated. The Carson Valley, which opens out to the north, is a large alluvial fan of recent material. Pods of glacial till are found locally throughout the hills. The volcanic rocks are highly fractured by regularly spaced contraction joints.

6.2.3 Faults

The Carson Valley is the northeastern edge of the active Western Nevada-Eastern California seismic zone. The Genoa fault runs north to south through the project area, lies at the base of the Carson Range and runs through the town of Genoa, NV. This fault is an extension of the Genoa fault that underlies Woodfords in Alpine County. This extension of the Genoa fault is designated as an Alquist-Priolo earthquake fault zone (Alpine County General Plan 1996). Figure 6-1 shows faults in the project area.

6.2.4 Earthquakes and Historical Seismicity

The Genoa fault and its related systems may be capable of a magnitude 7.5 earthquake (Douglas County General Plan 1996). The largest recorded earthquake in the project area was a magnitude 6.3 quake, which occurred in 1887 on the Genoa fault. A M6.1 quake occurred south of Gardnerville, NV in 1994. Alpine County has experienced several quakes in the 4.0 to 4.9 magnitude range on the Richter scale and one in the 5.0 to 5.9 magnitude range. A maximum moment magnitude (Mmax) of 6.9 was assigned to the Genoa fault by the California Division of Mines and Geology (CDMG) (1996). Such large events are thought to reoccur at 1,000-year intervals on average. There is the potential for a moderate to major earthquake in the area.

Figure 6-1. Regional Fault Map (11X17)

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6.2.5 Soils

Based on the United States Department of Agriculture (USDA) Soil Survey of Carson Valley Area, California-Nevada, there are six primary soil associations in the project area (USDA 1971).

- The Borda-Reno-Indian Creek association consists of nearly level to steep, well-drained, gravelly and stony fine sandy loams and sandy loams on high terraces and foothills. Shrink-swell potential is low to high, and corrosivity also ranges from low to high.
- The Cradlebaugh-Fettic association consists of nearly level, somewhat poorly drained to poorly drained fine sandy loams and clay loams that have been affected by salts and alkali; these soils are found on low terraces. Shrink-swell potential is low to high, and corrosivity is high.
- The Dressler-Hussman-East Fork association consists of nearly level, somewhat poorly drained sandy loams, clay loams, and clays on low terraces. Shrink-swell potential is low to high, and corrosivity is moderate to high.
- The Kimmerling-Voltaire-Dangberg association consists of level, poorly drained loams, silty clays, and clays on flood plains and low alluvial terraces and in basins. Shrink-swell potential is moderate to high, and corrosivity is high.
- The Mottsville-Holbrook-Ophir association consists of nearly level to steep, excessively drained to poorly-drained, gravelly or stony find sandy loams, sandy loams, or loamy coarse sands on alluvial fans. Shrink-swell potential is low (except for peat soils which have high shrink, but low swell potential), and corrosivity is low to high.
- The Toll-Washoe-Turria association consists of nearly level to moderately sloping, well-drained and somewhat excessively drained sands, sandy loams, cobbly sandy loams, clay loams, and loams on alluvial fans and terraces. Shrink-swell potential is low to moderate, and corrosivity ranges from low to high.

The Carson Valley was surveyed to determine which soils are suitable for irrigation with recycled water and which soils are not suited to irrigation because of drainage problems (either poor drainage or excessive drainage), flooding problems, excessive slope, high water table, or high salt concentrations. Large portions of the project area contain alluvium in the near surface. Some soils are not suited for irrigation with recycled water because of high salt concentrations and low assimilative capacities. Site-specific evaluations are typically necessary to make these determinations

6.2.6 Geologic Hazards

The most significant geologic hazards associated with construction in the project area are from earthquakes and their associated effects. Earthquakes present direct and indirect hazards, both of which can occur locally or at locations distant from the earthquake source. Direct, local earthquake hazards include damage caused by fault displacements either by ground surface rupture or gradual fault creep. The damage caused by ground shaking is also a direct effect. Shaking can occur locally or at remote locations. Indirect hazards presented by earthquakes include liquefaction of soil and earthquake-induced landslides, both of which are triggered by ground shaking. The portions of the project area that are located on or near steep terrain may also be subject to slope instability (landsliding) hazards. Distribution pipelines and embankments may also be subject to this hazard. Analysis of these hazards is based on an understanding of the potential for any or all of these events to occur in the project area.

6.2.6.1 Fault Rupture and Creep

Project facilities could intersect known active faults. Displacement caused by fault rupture or creep could occur along future pipelines that must cross fault zones. For example, the Genoa fault crosses Route 88 and passes through the communities of Woodfords, CA and Genoa, NV.

6.2.6.2 Ground Shaking

The severity of ground shaking due to an earthquake is determined by several factors including the size of the earthquake, fault rupture characteristics, and proximity of the earthquake to the site of interest. The type of soil or bedrock beneath the site will determine the strength of ground shaking.

The potential for intensity of earthquake shaking is evaluated as Modified Mercalli Intensity (MMI) on a scale that relates to human perception and amount of damage. Eastern Alpine County is mapped as having a probable maximum earthquake intensity of IX or X on the Modified Mercalli scale (Alpine County General Plan 1999), and adjacent areas in Nevada would be expected to experience similar intensities. Intensity IX involves violent ground shaking and heavy damage. The effects of Intensity IX are described as "considerable damage to designed structures; well designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse; underground pipes may be broken." Damage under Intensity X is even greater, with "some well built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked." The Uniform Building Code classifies the area as Zone 3 to Zone 4 (greatest potential for seismic activity).

Peak ground acceleration (PGA) has been calculated by the USGS at various grid points in California and Nevada. The probability of PGA exceedance is typically measured over a period of 50 years. For example, a 10% probability of exceedance in 50 years indicates that there is a 10% chance that the region will experience or exceed its PGA within the next 50 years. For the project area, the PGA with a 10% probability of exceedance is generally above 0.40g (USGS 2001), which was the maximum PGA from the Loma Prieta earthquake in 1989. This level of acceleration is high, indicating the severity of the area earthquake hazards.

Liquefaction

Liquefaction occurs in water-saturated sediments that are shaken by moderate to large earthquakes. The liquefied soil loses strength and may fail, causing damage to all types of structures. Liquefaction was responsible for much of the damage during the 1906 San Francisco earthquake and the 1989 Loma Prieta earthquake. Liquefaction hazard analysis involves understanding the potential for ground shaking combined with the physical properties and conditions of the soil. In order for liquefaction to occur, two criteria must be met. First, there must be an opportunity for liquefaction to occur, and second, the soil must be susceptible to liquefaction as explained below.

Liquefaction Opportunity

According to the criteria developed by the California State Mining and Geology Board (CDMGB), liquefaction opportunity is a measure of the potential for ground shaking strong enough to cause liquefaction (CDMGB 1993). Liquefaction opportunity can be measured using ground acceleration. Based on the proximity to several active faults and the estimated potential for ground shaking, the Project will be located on land that provides liquefaction opportunity.

Liquefaction Susceptibility

Liquefaction susceptibility represents the degree to which soils will lose their strength when subjected to ground shaking. This loss of strength is governed primarily by the physical properties of the soil, including grain-size distribution, compaction, cementation, saturation, and depth. Loose, sandy, saturated soils typically lack resistance to ground shaking and are thus considered susceptible to liquefaction. Dry, dense, and cohesive soils are generally not considered susceptible to liquefaction. Detailed screening criteria for liquefaction susceptibility investigations are presented in CDMG (1997), Chapter 6.

The sandy alluvial soils and periodic high water table in parts of the Diamond and Carson Valleys suggest that much of the Project area is seasonally or periodically susceptible to liquefaction during seismic events (Jones and Stokes 1978).

6.2.6.3 Earthquake-Induced Landslides

Landslides triggered by earthquake ground shaking have historically been the cause for a great deal of property damage and loss of life. Areas most susceptible to earthquake-induced landslides are generally on steep slopes or adjacent to existing landslide deposits. The seismic safety element of the Central Sierra Planning area rates the landsliding potential in the Woodfords-Markleeville area as low despite the ground-shaking hazard; this is because of the relatively gentle slopes in the area and the character of the bedrock (Jones & Stokes 1978). The Alpine County General plan identifies landslide hazards primarily in areas of man-made road cuts. Man-made slopes such as impoundment dikes that enclose basins would be potentially affected by ground accelerations capable of causing slope instability.

6.3 Regulatory Setting

The Project will comply with federal, state, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Geology, Soils and Seismicity Chapter, the following subsections provide descriptions of applicable requirements.

6.3.1 Alpine County

Alpine County requires new development to conform with the 1997 Uniform Building Codes, as locally amended, to ensure public safety. Projects that include earthwork and grading are required to minimize erosion and sedimentation, conform to contours, maintain natural drainage patterns, minimize impervious surface coverage and maximize retention of natural vegetation, as well as comply with County grading ordinances. Construction activities must comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit issued by Lahontan.

Earthquake fault zones are established under the Alquist-Priolo Earthquake Fault Zone Act by the California Division of Mines and Geology (CDMG) to regulate development near active faults to mitigate the hazard of surface rupture. Alpine County requires that all new development proposed within or adjacent to a “Special Study Zone” as identified on the Official Map prepared by the State Mines and Geology and Shown in Appendices R-8 through R-10 in the Alpine County General Plan prepare a geologic report. Human occupied structures cannot be constructed across traces of active faults as identified in a required geologic report.

6.3.2 Douglas County

New development in Douglas County must comply with International Building Codes, as amended locally (Title 20, Section 109.3) and grading ordinances. Douglas County requires site specific soils and geologic studies to assess natural and graded slope stability for development proposed in areas that may have moderate to high potential for landsliding, erosion, or other soil or geologic instability and require mitigation through setbacks, special foundation design, etc. The County restricts the location of utility lines within an appropriate distance from active fault traces. Utility lines crossing active fault traces should be specifically designed to withstand the expected movement. Utility lines include electricity, water, gas, and sewer. Construction activities must comply with the requirements of the NPDES Permit issued by NDEP.

6.4 Geology, Soils and Seismicity Goals, Objectives and Policies

Table 6-1 identifies goals, objectives, and policies that provide guidance for development in relation to geology, soils and seismicity in the project area. The table also indicates which criteria in the Geology, Soils and Seismicity chapter are responsive to each set of policies.

Table 6-1

General Plan Goals, Objectives, and Policies – Geology, Soils and Seismicity

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Safety Element	Goal No. 21 Policy No. 21b	All new development proposed within or adjacent to a "Special Study Zone" as identified on the Official Map prepared by the State Mines and Geology and Shown in Appendices R-8 through R-10 in the Alpine County General Plan shall require a geologic report. Human occupied structures shall not be constructed across traces of active faults as identified in a required geologic report.	2
Alpine County General Plan	Safety Element	Goal No. 22	All developments intended for human use or occupation shall address potential hazards by natural or construction related landslides	1, 4
Douglas County Master Plan	Conservation Element	Goal 4.01 Policy 4.01.03	Require site specific soils and geologic studies to assess natural and graded slope stability for development proposed in areas which may have moderate to high potential for landsliding, erosion, or other soil or geologic instability and require mitigation through setbacks, special foundation design, etc.	1, 3, 5, 6, 7
Douglas County Master Plan	Conservation Element	Goal 4.01 Policy 4.01.04	Restrict location of utility lines within an appropriate distance from active fault traces. Utility lines crossing active fault traces should be specifically designed to withstand the expected movement. Utility lines would include electricity, water, gas, and sewer.	2

Source: Hauge Brueck Assoc. 2009

1 The geology, soils and seismicity evaluation criteria are provided in Table 6-2.

6.5 Evaluation Criteria with Points of Significance

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A geology, soils or seismicity impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 6-2. CEQA Checklist item VI-e is not applicable because the Project does not involve septic systems.

Table 6-2

Evaluation Criteria with Points of Significance - Geology, Soils and Seismicity

Evaluation Criteria	As Measured by	Point of Significance	Justification
GEO-1. Will Project facilities be damaged by unstable slope conditions?	Percent slope	Slope greater than 30%	CEQA Checklist VI-aiv, VI-c Alpine County General Plan has determined that landslide potential is significant where slopes consist of questionable material or slopes exceed 30 percent.
GEO-2. Will Project facilities be subject to ground rupture due to location near a surface trace of an active fault?	Location of facilities within an Alquist-Priolo earthquake fault zone in California, or identified active fault in Nevada	Any portion of facilities within zone	CEQA Checklist VI-ai Earthquake fault zones are established under the Alquist-Priolo Earthquake Fault Zone Act by the California Division of Mines and Geology (CDMG) to regulate development near active faults to mitigate the hazard of surface rupture.
GEO-3. Will Project facilities be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?	Geotechnical assessment of potential for liquefaction or more detailed mapping, where available	A rating of High for liquefaction for project facilities	CEQA Checklist VI-aiii Certain soil types, especially fine, sandy soils underlain by shallow groundwater are prone to liquefaction. The USGS Open File Report 00-444 shows areas of liquefaction susceptibility in the project area. Guidelines for evaluating and mitigating seismic hazards are shown in CDMG, Chapter 6, 1997
GEO-4. Will earthquake-induced strong ground shaking damage Project facilities?	Structural and geotechnical design and construction not in conformance with requirements of applicable building codes (refer to text).	Construction not in conformance with requirements of applicable building codes and geotechnical design practice	CEQA Checklist VI-aii Uniform Building Code (UBC 1997) as amended locally
GEO-5. Will construction of the Project cause off-site water-related erosion?	Construction activities not in compliance with requirements of the project National Pollutant Discharge Elimination System Permit (NPDES), or building and grading codes.	Construction not in compliance with NPDES, or building and grading codes	CEQA Checklist VI-b Clean Water Act regulations and local building or grading ordinances

Table 6-2			
Evaluation Criteria with Points of Significance - Geology, Soils and Seismicity			
Evaluation Criteria	**As Measured by**	**Point of Significance**	**Justification**
GEO-6. Will Project facilities be exposed to damage due to expansive soils?	Shrink-swell potential as rated in Soil Survey: Carson Valley Area, Nevada-California (USDA 1971)	A rating of Moderate to High	CEQA Checklist VI-d USDA Natural Resource Conservation Service (NRCS) indicates that soils rated moderate to very high shrink-swelling potential can damage buildings, roads, and other structures
GEO-7. Will Project facilities be exposed to damage due to construction on corrosive soils?	Corrosion potential as rated in Soil Survey: Carson Valley Area, Nevada-California (USDA 1971)	A rating of High for corrosion potential	The NRCS indicates that soils with high corrosivity can damage uncoated steel and concrete by chemical actions that dissolve and weaken the material.

Source: Hauge Brueck Assoc., 2009

Note: Check Checklist VI-e is not applicable to the project

6.6 Environmental Consequences (Impacts) and Recommended Mitigation

6.6.1 No Project Components

Table 6-3 presents potential geologic, soil and seismic impacts, outlines points of significance, level of impact, and type of impact and also ranks the level of significance for the No Project Components.

Table 6-3					
Geology, Soils and Seismicity Impacts – No Project Components					
		Level of Significance by Component			
Impact	**Point of Significance**	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
GEO-1. Will the No Project Components be damaged by unstable slope conditions?	Slope greater than 30%				NP-1, NP-2

Table 6-3

Geology, Soils and Seismicity Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
GEO-2. Will the No Project Components be subject to ground rupture due to location near a surface trace of an active fault?	Any portion of facilities within zone	NP-1, NP-2			
GEO-3. Will the No Project Components be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?	A rating of High for liquefaction for project facilities	NP-1, NP-2			
GEO-4. Will earthquake-induced strong ground shaking damage the No Project Components?	Construction not in conformance with requirements of applicable building codes and geotechnical design practice	NP-1, NP-2			
GEO-5. Will construction of the No Project Components cause off-site water-related erosion?	Construction not in compliance with NPDES, or building and grading codes				NP-1, NP-2
GEO-6. Will the No Project Components be exposed to damage due to expansive soils?	A rating of Moderate to High				NP-1, NP-2
GEO-7. Will the No Project Components be exposed to damage due to construction on corrosive soils?	A rating of High for corrosion potential				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **GEO-1, GEO-5, GEO-6, GEO-7. Will the No Project Components have geology, soils or seismic impacts based on evaluation criteria 1, 5, 6, and 7?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction or new facilities and will have no new impacts. There will be no new exposure to unstable slopes, earthquake hazards, or poor soil conditions, and no new operations or facilities that will be damaged in a seismic event.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: GEO-2, GEO-3, GEO-4. Will the No Project Components have geology, soils or seismic impacts based on evaluation criteria 2, 3, and 4?

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components will involve no construction or new facilities and will have no new impacts to geology or soils. Since the No Project Components are located in an area of a surface trace of an active fault, impacts from seismic hazards will persist. The project area has soils and groundwater conditions that are susceptible to liquefaction during an earthquake and the No Project Components, for freshwater and recycled water alike, could be subject to impacts from earthquake induced strong ground shaking. These seismic impacts are significant.

Mitigation: *No additional mitigation is possible. NP-1, NP-2*

After Mitigation: *Significant Impact; NP-1, NP-2*

Under the No Project Components, system maintenance will continue but upgrades to existing freshwater and recycled water systems will not occur. Engineers will implement standard engineering design features and practices to reduce the effects of a potential pipeline break, but cannot prevent a pipe rupture in the event of a seismic event. The impact remains significant.

6.6.2 Project Components

Table 6-4 presents potential geologic, soil and seismic impacts, outlines points of significance, level of impact, and type of impact and also ranks the level of significance for the Project Components.

Table 6-4					
Geology, Soils and Seismicity Impacts – Project Components					
Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
GEO-1. Will the Project Components be damaged by unstable slope conditions?	Slope greater than 30%			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24
GEO-2. Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?	Any portion of facilities within zone	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32			8, 18, 19, 23, 24
GEO-3. Will the Project Components be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?	A rating of High for liquefaction for project facilities			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24
GEO-4. Will earthquake-induced strong ground shaking damage the Project Components?	Construction not in conformance with requirements of applicable building codes and geotechnical design practice			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24
GEO-5. Will construction of the Project Components cause off-site water-related erosion?	Construction not in compliance with NPDES, or building and grading codes			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24
GEO-6. Will the Project Components be exposed to damage due to expansive soils?	A rating of Moderate to High			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24
GEO-7. Will the Project Components be exposed to damage due to construction on corrosive soils?	A rating of High for corrosion potential			1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24

Source: Hauge Brueck Assoc. 2009

Impact: **GEO-1. Will Project Components be located within an area of unstable slope conditions?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

The project area is located in relatively level to gently sloping areas with slopes less than 30 percent, and conveyance systems in these areas are not expected to experience slope stability problems. Conveyance components 3, 17 and 20 entail improvements to the stability of existing conveyance facilities. Components 2, 4, 5, 6, 14, and 22 required construction of new pipeline alignments. Application component 1, 7, 9, 10, 12, 13, 15, 16, 21 29 and 30 will entail new pipelines and facilities such as sprinkler systems, wetlands and infiltration basins.

The temporary containment facilities of Component 11 are not proposed in areas with slopes greater than 30 percent, as sited on Figure 2-6. The majority of the site has slopes of less than 2 percent, which accommodates irrigation practices and the function of a common sump pump to facilitate draining and water management of the area. Basins and impoundments may create embankments with slopes greater than 30 percent, and these areas will require implementation of SP-16, Slope Stabilization Design, to ensure stability of the structures.

Locations of new pipelines are determined at a preliminary level, and only generalized slope mapping is available. Pipes may cross small areas with slopes greater than 30 percent, which may be subject to unstable conditions. All trenches will be stabilized and revegetated in accordance with SP-8, Repair Road Damage and Revegetate Temporarily Disturbed Areas.

Components 31 and Component 32 will be located on fairly level grounds adjacent to HPR and ICR, respectively.

Requirements of standard design measure SP-16, Slope Stabilization Design, reduces impacts to a less than significant level by implementing standard geotechnical practices as part of project design to stabilize slopes. During project planning the District will retain a licensed geotechnical engineer to conduct a construction-level geotechnical investigation for physical facilities such as pipeline routes, irrigation systems and embankment locations. Results from this investigation will be used to refine the final project design. Compliance with this standard design measure will avoid and minimize adverse environmental impacts from unstable slopes. Implementation of SP-8 will revegetated disturbed areas and further reduce adverse environmental impacts from unstable slopes to a level of less than significant.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 do not implement new physical structures that will be subject to unstable slope conditions. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: **GEO-2. Will Project Components be subject to ground rupture due to location near a surface trace of an active fault?**

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Conveyance components 4, 5, 6. 14, 17, 22, 31 and 32 cross an Alquist-Priolo earthquake fault zone. Conveyance components 3 and 20 are located in close proximity to an Alquist-Priolo earthquake fault zone.

Surface fault rupture associated with seismic activity will result in pipeline damage and/or rupture. Pipe rupture will result in release of recycled water and will cause substantial erosion at the discharge point. Damage to pipelines occurs throughout eastern California and western Nevada in the event of a large earthquake. The existing system as well as components proposed by the Project will be vulnerable to damage. Damage to pipelines is an unavoidable consequence of construction and operation of a recycled water system in a seismically active area.

Damage to components 31 and 32 from surface fault rupture will result in damage to ICR conveyance ditches or the spillway channel and will result in release of freshwater. Erosion could occur at the discharge point.

Application areas for components 10, 15, 29 and 30 cross an Alquist-Priolo earthquake fault zone. Components 1, 7, 9, 12, 13, 16, 18 and 21 are located in close proximity to an Alquist-Priolo earthquake fault zone. Surface fault rupture associated with seismic activity will result in damage to irrigation systems. Irrigation pipelines will have shut-off valves, which limit the amount of water released. Due to the small diameter of the pipes, and the small quantity of water that would be released, this impact will be contained in the immediate vicinity of the break and is thus not considered significant. Resulting spills from a new pipe rupture will not be substantially different than what occurs during potential pipe ruptures associated with the existing flood irrigation system. Surface fault rupture associated with seismic activity will result in pipeline damage and/or rupture. Pipe rupture will result in release of recycled water and will cause substantial erosion at the discharge point. Damage to pipelines occurs throughout eastern California and western Nevada in the event of a large earthquake. The existing system as well as components proposed by the Project will be vulnerable to damage. Damage to pipelines is an unavoidable consequence of construction and operation of a recycled water system in a seismically active area.

Temporary containment Component 11 is located on three Alquist-Priolo earthquake fault zones, and crosses the end of a fourth. Surface fault rupture associated with seismic activity could cause a breach in the substrate of the irrigation field or overtopping of the embankment. The impoundments will be designed with additional freeboard to reduce the risk of overtopping in the event of a seismic event. As proposed and illustrated in Figure 2-5, Field 1 and Field 2 will be sized at 24 and 25 acres, respectively. The fields will be surrounded by a six-foot high berm and diked. Implementation of Component 11 is subject to standard practice SP-21, Temporary Containment and Impoundment Siting and Design. Impoundments larger than 50 acre-feet or with embankments more than 25 feet tall are required to meet design requirements of the California Division of Safety of Dams. District temporary containment basins will be sized much smaller than these dimensions.

An off-site alternative for the temporary containment basins and fields was considered but rejected from further analysis. The District considered off-site temporary containment areas during the Master Plan development process and eliminated the Gansberg property, Ace Hereford property and Swake property from further consideration. Criteria for the temporary containment site include:

- Proximity to Recycled Water Inflow Pipeline to Reservoir;
- Ability to receive waters from Harvey Place Reservoir; and
- Suitability of Soils and terrain.

The analysis of off-site alternatives prepared by Matthew Setty in a series of memorandums dated March 2001 is summarized in Chapter 2, Section 2.7.

The potential for damage to facilities is reduced through implementation of SP-17, Pipeline Design Features in Active Fault Zones. The District will design pipelines crossing active faults with isolation valves. Automatic valves will be used whenever feasible. Pipelines will be sited outside of fault zones whenever possible. During final design, engineers will implement standard engineering design features to reduce the effects of a potential pipeline break, but cannot prevent a pipe rupture in the event of a seismic event. The impact remains significant.

Mitigation: *No additional mitigation is possible. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

After Mitigation: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

No mitigation measures are available for recommendation above and beyond designing and engineering facilities to withstand ground rupture within or in the vicinity of the project area. The situation remains that the faults that run through the project area are considered active and pose the potential to cause ground rupture.

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 do not implement new physical structures that will be subject to ground rupture due to location near a surface trace of an active fault. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: **GEO-3. Will Project Components be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 and application components 1, 7, 9, 10, 12, 13, 15, 16, 21, 29 and 30 will be located on potentially liquefiable soil, since much of the project area is comprised of soils susceptible to liquefaction. Standard design feature, SP-18, Liquefaction Stabilization Design, reduces the potential effects from liquefaction. Complete mitigation of risk of liquefaction damage due to a nearby high magnitude earthquake may not be possible. The District is responsible for hiring a registered geotechnical engineer to performing site-specific soil evaluations of liquefaction potential in project sites mapped as having high liquefaction potential. The risk of damage will be reduced to within acceptable limits by incorporating these standard engineering design practices, which remove liquefaction-prone soils, dewater, or provide foundations at a depth where liquefaction is not expected to occur.

Due to the fact that irrigation pipelines associated with a number of components have shut-off valves, damage to irrigation systems will be localized and recycled water released from damaged pipelines will be confined to the immediate area of the damage.

The temporary containment facilities of Component 11 will most likely be located on potentially liquefiable soil, as much of the project area is susceptible to liquefaction. Complete mitigation of risk of liquefaction damage due to a nearby major earthquake may not be possible. The risk of damage will be reduced to within acceptable limits by incorporating standard engineering design measure SP-18, Liquefaction Stabilization Design, which requires the removal of liquefaction-prone soils, dewatering, or foundations at a depth where liquefaction is not expected to occur.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 do not implement new physical structures that will be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: GEO-4. Will Project Components be damaged by earthquake-induced strong ground shaking?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Project design, construction and operation of components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31 and 32 will be in conformance with applicable building codes (Uniform Building Code 1997), standard engineering practices, and local grading ordinances. Compliance with State and local regulations in combination with standard engineering practices for design and construction of projects within Seismic Zone III will ensure that strong ground shaking during an earthquake will not result in significant impacts in the project area.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 do not implement new physical structures that will be damaged by strong ground shaking during an earthquake. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: **GEO-5. Will construction of the Project Components cause off-site water-related erosion?**

Analysis: *Less than Significant; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Project design and construction of the components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 components will be in conformance with NPDES permit requirements and local grading ordinances. Regulatory compliance ensures erosion during construction will be contained on-site and will not be a significant impact.

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 will not be subject to off-site erosion during construction because the components do not implement new physical facilities. No impact from erosion will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: **GEO-6. Will Project Components be exposed to damage due to expansive soils?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17,20, 21, 22, 29, 30, 31, 32*

Some of the soils within the project area contain clay and have a moderate to high shrink-swell potential (USDA 1971). These soil types typically expand when wet and contract when dry. These changes in soil moisture content will damage facilities and pipelines of components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 if not properly managed during design and construction. Without a site specific soil evaluation, potential impacts from expansive soils are unknown. Prior to project design, the District will retain a certified professional soil scientist or licensed geotechnical engineer to conduct a pre-design soil analysis along all pipeline alignments. Implementation of standard engineering practice SP-19, Standard Engineering Methods for Expansive Soils, avoids impacts by removing the expansive soils, remediates the situation by changing the composition of the soil, or avoids impacts by providing deeper foundations, footings and other support structures.

Components 9 and 10 involve the construction of infiltration and zero-discharge basins. Component 11 will install irrigation fields for temporary containment of recycled waters that will be surrounded by a six-foot high berm and diked. During construction of basins and containment fields, the construction manager will ensure that weak surficial deposits will be excavated and removed (SP-28 Remove Weak Surficial Deposits from Basin Footprints).

Additionally, although irrigation systems may also be subject to damage from expansion and contraction of soils, any release of recycled water will be confined to the immediate area of the damage as a result of irrigation pipelines have shut-off valves. This impact is considered to be at a level of less than significant.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Component 8, 18, 19, 23, 24*

Components 8, 18, 19, 23 and 24 do not implement new physical structures that will be damaged by expansive soils. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: GEO-7. Will Project Components be exposed to damage due to construction on corrosive soils?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

The project area soils have a high corrosivity rating and the facilities comprising components *1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, and 32* may be impacted. Steel, concrete, and other structures will be damaged by the highly corrosive soils. As part of the pre-design soil analysis for project siting, the certified professional soil scientist or licensed geotechnical engineer will conduct an additional analysis of soil properties and chemical interaction between soil groundwater and pipe materials. Should the analysis conclude that facilities and pipelines require corrosion prevention measures, SP-20 Standard Engineering Methods for Corrosive Soils, will be employed. This standard measure avoids impacts by removing corrosive soils or using materials that will not be affected by corrosive soils.

The further reduce potential impacts from expansive soils, standard practice SP-28, Remove Weak Surficial Deposits from Basin Footprints, will be incorporated during construction of irrigation fields for temporary containment of recycled water (Component 11) to ensure that weak surficial deposits, including all landslide deposits, unconsolidated alluvium and colluvium and soil are excavated and removed from the borrow excavation plan for the impoundment sites to stabilize the facilities to the extent feasible.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23 24*

Components 8, 18, 19, 23, 24 do not implement new physical structures that will be damaged by corrosive soils. No impacts will result.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

6.7 Cumulative Impacts

There is one significant Project impact identified in the Geology, Soils, and Seismicity chapter: Project Components will be subject to ground rupture due to location near a surface trace of an active fault. The No Project Components could be impacted from ground rupture, along with ground shaking or liquefaction from earthquakes; these impacts are site-specific and will not contribute to cumulative seismic and geologic impacts in the region.

The Project Components will construct additional facilities in a seismically active area, and thus contributes to the cumulative exposure of structures to seismic hazards in the region as a whole. This is the case for the majority of projects constructed in the state of California. The actual level of risk is site-specific and will not be cumulatively increased at any particular site. The risk of damage to facilities from unstable slopes and soils is also site-specific. Slope stabilization and standard engineering and design measures, as outlined under the standard practices SP-16, 17, 18, 19, 20, 21 and 28, avoid potential seismic impacts or reduce site-specific impacts to a less than significant level, and because the risk is site-specific will not be cumulatively increased at any particular site.

Project Components with potential for impacts from off-site erosion, as well as other projects within the Carson Valley, will be subject to the National Pollutant Discharge Elimination Program (NPDES) permit and review process and conformance with the NPDES permit requirements, as well as local grading and building requirements to reduce any impacts to less than significant on a cumulative basis.

In summary, Project Components will be required to utilize standard engineering and meet design standards for construction in an earthquake zone that will reduce the potential for these cumulative seismic impacts during construction and operation to a less than significant level.

6.8 Summary of Significant Impacts and Mitigation Measures

6.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 6.8 summarizes the significant impacts by Project Component and identifies the mitigation measures required for each impact.

Table 6-5		
Summary of Significant Impacts and Mitigation Measures – Geology, Soils and Seismicity		
Impact	**Level of Significance**	**Mitigation Measure**
Project Components		
GEO 2. Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 ●	Standard Practices - SP-16, 17, 18, 19, 20, 21 and 28

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

6.8.3 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

The significant impacts identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3) are listed below. A discussion follows as to why the impact is significant and how the impact is mitigated to a level of less than significant. If impacts are significant and unavoidable, an explanation is provided.

GEO-2. Will Project Component facilities be subject to ground rupture due to location near a surface trace of an active fault?

The level of this significant impact is reduced through implementation of the following standard practices of the Project:

- SP-16. Slope Stabilization Design;
- SP-17. Pipeline Design Features in Active Fault Zones;
- SP-18. Liquefaction Stabilization Design;
- SP-19. Standard Engineering Methods for Expansive Soils;
- SP-20. Standard Engineering Methods for Corrosive Soils;
- SP-21. Temporary Containment and Impoundment Siting and Design; and
- SP-28. Remove Weak Surficial Deposits for Basin Footprints

The standard practices are detailed in Appendix D.

Impact GEO-2 is considered significant because project components 4, 6, 11, 22, 29 and 30 that comprise Alternative 3 cross an Alquist-Priolo earthquake fault zone and Project Component 3 is located in close proximity to an Alquist-Priolo earthquake fault zone. Surface fault rupture associated with seismic activity will result in damage to conveyance, irrigation and temporary containment systems.

The potential for damage to facilities is reduced through implementation of SP-17, Pipeline Design Features in Active Fault Zones. The District will design pipelines crossing active faults with isolation valves. Automatic valves will be used whenever feasible. Pipelines will be sited outside of fault zones whenever possible. During final design, engineers will implement standard engineering design features to reduce the effects of a potential pipeline break, but cannot prevent a pipe rupture in the event of a seismic event. Standard Practice SP-21, Temporary Containment and Impoundment Siting and Design, will reduce the potential for berm failure but cannot fully avoid or mitigate the impact. No mitigation measures are available for recommendation above and beyond designing and engineering facilities (standard practices that are part of the Project) to withstand ground rupture within or in the vicinity of the Project area. The situation remains that the faults that run through the project area are considered active and pose the potential to cause ground rupture. During the Master Plan planning process, the District explored relocating Project Components to off-site locations. Relocation was determined to be infeasible as based on proximity criteria or cost prohibitive based infrastructure requirements as discussed under impact GEO-2 above. The impact remains significant and unavoidable.

7 Groundwater

7 Groundwater

This chapter describes the effects of the Project on groundwater resources in the Carson Valley groundwater basin.

7.1 Impacts Evaluated in Other Chapters

The following items are related to the Groundwater Chapter but are evaluated in other chapters of this document:

- Biological Resources. The issues related to biological resources are discussed in Chapter 11, Biological Resources.
- Hydrology. The issues related to hydrology are discussed in Chapter 9.
- Surface Water. The issues related to surface water are discussed in Chapter 8.
- Land Use. Land use concerns associated with groundwater are discussed in Chapter 4, Land Use.
- Agriculture. Agricultural concerns associated with groundwater are discussed in Chapter 5, Agriculture.

7.2 Affected Environment (Setting)

Groundwater originates from surface water after percolating through the soil profile and/or underlying rock formations. Groundwater is water stored underground in permeable rock or soil formations known as aquifers. Aquifers at the upper end of the Carson River Basin in Alpine County, CA are contiguous with their counterparts in Douglas County, NV.

7.2.1 Alpine County, California

Rock types of Alpine County's seven special planning areas are mapped in earlier reports. The locations of more than 50 wells existing in Alpine County in 1981 are plotted upon the geologic information mapped in these reports. Information about well-depths and rates of flow is also documented.

Stream deposits of alluvium are a common source for groundwater. Granitic rocks tend to be impermeable and of little importance to groundwater. In much of the upland areas of California, fractures and other spaces in harder rock formations yield small quantities of water sufficient for a domestic supply for an individual home or for stock water. Weathered top of bedrock rock, commonly referred to as "residuum", frequently provides supplies of groundwater sufficient for domestic use. Availability of water in such formations can vary widely between areas. The presence of springs or seeps indicates good locations for wells. The groundwater capacity of volcanic rock tends to be inconsistent and variable. Much volcanic material is permeable; therefore its ability to store groundwater and provide yield to wells can be better than that of granitic rocks. Glacial deposits are also sufficiently permeable to provide usable supplies of groundwater locally.

Much of California's groundwater occurs in alluvial material deposited by the existing streams. The water in this alluvial material is usually contained in deposits of sand and gravel and can range from 10 to 25 percent of the soil volume. The alluvial fan that underlies the Woodfords, Fredericksburg and Paynesville areas is identified as the largest alluvial deposit in Alpine County. Several reports describe the fan's capacity to collect, store and transmit groundwater. Older State Groundwater Reports define the deposit as an extension of the Carson Valley in Alpine County. The water-bearing zone is estimated to lie between the depths of 20 to 120 feet. The composition and nature of the alluvial deposits of the West Fork of the Carson River are described in studies for Alpine Waste Disposal Site (El Dorado Irrigation District 1973). According to the Alpine County General Plan the most reliable groundwater supplies are in recent alluvial deposits. The alluvial fan of the West Fork of the Carson River is estimated to have a storage capacity of 100,000 acre-feet of groundwater (Alpine County 1999).

The hydrogeologic setting for the project area is determined from several decades of groundwater monitoring in combination with mapped surface geology (Armin and John 1983) and geologic interpretations of major rock types (Appendix G - USGS Misc Inv. Series Map I-1424). Detailed descriptions of surface geology, soils and groundwater flow contours along with results, conclusions and recommendations from the Alpine County Groundwater Monitoring Program (ACGMP) are found in Appendix H of this EIR, which contains the South Tahoe Public Utility District Wastewater Monitoring Report (Alisto 2008).

Additional groundwater evaluations are referenced to Appendix I-a, Investigations of Increasing Nitrate to Groundwater in Alpine County, California (McGraw 2006). The District and its consultants installed nine groundwater monitoring wells in years 2003 (wells ACMW-07S, ACMW-07D, ACMW-08N, ACMW-08S, ACMW-09S) and 2008 (wells, ACMW-09D, ACMW-10, ACMW-11 and ACMW-12) as part of a hydrogeologic reconnaissance investigation in Diamond Valley (Brown and Caldwell 2006). These wells are ~~not currently part of~~ proposed for addition to the ACGMP and ~~but~~ are currently utilized to supplement the existing groundwater monitoring network to characterize project area and regional groundwater flow regimes. Appendix J contains the Memorandum - Proposed Changes to the Alpine County Groundwater Monitoring Program N0. R6T-2004-0010 (Bergsohn 2009), which summarizes the results from prior groundwater studies and outlines the changes and improvements to the ACGMP the District submitted to the Regional Water Quality Control Board for the Lahontan Region (Lahontan).

Figure 6 in Appendix J depicts the general bedrock geology and groundwater regime within and surrounding the project area. In general, quaternary alluvial and glacial deposits lie upon the hanging wall of the Genoa fault occurring along the mountain front of the Carson Range. Outwash, moraine and alluvial deposits form the eastward sloping alluvial fans between the Carson Range and the West Fork of the Carson River, the valley floor on the west side of Diamond Valley and the valley floor underlying Wade Valley and Dutch Valley. The southern end of the Carson Valley contains the primary water-bearing units within the Quaternary alluvial fan, basin-fill, outwash and floodplain deposits.

Mapping of groundwater elevations inferred from surface water features, alluvial-bedrock contact elevations and monitoring data determine that groundwater moves from the mountain front areas at higher elevations to surface water reaches along the valley floor. Groundwater depths at mountain fronts are inferred as 120 feet below contact elevations between plutonic rocks and alluvial and glacial deposits (west project area); 60 feet below contact elevation between consolidated volcanic rocks and alluvial and glacial deposits (southwest project area); and 30 feet below contact elevation between consolidated volcanic rocks and alluvial deposits bordering Tertiary volcanics between Diamond Valley and Wade Valley.

Results from USGS water resource investigations characterize groundwater flow as originating at the mountain fronts bordering the east and west margins of the Carson groundwater basin and moving towards the center of the Carson Valley. Flows then move northward along longitudinal profile of the valley concordant with the West Fork of the Carson River. Groundwater depths at the mountain fronts are typically 100 to 200 feet below ground surface (bgs) and decline progressively to depths of 5 ft bgs in portions of the valley floor (Maurer and Berger 2007).

7.2.2 Douglas County, Nevada

According to a 1979 EPA study, the available groundwater supply in the Carson Valley (presumably above Lahonton Reservoir to the Nevada State line) is estimated to be 32,000 AF/yr. This study estimate assumes an annual groundwater recharge of 25,000 acre-feet from precipitation plus an additional 7,000 AF of subsurface inflow from surrounding geologic rock formations but does not take into account the input from the District's water recycling program which brings Lake Tahoe Basin recycled water over Luther Pass into the area (USEPA 1979).

Studies have been undertaken to provide data on the quantity and quality of groundwater in Douglas County. The literature is summarized in the 1994 Carson Valley Comprehensive Water Plan (Douglas County 1996).

The Carson Valley Groundwater Basin was designated by the State Engineer on June 14, 1977 under State of Nevada Order No. 684. According to the Master Plan, future recycled water could increase the water resources available for development in the valley. Alternative uses of the effluent, which may be beneficial to the development of additional water supplies include:

- Use of recycled water to supplement existing surface water rights rather than supplemental wells, thereby reducing the pumpage of groundwater resource, and

- Use of recycled water to replace the use of existing surface water rights for irrigation and use the surface water rights to recharge the groundwater basin.

As discussed in Chapter 2, the District's recycled water facilities currently convey, apply, contain and manage 4,873 acre-feet annually of recycled waters within the Carson River Groundwater Basin, by 2028 this volume is projected to be 6,498 AF annually.

Water rights totaling about 35,000 AF have been granted to the municipalities of Minden, Gardnerville, Indian Hills, and Douglas County. Groundwater rights for industrial, stockwater, recreation, wildlife, environmental, and fire protection total about 13,000 AF. The majority of this latter group of groundwater rights are owned by the Lahontan Fish Hatchery with rights totaling 7,360 AF (see Chapter 9, Hydrology).

7.2.3 Groundwater Monitoring Program

Since 1968, the District has exported recycled water for use as supplemental irrigation water in portions of Diamond Valley, Dutch Valley and Wade Valley in Alpine County. Based on recommendations of an independent study by the USDA in 1980, the District commenced a monitoring program in 1981 to collect background groundwater and soil quality data at existing, established domestic water supply wells. Lahontan adopted the groundwater monitoring program as part of the Board Order 6-90-14 issued to the District in 1984.

The District has maintained a groundwater monitoring program in Alpine County since 1981, collecting monthly samples from 16 wells in the vicinity of the project area. The wells include the seven domestic water supply wells and the nine shallow groundwater monitoring wells installed by the District in 1988 as part of additions to the recycled water conveyance system:

- Domestic Water Supply Wells - GW-03, GW-04, GW-05, GW-07, GW-08, GW-11 and GW-14; and

- Groundwater Monitoring Wells - ACMW-01AW, ACMW-01BE, ACMW-02N, ACMW-02S, ACMW-03W (former ACMW-03), ACMW-04W, ACMW-05, ACMW-06N, and ACMW-06S.

Figure 1 in Appendix J, orients the location of the monitoring wells within the project area. The irrigated properties and groundwater wells included in the ACGMP are spread across an area of 10.5 square miles that include portions of the Diamond Valley, Dutch Valley, Wade Valley and the south end of the Carson Valley.

The purpose of the groundwater monitoring program is to verify that the District's recycled water operations do not have a negative impact on the groundwater resources of Alpine County and the much larger Carson River groundwater basin. The groundwater monitoring program is a requirement of the monitoring and reporting for Lahontan's WDR. Samples are collected monthly from the upper three feet of the first groundwater encountered in each well and analyzed for the parameters listed in the WDR. The primary compound of concern in both the recycled waters and groundwater is Nitrate – Nitrogen because this constituent can occur in relatively high concentrations in the District's recycled waters and also because it is regulated by State and Federal drinking water standards. The use of the term "Nitrate-Nitrogen" throughout this chapter refers to Nitrogen expressed as N, which when present in drinking water at elevated concentrations has been linked with methemoglobinemia (blue baby disease) and chronic toxicity in adults (National Academy of Sciences 1978). The results of monitoring are reported to Lahontan on a quarterly basis along with the results of the other WDR and in an annual report submitted by June 15th of each year.

When the District's wastewater treatment level changed from tertiary to secondary, Nitrate-Nitrogen levels in the recycling systems increased. Since 1995, management improvements have lowered the average Nitrate-Nitrogen levels in recycled water exported from theWWTP to around 0.5 milligrams per liter (mg/L) (District Effluent Monitoring Data 1995-2008). Total Nitrogen, remains in high concentrations at times at <u>17</u>~~20~~ mg/L (Technical Memorandum 1, Appendix A, Master Plan 2008 <u>and Harvey Place Reservoir Summary 1989-2008</u>). In 2004, 2005 and 2006, Alpine County, the District, and Desert Research Institute (DRI) completed reconnaissance level investigations through site visits, interviews with irrigators and review of historical data to determine the reasons for trends of increasing Nitrate-Nitrogen concentrations and to identify the potential sources of Nitrogen contamination in five of the domestic wells (GW-04, GW-05, GW-07, GW-08 and GW-11) and one shallow groundwater well (ACMW-04).

Table 7-1 depicts the higher average Nitrate-Nitrogen levels at ACMW-03 (5.70 mg/L) and ACMW-04 (2.79 mg/L) as compared to the other groundwater monitoring wells. These monitoring wells contain the groundwater west of the West Fork of the Carson River and are in the vicinity of properties that irrigate fields with a blend of recycled water and freshwater. The DRI reconnaissance evaluation reports that the Nitrate-Nitrogen concentrations in these wells may be increasing but that the rate and levels are manageable. The Nitrate-Nitrogen concentrations are typically below 5 mg/L and continue to remain well below the drinking water standard of 10 mg/L (McGraw 2006).

Well ACMW-03 is located on the Bruns Ranch near the south bank of the Upper Fredricksburg Ditch near State Route 88. The well is noted as being the shallowest of the monitoring wells and as being dry for approximately 25% of the sampling events. The highest Nitrate-Nitrogen readings occurred in 1992 and 1993, and only one sample was collected in 2008 (no samples in 2007) due to the well being dry. The abnormally high concentrations and low sample size notably skew the average for the period of record. Water quality is determined to be representative of seepage from the adjoining Upper Fredricksberg Ditch and may not be representative of water quality in the uppermost zone of saturation. This monitoring well is recommended for removal from the ACGMP (Bergsohn 2008). Well ACMW-04W has slightly elevated levels of Nitrate-Nitrogen due to site-specific application methods and the proximity of the well to irrigation ditches.

Table 7-1

Annual Average Nitrate – Nitrogen in Monitoring Wells

	ACMW-01AW	ACMW-01BE	ACMW-02N	ACMW-02S	ACMW-03W	ACMW-04W	ACMW-05*	ACMW-06N	ACMW-06S
Year	HPR Main Dam	HPR Auxiliary Dam	DV Haul Road	DV Haul Road	Hwy 89 S/Bruns Ranch	Hwy 89 N/ Gansburg Ranch	Dressler Ranch	Celio Ranch	Celio Ranch
1988	0.12	0.17	0.11	0.46	ns	0.71	ns	0.01	0.04
1989	0.31	0.37	0.11	0.19	2.7	0.82	ns	0.02	0.03
1990	0.28	0.16	0.08	0.16	3.12	0.99	ns	0.01	0.07
1991	0.23	0.19	0.09	0.22	7.06	1.51	ns	0.01	0.07
1992	0.21	0.16	0.09	0.09	9.09	1.74	ns	0.01	0.07
1993	0.59	0.73	0.09	0.08	21.05	2.22	ns	0.01	0.08
1994	0.23	0.32	0.07	0.09	4.86	3.55	ns	0.02	0.07
1995	1.05	0.41	0.09	0.01	5.14	4.42	ns	0.01	0.08
1996	0.54	0.44	0.09	0.08	3.15	3.03	ns	0.01	0.04
1997	1.01	0.82	0.09	0.1	4.28	2.51	ns	0.01	0.04
1998	0.31	0.54	0.11	0.14	0.89	3.2	ns	0.01	0.05
1999	0.2	0.45	0.13	0.04	1.45	2.61	ns	0.02	0.06
2000	0.6	0.17	0.09	0.04	1.26	2.65	ns	0.01	0.02
2001	0.04	0.06	0.07	0.03	7.19	2.53	ns	0.03	0.05
2002	0.611	0.142	0.084	0.186	2.50	2.29	ns	0.013	0.050
2003	0.870	0.587	0.104	0.077	5.60	1.79	ns	0.010	0.067
2004	1.215	0.128	0.057	0.139	ns	1.70	ns	0.010	0.074
2005	0.516	0.204	0.149	0.119	6.35	1.96	ns	0.016	0.079
2006	0.132	0.425	0.135	0.123	12.90	5.31	ns	0.010	0.065
2007	0.36	0.13	0.09	0.23	ns	7.46	ns	ND	0.08
2008	1.28	0.19	0.15	0.34	3.98**	5.49	ns	ND	0.05
Average	**0.51**	**0.32**	**0.10**	**0.14**	**5.70**	**2.79**	**ns**	**0.01**	**0.06**

Source: District's Annual Reporting; Hauge Brueck Assoc. 2009

Notes:
ns = no sample taken when well is dry;
ND = Not detected at the reporting limit 0.010 mg/L
* = Well drilled to a depth of 13 ft bgs and does not penetrate watertable, no samples are collected
** = Only one sample was collected in 2008 from well ACMW-03W

Data from the domestic wells reveal elevated Nitrate – Nitrogen concentrations on the, Neddenriep (GW-5), Arant (GW-8) and Gransburg (GW-7) properties with long-term means, as of 2008 averaging concentrations of 2.35 mg/l, 4.29 mg/l and 1.38 mg/l, respectively, for the period of record. Temporal trends for these three wells are shown in Figures 7-1, 7-2 and 7-3 below. Nitrate-Nitrogen concentrations have been increasing since the mid-1980's and levels tend to be higher in the winter months than in the summer.

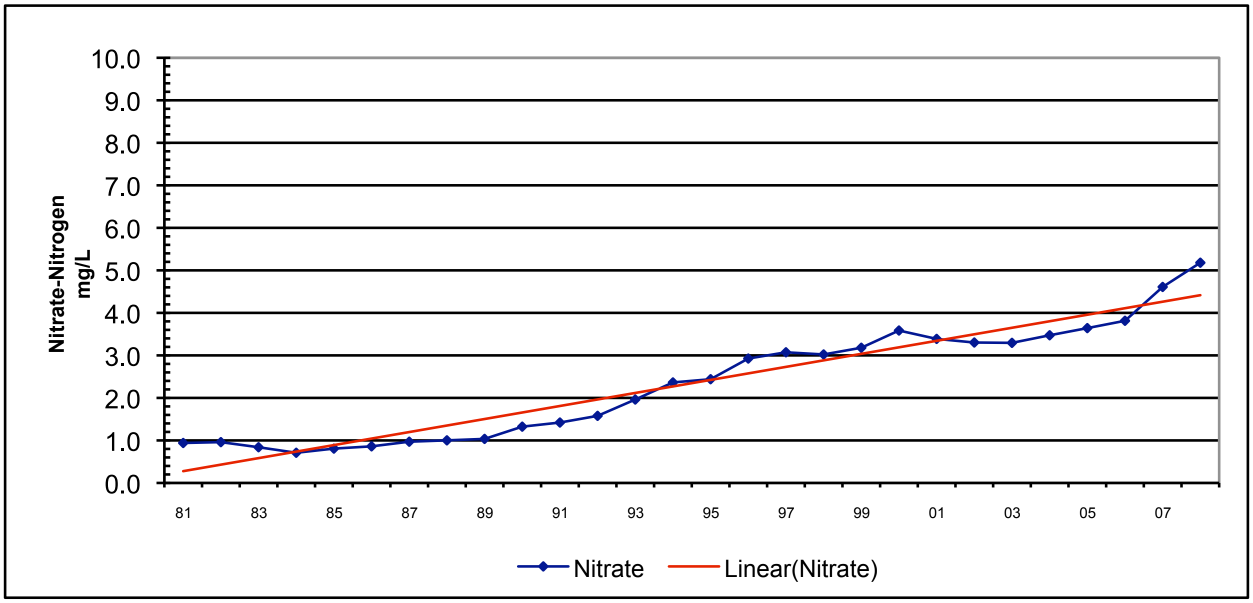


Figure 7-1. Average Nitrate-Nitrogen concentrations in the Neddenriep property well (GW-05).

Source: Hauge Brueck Assoc. 2009

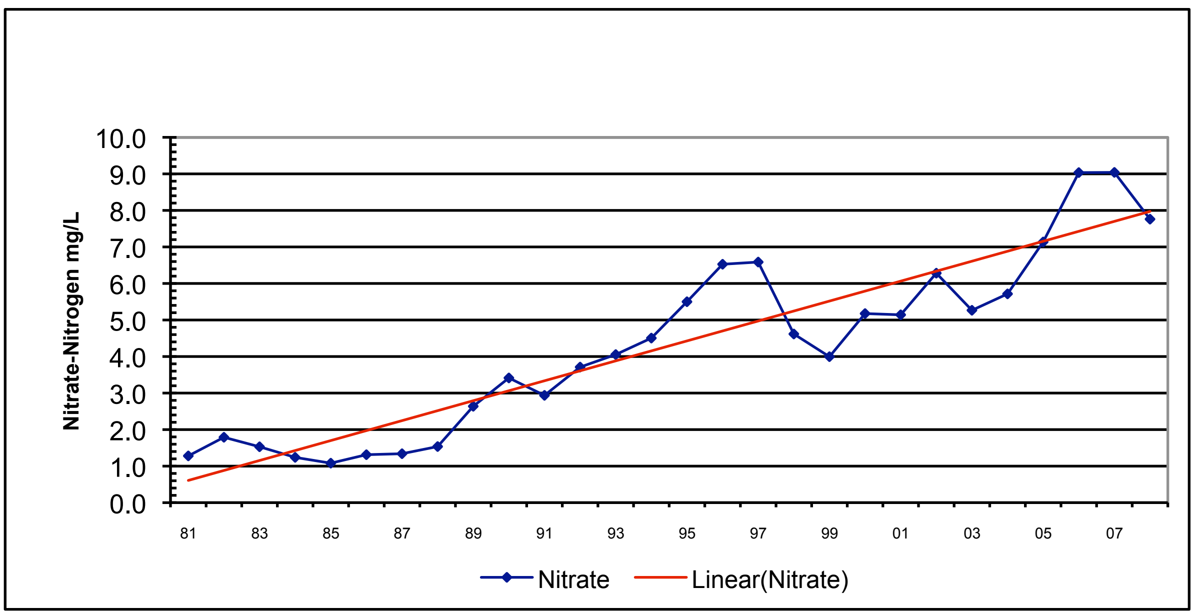


Figure 7-2. Average Nitrate-Nitrogen concentrations in the Arant property well (GW-08).

Source: Hauge Brueck Assoc. 2009

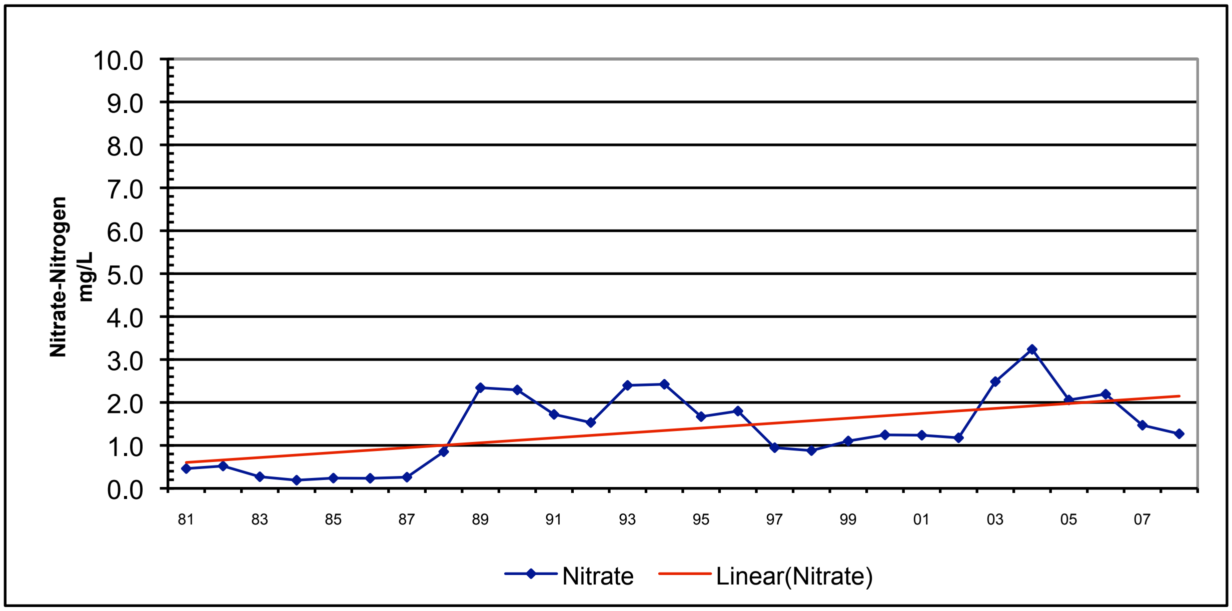


Figure 7-3. Average Nitrate-Nitrogen concentrations in the Gansburg property well (GW-07)

Source: Hauge Brueck Assoc. 2009

Alpine County contracted with DRI to identify the source, or sources, of Nitrogen contamination in groundwater areas of the domestic supply wells. On July 5, 2006, DRI personnel accompanied the District on their groundwater sampling. Each monitoring site was visited to survey the landscape, take photographs of the well, and document the land uses in the area. Additionally, each well owner was interviewed about the history of the well and land-use practices in the surrounding area. A summary of the investigations and resultant recommendations are reported in Appendix I-a. The report concludes that elevated Nitrate-Nitrogen concentrations in wells on the Gansburg, Neddenriep and Arant properties are a result of discharge of untreated waste from aging or improperly maintained septic systems and leach fields. The use of recycled water for irrigation is linked to the elevated Nitrate-Nitrogen concentrations in well GW-05, resulting from leaks in the conveyance ditches and flood irrigation practices. Wells GW-07 and GW-08 are located up-gradient with respect to areas where District recycled water is conveyed or used and are contaminated by local septic systems.

The monitoring recommendations include:

- Abandoning the existing well and constructing a new one with a surface seal (GW-5);
- Pumping the septic system tank every two to three years (GW-7); and
- Pumping the septic system tank every two to three years and consider an engineered leach system because of high (near-surface) groundwater table (GW-8).

The District's response to these monitoring recommendations is documented in Appendix J, which outlines the changes that the District proposes to improve upon the ACGMP in fulfillment of Lahontan's waste discharge requirements. These recommendations concern changes to the existing groundwater monitoring network, including:

- Inclusion of six existing groundwater wells into the ACGMP;

- Removal of six private wells and two District monitoring wells presently included in the ACGMP; and
- Addition of eight future sites for groundwater well construction proposed for later inclusion to the ACGMP.

These changes will increase the total number of groundwater wells in the ACGMP from 16 to 22 and will improve the capability of the monitoring network to collect groundwater data that better evaluates changes in water quality resulting from current and future uses of recycled water in Alpine County, CA.

7.2.4 Groundwater Level Trends

Groundwater monitoring results report that the infiltration of surface water through stream beds and ditches and percolation of recycled wastewater from the flood-irrigated fields have maintained the shallow water table beneath much of the valley floor. The water table level and the degree to which these levels fluctuate are influenced by the characteristics of the zone of saturation and hydraulic conductivities of soils. Results from geologic logging, aquifer testing and water level monitoring, determine that the uppermost portion of the zone of saturation is confined on the west side of Diamond Valley. The monitoring locations near the center of Diamond Valley and Indian Creek measure the uppermost portion of the zone of saturation as unconfined. Perched water table has been identified overlying the zone of saturation in the northern portion of Diamond Valley. Groundwater level data suggests that the zone of saturation may be semi-confined in Wade Valley, while the uppermost portion of the zone of saturation in the Carson Valley portion of the project area are is unconfined. The investigation of the Diamond Valley portion of the project area proposed for irrigation fields and temporary containment area suggests that shallow confined layers will retard infiltration from the uppermost portion of the water tables into lower water bearing zones (FWE 2009).

Depth to groundwater is less than five feet in some areas. The groundwater levels beneath alluvial fans on the west side of the valley increase to greater than 200 feet within one mile of the valley floor and depth to water reaches 200 feet on the eastern side of the valley approximately three miles from the valley floor (Alisto 2008). Evaluation of available geologic information and monitoring data collected during quarterly events in 2007 and 2008 indicates that the regional flow direction of the shallow groundwater is generally towards the north-northeast in the Diamond Valley area and primarily to the north within Wade Valley and Carson Valley. The Alisto report (2008), included in Appendix I-a, states that the data interpretations are consistent with the results of previous monitoring events and the Diamond Valley hydrogeologic reconnaissance study conducted by the District (Brown and Caldwell 2006). The shallow water bearing unit beneath Diamond Valley, Wade Valley, and Carson Valley is interpreted to be hydraulically connected as one hydrogeologic unit. The volcanic and volcaniclastic blocks between Diamond Valley and Wade Valley are not acting as hydraulic barriers to groundwater flow from the south (Diamond Valley) towards Carson Valley and the California-Nevada border.

The Alisto study reports on groundwater trends in the project area. Diamond Valley shows an increasing trend from September 2007 to June 2008; while the groundwater levels in the Wade Valley and Carson Valley has remained consistent over time since 2005. These levels are most likely due to influence of recycled water applications. Site-specific groundwater trends, as measured at the individual monitoring wells are being influenced by different methods of application, proximity to ditches and conveyance structures and local evapotranspiration rates. Recharge along basin fringes and stream flow influence groundwater levels across the entire project area. These levels are noted to fluctuate seasonally and to be generally increasing since 2007.

7.2.5 Groundwater Levels for Diamond Valley Ranch - Temporary Containment Fields (Component 11 - Project-Level)

Farr West Engineering conducted soil sampling, well construction and water quality sampling for the northern portions of Diamond Valley Ranch for the purpose of determining the depth and thickness of water-bearing zones in the area of Project Component 11, Construct Irrigation Fields with Pumping Back to HPR. The work was performed in accordance with the work plan prepared by the District and approved by the Lahontan. The report is attached in Appendix I-b.

Boring activities were conducted on November 3 and 4, 2008 by Boart Longyear from Yuba City, California. Soil samples were collected continuously from unconsolidated alluvial units from three sites with borehole depths between 32.5 and 72.5 below ground surface (bgs). Soil classifications ranged from silty sand and silty clayey sand with gravel to well-graded sand with silt. Laboratory analysis confirmed generally low hydraulic conductivities of soil samples taken in these areas and observed during well development. Hydraulic conductivities ranged from 0.02 ft/day (ACMW-12) to 1.58 ft/day (ACMW-11) (FarrWest Engineering 2009). See Figure 2-6 for well locations.

The Boart Longyear crew conducted well construction and development activities in November and December 2008 for wells ACMW-10, 11 and 12. Water-level readings collected from these wells in December 2008 showed groundwater depths ranging from 16.9 to 34.2 feet bgs. The surveys suggest that the shallow alluvial water bearing zone has a hydraulic gradient to the east.

Based on the findings of the soil sampling and testing and groundwater level readings, the study concludes that the proposed irrigation and temporary containment area could receive recycled water (Farr West Engineering 2009). The measured hydraulic conductivities are indicative of poor aquifer conditions and are orders of magnitude below what is required for significant infiltration or municipal groundwater productions. Perched water was encountered at a depth of 32 and 37 ft bgs. A confining layer comprised of silt with variable gravel was encountered from 37 to 57 ft bgs. A water bearing zone was encountered a depths of 57 ft bgs to the borehole total depth of 73.5 ft bgs (FarrWest Engineering 2009).

Water level data indicate that low to virtually impermeable material separates multiple permeable units. The shallow alluvial zone can be under the direct influence of surface water, is generally less than 40 ft bgs, and fluctuates seasonally to a much greater extent than the lower alluvial zone. The lower alluvial zone is the unit between the upper alluvial zone and the bedrock interface. The water level elevation difference between shallow and lower alluvial zones is less than several feet.

The study concludes that the northern portion of Diamond Valley Ranch could receive recycled water for irrigation and temporary containment with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained poorly sorted material. Movement of recycled water from the shallow alluvial zone to the lower semi-confined and confined alluvial zones are expected to be minimal because of the interbedded alluvial and morainal deposits that form confining layers layers that will retard infiltration.

Farr West Engineering worked with the District to determine the appropriate length of time for temporary containment, a duration of containment that meets the management and response needs of the District while assuring the protection of groundwater resources. To predict the impacts of recycled water on groundwater resources under a worst-case scenario, which is 100 days of containment during saturated soil conditions, a one-dimensional mass flux equation was computed using site-specific environmental metrics measured during November 2008 study and using the highest annual nitrate concentrations that have been discharged from the WWTP during the past 15 years. The computations support the conclusion that temporary containment of recycled water for up to 100 days will not result in significant increases in nitrate concentrations in underlying water bearing zones and that the concentration of mixed waters will remain below the proposed action level of 7.0 mg/L, which is below the 10.0 mg/L State of California drinking water standard. See Appendix I-c for the complete memorandum and tabulated calculations (Farr West October 15, 2009).

7.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Groundwater Chapter the following subsections provide descriptions of applicable requirements.

7.3.1 State of California - State Water Resources Control Board

The State Board has authority to implement the requirements of Title 22 of the California Code of Regulations governing the use of recycled water in California. The State Water Resources Control Board (State Board) is developing a statewide Recycled Water Policy to establish more uniform requirements for recycled water projects. The goal of the Policy is to provide an incentive for development of salt (including nutrient) management plans by recycled water dischargers in groundwater basins that are threatened by salts. In general, NMPs will be required for irrigation projects when recycled water exceeds three (3) mg/L for Total Nitrogen. The District recycled water averages 17~~20~~ mg\L for Total Nitrogen. For purposes of recycled water application, nutrient management means consideration of nutrient concentrations present in the recycled water when calculating fertilizer application rates. At times fertilizer application will not be recommended. The time frame for development of the NMPs is five years after the date of the State Board finding that a particular groundwater basin is threatened by salts, with a possible five-year extension. The NMPs must include a description of the best practicable treatment or control measures necessary to prevent salt or nutrient-related pollutant treatment or control measures necessary to prevent salt or nutrient-related pollution or nuisance.

Appendix A of the District's Master Plan further outlines the environmental regulations and planning needs for the NMPs. Appendix F of this EIR contains the NMP prepared for the Diamond Valley Ranch portion of the project area by Wood Rodgers (March 2009).

7.3.2 State of California - Regional Water Quality Control Board - Lahontan Region

The California Environmental Protection Agency (CalEPA) administers State and federal regulations that pertain to water quality. The primary responsibility for the protection of water quality in California rests with the State Board and nine Regional Water Quality Control Boards (RWQCB). The State Board sets statewide policy for the implementation of state and federal laws and regulations.

Lahontan implements the Basin Plan, which recognizes natural water quality, existing and potential beneficial uses, and water quality problems associated with human activities in Alpine County (Lahontan 1995). Lahontan also has regulatory authority to enforce the requirements of the Clean Water Act and the California Water Code. This includes the regulatory authority to enforce the implementation of TMDLs, the adoption of WDRs to ensure compliance with water quality standards, and groundwater management (as confirmed by the November 6, 2001 and February 5, 2009) letter from the Lahontan responding to the Notice of Preparations for this EIR).

Lahontan originally established WDR for the District's treatment and discharge facility under Order No. 6-79-43, which was adopted on December 6, 1979. Subsequent updates to the WDR included Order No. 6-84-24, adopted February 9, 1984, Order No. 6-90-14, adopted February 8, 1990, and Order No. 6-95-65 adopted on June 8, 1995. In 2004, Lahontan adopted Revised Order No. R6T-2004-0010 as an update to the WDRs for the District's WWTP in South Lake Tahoe, CA, El Dorado County and the wastewater application areas in Alpine County. The uses of recycled water is restricted by the Board Order to irrigation of seed and fiber crops, and fodder crops for non-milking animals. The Order also prohibits the use of recycled water for crop irrigation within 100 feet of an active domestic water supply well and spray irrigation within 100 feet of a residence, school or public place to prevent exposure to the public.

Because Project construction results in the disturbance of an area greater than 5 acres (to be reduced to one acre according to the letter submitted by Lahontan on February 5, 2009), the District will be required to comply with the California General Permit for Discharges of Storm Water Associated with Construction Activities (NPDES General Permit CAS000002) adopted by the State Board. The Permit requires that the construction contractor develop and implement a site-specific SWPPP to prevent storm water and groundwater pollution caused by construction activities. Although the SWPPP focuses primarily on protection of surface waters, it also contains a plan for responding to and managing accidental spills during construction and a plan for management and storage of pumped groundwater. The SWPPP addresses overall management of the construction project such as designating areas for material storage, equipment fueling, concrete washout, and stockpiles.

Under CEQA, Lahontan is a responsible agency with regard to the project. The CWC section 13050(e) reads as follows: "Waters of the State means any surface water or groundwater, including saline waters, within the boundaries of the state." State waters include irrigation canals and surface impoundments (other than those solely constructed for wastewater), wetlands, and waters of the United States (a subset of State waters). Lahontan's policies concerning wetland protection are stated in chapter four of the Basin Plan as outlined under sub-section Wetlands Protection and Management (pages 12-8 to 12-14).

7.3.3 Nevada Division of Water Resources

Nevada Division of Water Resources (NDWR) is responsible for allocating, adjudicating and managing surface and groundwater rights in Nevada through the office of the State Engineer. Authorization for groundwater use is dependent upon the availability of unappropriated water and protection of existing water rights. Groundwater and surface water use requires a permit which identifies the point of use, timing and manner of beneficial use. The State Engineer encourages the practice of conjunctive use for both public water supply systems and irrigation systems in Nevada.

Project proponent is required to make application to the State Engineer to change places of diversion, or to change the manner or place of use of water. When the State Engineer issues permits for supplemental water rights, the total volume of water that can be used from any and all sources is established in the permit conditions. The State Engineer is also responsible for ensuring that groundwater withdrawals do not exceed the perennial yield for each basin, in part to avoid impacts on surface water resources. NDWR also administers permits for the conservation of water resources and for the quantities and types of uses of these resources. This agency issues permits for aquifer recharge/recovery projects and conjunctive use projects.

7.3.4 Nevada State Division of Environmental Protection

NDEP is a division of the State of Nevada Department of Conservation and Natural Resources. NDEP's mission is to "protect and enhance the environment of the state, consistent with the public health and enjoyment, the propagation and protection of terrestrial and aquatic life, the operation of existing industries, the pursuit of agriculture, and economic development of the state." Groundwater and surface water quality are regulated by the NDEP and the State Environmental Commission. In March 1998, the agency updated the state of Nevada Comprehensive State Ground Water Protection Program (CSGWPP) in March 1998. This program addresses water quality impacts from sources such as agricultural chemicals, mining, underground storage tanks, underground injection wells, landfills and hazardous waste disposal through an approach that emphasizes pollution prevention.

For groundwater resources, NDEP regulates point source discharges, storm water discharges and underground injections systems. In the state of Nevada, all ground water is considered a potential source of drinking water and all aquifers are subject to non-degradation standards set by the United States Environmental Protection Agency (USEPA) and regulated by NDEP and the agency's divisions.

7.3.5 Nevada State Bureau of Water Quality Planning

Nevada State Bureau of Water Quality Planning (BWQP) of NDEP is responsible for several water quality protection functions which include collecting and analyzing water data, developing standards for surface waters (which are listed in Chapter 445a of the Nevada Administrative Code), publishing informational reports, providing water quality education and implementing programs to address surface water quality. BWQP is divided into three branches: water quality standards; monitoring and non-point source; and groundwater protection.

BWQP is charged with development and implementation of a plan for use of groundwater and surface water resources within Nevada (State Water Plan). BWQP provides the State, counties, and local communities with information, alternatives and recommendations for regional water planning and action for acquisition or conservation of existing resources. This agency is responsible for investigation of new sources of water, including importation and conservation. The Nevada legislature has recognized the critical nature of the State's limited water resources and the demands placed in that resource by an increasing population in BWQP's statute (NRS 540).

7.3.6 Nevada State Bureau of Water Pollution Control

The Bureau of Water Pollution Control (BWPC) of NDEP is responsible for regulating discharges into the waters of the State. This is accomplished by issuing discharge permits, enforcing the State's water pollution control laws and regulations, and by providing technical and financial assistance to dischargers.

The BWPC issues NPDES permits for discharge to surface waters, ground water permits for discharges that may impact subsurface waters, and Underground Injection Control (UIC) permits for injection through wells and storm water permits.

7.3.7 Nevada Division of Wildlife

The Nevada Division of Wildlife (NDOW) is responsible for protection and management of wildlife and wildlife habitat in the state of Nevada. NDOW has specific water management concerns at Wildlife Management Areas (WMA) throughout the State. Water for fish and wildlife has been recognized as a beneficial use in Nevada since 1982, and NDOW is authorized to acquire land and water rights for preservation and restoration of wildlife and wildlife habitat. Water supplies vary depending on the seniority of water rights owned by NDOW, and drought periods can severely impact wildlife habitat. Integrated groundwater and surface water management is a key component in maintaining water supplies for fish and wildlife habitat throughout the State and minimizing drought impacts.

7.4 Groundwater Goals, Objectives and Policies

Table 7-2 identifies goals, objectives, and policies that provide guidance for development in relation to groundwater in the project area. The table also indicates the criteria in the Groundwater Chapter that are responsive to each set of policies.

Alpine County's General Plan includes several goals and policies, relevant to groundwater, that apply to the formulation of evaluation criteria and impact analysis for the Project. In addition, County Ordinance 365-77 controls the construction of sewage disposal systems. Related to the drilling of new wells such as monitoring wells, the County adopted County Ordinance 364-76 that regulates well drilling, repair, and abandonment.

The Douglas County's Master Plan applies to resources of the project area, including groundwater resources (Douglas County 1996). The policies of this Nevada document are applicable to the present analysis under CEQA for those components affecting Nevada.

Table 7-2

General Plan Goals, Objectives, and Polices – Groundwater

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria
Alpine County General Plan	Conservation Element Water: Groundwater	Goal 5 Policy 5a Policy 5b Policy 5c Policy 5d	Maintain adequate supplies of groundwater for all current and foreseeable needs; Withdrawals should not exceed groundwater supplies; oppose significant reduction of supplies due to extractions by wells that serve areas outside the County; minimize land development that would reduce infiltration; prohibit residential development unless an acceptable water supply has been established.	3
Alpine County General Plan	Conservation Element Water: Groundwater quality	Goal 7 Policy 7a Policy 7b Policy 7c	Maintain safe, clean groundwater supplies that are adequate for all current and foreseeable beneficial uses; advise Lahontan of all projects for which County approval is necessary; prohibit residential development unless an acceptable means of sewage disposal has been established.	1
Douglas County Master Plan	Water Resources	Goal 4.08 Policies 4.08.01 to 4.08.07	Protect potable water supplies, limit non-point source impacts on groundwater quality, and promote aquifer management. Minimize creation of impervious surfaces and promote open space and landscaped areas. Maintain historic drainage patterns, run-off rates and volumes, except as part of a regional drainage plan. Urban development to be serviced by sanitary sewer utilities. Minimize spill impacts to groundwater quality. Mitigate impacts to groundwater supplies due to development and non-point sources. Conduct additional hydrogeologic and groundwater studies.	3
Douglas County Master Plan	Water Resources	Goal 4.11 Policy 4.11.01	Coordinate a regional approach to water resource development and management, working with the Carson Water Sub-conservancy District, the Carson Valley Water Authority, the improvement districts, Washoe Tribe, and other appropriate water purveyors.	1, 2, 3

Table 7-2

General Plan Goals, Objectives, and Polices – Groundwater

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria
Douglas County Master Plan	Water Resources	Goal 4.12 Policy 4.12.01 Policy 4.12.02 Policy 4.12.03	Maintain groundwater withdrawals at, or below, the limits prescribed by the State Engineer. Obtain existing non-supplemental groundwater rights for quasi-municipal use when such rights become available. Institute water conservation programs to reduce municipal demands.	3
Douglas County Master Plan	Water Resources	Goal 4.13 Policy 4.13.01 Policy 4.13.02 Policy 4.13.03	Evaluate water resource alternatives to supplement groundwater supply for future quasi-municipal use. Investigate feasibility of developing surface water resources to supplement groundwater supply for future needs. Use treated effluent for irrigation purposes where feasible.	2, 3

Source: Hauge Brueck Assoc. 2009

1 The evaluation criteria are in Table 7-3.

7.5 Evaluation Criteria with Points of Significance

The evaluation criteria for groundwater are presented in Table 7-3. These criteria are drawn from a review of the relevant literature on groundwater resources, including a review of local, tribal, State of California, State of Nevada, and federal agency policies and procedures, adapted when necessary to reflect CEQA requirements.

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A groundwater impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 7-3.

Table 7-3

Evaluation Criteria with Points of Significance - Groundwater

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project degrade groundwater quality in the Carson, Wade or Diamond Valleys?	State standards, including nondegradation policy, which requires that existing high water quality be maintained	Departure from State standards	CEQA Checklist VIII-f Lahontan Basin Plan State of California Recycled Water Policy

Table 7-3

Evaluation Criteria with Points of Significance - Groundwater

Evaluation Criteria	As Measured by	Point of Significance	Justification
2. Will the Project cause groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment?	Groundwater levels that are raised to within 6 feet of the surface	Groundwater that is raised to within 6 feet of the surface	CEQA Checklist VIII-b Elevated water tables can damage vegetation, interfere with the operation of leach-fields or can result in surface runoff and flooding
3. Will the Project lower groundwater levels at existing wells?	Number of documented wells subject to lower groundwater levels	Greater than 0 wells	CEQA Checklist VIII-b The reduction of groundwater levels can cause existing wells to cease providing water for their intended uses

Source: Hauge Brueck Assoc. 2009

7.6 Environmental Consequences (Impacts) and Recommended Mitigation

7.6.1 No Project Components

Table 7-4 presents potential groundwater impacts, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 7-4

Groundwater Impacts - No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
GW-1. Will the No Project Components degrade groundwater quality in the Carson, Wade or Diamond Valleys?	Departure from State standards, including non-degradation policy, which requires that existing high water quality be maintained			NP-2	NP-1
GW-2. Will the No Project Components cause groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment?	Groundwater that is raised to within 6 feet of the surface			NP-1, NP-2	
GW-3. Will the No Project Components lower groundwater levels at existing wells?	Greater than 0 wells			NP-1, NP-2	

Source: Hauge Brueck Assoc. 2009

Impact: **GW-1. Will the No Project Components degrade groundwater quality in the Carson Valley, Wade or Diamond Valleys?**

Analysis: *Less than Significant Impact; NP-1, NP-2*

The Upper Dressler Ditch and Snowshoe Thompson No. 1 Ditch, two systems of the freshwater components of the No Project (NP-1), have earthen sections of open conveyance ditch. The earthen sections have high transmission losses and likely contribute some recharge to groundwater. The level of impact to groundwater quality, is less than significant given that recharge is from freshwater sources that are typically of comparable quality to groundwater.

The existing Diamond Ditch and Dressler On-Farm systems, recycled water components of the No Project (NP-2), consist of 8,000 feet and 11.5 miles of unlined ditch, respectively. The earthen sections have very high transmission rates and likely contribute to groundwater recharge. Recycled water sources typically have elevated levels of Nitrogen that could degrade groundwater resources. System maintenance will continue but system improvements will not be made under the No Project Components.

The existing application of recycled water has not been optimized, and excessive irrigation has the potential to percolate beyond the active root zones of vegetation and crops and contribute Nitrogen to groundwater. Flood irrigation is a common practice by recycled water irrigators within the project area, as sprinkler irrigation systems have not been installed for all permitted acreage. Under the No Project Components, non-flood irrigation application systems will not be installed, but development and implementation of nutrient NMPs, mandated by the State of California Recycled Water Policy (final draft forthcoming), will be completed.

An NMP was developed for the Diamond Valley portion of the project area, and NMPs will be developed for the remainder of the project area to more precisely determine hydraulic loading levels. Facilities necessary to optimize recycled water conveyance, application and temporary containment will not be constructed under the No Project Components. Diamond Valley will be maintained with flood irrigation waters from Snowshoe Thompson No. 1 (fresh water) and grazed with cattle as currently occurs, which to date has not been determined to degrade groundwater quality.

Several decades of groundwater monitoring have not measured groundwater degradation resulting from reuse of recycled water in the project area, as discussed in the Environmental Settings section above. Elevated Nitrate-Nitrogen concentrations have been linked to poor well construction, recycled water irrigation practices on private lands, and contamination by local septic systems. Wood Rodgers calculated Nitrogen loading for the Diamond Valley Ranch portion of the project area in response to Lahontan's request for an Assimilative Capacity Model for the NMP. The loading methods used site-specific data and followed WTS-1B: General Criteria for Preparing an Effluent Management Plan, an NDEP White Paper, to determine the amount of recycled water that can be applied given the Nitrogen concentration of the recycled water, the threshold Nitrate-Nitrogen concentration for the receiving water, the specific crop and the climate conditions of the project area.

Wood Rodgers concludes that the assimilative capacity of receiving water will not be impacted when irrigating with recycled water from the District's South Tahoe WWTP. The conclusion is based on the result of no cumulative effect from loading because of the high quality of recycled water exports from the WWTP. The impact to groundwater in the Carson, Wade and Diamond Valleys is determined to be at a level of less than significant based on these calculations and past monitoring results (Alisto 2008).

The ACGMP will continue and if Nitrate-Nitrogen concentrations approach 7.0 mg/L, the trigger concentration decided upon during NMP preparation, recycled water application and management will be altered until levels decrease. The trigger of 7.0 mg/L was decided upon, instead of the 10.0 mg/L State drinking water standard, in order to allow for ample response time for the protection of groundwater resources. At present, no District groundwater monitoring wells lend samples with concentrations approaching the trigger concentration.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: GW-2. Will the No Project Components cause groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment?

Analysis: *Less than Significant Impact; NP-1, NP-2*

The No Project Components will involve no construction or new facilities. There is evidence of transmissive losses from earthen ditches that at times give false evidence of surface water discharge, but to date there is no evidence of groundwater mounding or increased groundwater levels that cause surface water discharges in a non-stream environment. As discussed in the NMP in Appendix F, the Diamond Valley Ranch has potential for shallow depth to groundwater in several locations but groundwater mounding is not expected to occur because of soil moisture conditions and vegetative uptake of applied irrigation waters.

Results from USGS water resource investigations characterize groundwater flow as originating at the mountain fronts bordering the east and west margins of the Carson groundwater basin and moving towards the center of the Carson Valley. Flows then move northward along longitudinal profile of the valley concordant with the West Fork of the Carson River. Groundwater depths at the mountain fronts are typically 100 to 200 feet bgs and decline progressively where it is found at depths of 5 ft bgs at the valley floor (Maurer and Berger 2007). Groundwater levels within the project level are noted as being sustained by recycled water applications, but groundwater mounding has not been observed during the 20 plus years of monitoring of the project area. The impact is determined to be at level of less than significant.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: GW-3. Will the No Project Components lower groundwater levels at existing wells?

Analysis: *Less than Significant; NP-1, NP-2*

The No Project Components will involve no construction or new facilities that will lower groundwater levels at existing wells. The District continues a monthly monitoring regime from established monitoring wells consisting of nine shallow monitoring wells and seven private water supply wells in the vicinity of the project area. The District proposes the addition of six wells to the ACGMP that where installed in Diamond Valley to better characterize hydrogeologic conditions in this portion of the project area. As outlined in the March 5, 2009 Memorandum to Lahontan (Appendix J), the District also proposes the removal of six domestic water supply wells and two existing groundwater monitoring wells from the ACGMP and the addition of eight future sites for groundwater well construction for later inclusion in the monitoring program. The changes proposed are based on results and recommendations from third party reviews of the current ACGWP and Lahontan WDR by Alisto Engineering and DRI. The changes in well locations and types will improve the capability of the monitoring network to collect groundwater data that can be used to better evaluate potential changes in water quality resulting from present and future uses of recycled water in Alpine County, CA.

Based on monitoring data interpretations, the shallow water bearing unit beneath Diamond Valley, Wade Valley and Carson Valley is hydraulically connected as one hydrogeologic unit (Alisto 2008). The District's Recycled Wastewater Monitoring Report states that shallow groundwater levels in the Wade and Carson Valleys have remained relatively consistent over time since 2005, most likely due to the influence of recycled water application. The report states that groundwater levels in the project area fluctuate seasonally and have generally been sustained since 2007 due to recharge along the basin fridges. Groundwater levels will be influenced by fresh and recycled water application, but levels are not expected to decrease. The level of impact is concluded to be less than significant based on long term monitoring results and trends in project area groundwater levels.

Mitigation: *No mitigation is needed. NP-1, NP-2*

7.6.2 Project Components

Table 7-5 presents potential groundwater impacts, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 7-5

Groundwater Impacts – Project Components

		Level of Significance by Component			
Impact	**Point of Significance**	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade or Diamond Valleys?	Departure from State standards, including non-degradation policy, which requires that existing high water quality be maintained	1, 2, 3, 4, 5, 6,~~11~~, 14, 21, 22, 30	9, 10, 11, 12, 13, 15, 16, 19, 29	7, 8, 17, 18, 20, 23, 24, 31, 32	
GW-2. Will the Project Components cause groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment?	Groundwater that is raised to within 6 feet of the surface			1, 7, 9, 10, 11, 12, 13, 15, 16, 18, 19, 21, 29, 30	2, 3, 4, 5, 6, 8, 14, 17, 20, 22, 23, 24, 31, 32
GW-3. Will the Project Components lower groundwater levels at existing wells?	Greater than 0 wells				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade and Diamond Valleys?

Analysis: *Significant Impact; Component 11*

Degradation of groundwater quality will occur if the migration of recycled water into groundwater results from operations of the irrigation and temporary containment fields of Component 11. Implementation of Component 11 will increase access to and application of recycled water and/or irrigation of additional lands with recycled water that contains nutrients in concentrations above those measured in local groundwater sources. If application rates exceed site-specific hydraulic loading levels, recycled water will interact with shallow groundwater sources and groundwater quality could be degraded.

Through implementation of Component 11, Construct irrigation fields with pumping back to HPR, an additional 904 acres of direct land application of recycled water will be possible. The irrigation fields will normally be used for surface and aerial irrigation of alfalfa or native pasture grasses, the crops recommended in the Diamond Valley NMP (see Appendix F). Seven irrigation fields are proposed and are illustrated in Figure 2-6. Five of the seven fields will be central pivot irrigation fields (approximately 334 acres) and two of the fields will be for temporary containment of recycled water (49 acres). The remaining water righted lands will continue to be flood irrigated with freshwater. Application of freshwater is discussed in the analysis for NP-1 and will not result in degradation to groundwater quality.

Component 11 will first (project Phase 1A) construct five irrigation fields, ranging in size from 47 to 120 acres and install central pivot spray systems for irrigation with freshwater. The HPR by-pass system and connecting pipelines to the central pivot irrigation sites will be installed in Phase 1B, which will allow for irrigation with recycled water. Over time the irrigation system will apply recycled water or a blend of fresh and recycled water. Central pivot systems allow for optimized water application and metering of application rates.

The soils in the project area are reported (Wood Rodgers 2008) to be loamy sand, sandy loam and sand, in order of dominance. These soil textures are very conducive to sprinkler or flood/furrow irrigation practices. There was one occurrence of clay loam, which is a layer or accumulation of clay; the clay content is not high enough to meet the criteria as a restrictive layer for infiltration of irrigation water. The misapplication of recycled water will result in the migration of recycled water into shallow groundwater sources and the degradation of groundwater quality.

The Diamond Valley Ranch is currently grazed in the spring through the early fall by approximately 1,000 head of cattle. The Grazing Options Technical Memorandum attached in Appendix F as part of the Diamond Valley Ranch NMP states that the continuation of grazing after the transition to a recycled water irrigation regime will result in a small excess of Nitrogen (630 lb/yr) when considering Nitrogen available in recycled water and manure input measured against crop uptake. The modeled scenario of recycled water irrigation measures the relative impacts of flood irrigation methods for pasture grass and irrigating 15 days per month for eight months of the year to determine relative impacts. Nitrogen loading is notably small considering that current District effluent concentrations can deliver close to 661 pounds of Nitrogen a day. The impact is significant over time, and could contribute to cumulative impacts to groundwater quality.

Phase 2 will construct Field 1 (24 acres) and Field 2 (25 acres) with six foot high berms to allow for the temporary containment of up to 96 million gallons or 24 days of discharge from the WWTP during times of emergency, typically flooding events similar to the January 1997 precipitation event. The HPR bypass system will allow for the pumping of temporarily contained waters back to HPR or to the Diamond Ditch <u>during</u>

the period of April 1 through October 15. Increased inputs of recycled water into groundwater could result from the unlined containment fields depending on the timing and duration of containment, ~~raising~~ altering groundwater levels and potentially increasing Nitrate-Nitrogen concentrations in groundwater if mixing occurs in the unsaturated zone of shallow groundwater sources. ~~Impoundment~~ Containment of recycled water could be between one and 60 days in duration under a worst-case scenario according to the District. Based on the District's last 20 years of application history, the emergency use of these temporary containment fields would not have been necessary and thus the future need is inferred to be low. ~~Transmissive losses from the temporary containment fields could occur and significant impacts to groundwater quality could result.~~

Project-level Nitrate-Nitrogen investigations, as detailed in section 7.2.5, were completed in November and December of 2008. The Farr West Engineering report is attached in Appendix I-b and presents project-specific conditions and recommendations for Component 11. Water level data indicate that low to virtually impermeable material separates multiple permeable units. The study concludes that the northern portion of Diamond Valley Ranch could receive recycled water for irrigation and temporary containment with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained and poorly sorted material. Movement of recycled water from the shallow alluvial zone to the lower semi-confined and confined alluvial zones are expected to be minimal because of the interbedded alluvial and morainal deposits that form confining layers that will retard infiltration.

Groundwater level measurements collected from well ACMW-11 during March and April 2009 show that the water table occurs at depths range from 12.3 to 17.3 feet bgs during spring soil conditions. The findings from project-level Nitrate-Nitrogen investigations show that potential groundwater impacts from the temporary containment of recycled water could cause an increase of Nitrate-Nitrogen concentrations of less than 2.0 mg/L in the underlying groundwater. This potential impact is based on the mass flux estimated and is independent of groundwater depth.

Transmissive losses from the temporary containment fields could occur under the extreme conditions that would warrant the use of the temporary containment fields, and significant impacts to groundwater quality could result if containment duration is prolonged. The combination of early spring soil conditions and an emergency event occurring prior to April 1st, the date on which recycled water is permitted to be released from HPR, represents the worst-case scenario for temporary containment. To reduce potential impacts to groundwater resources to a level of less than significant, determination of the maximum duration of containment that site conditions can support is necessary.

Mitigation: **SP-33. Surface and Ground Water Protection Plan**

GW-1A. ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water

GW-1B. ~~Determine~~ Do Not Exceed the Maximum Duration ~~for~~ of Temporary Containment (100 Days)

After Mitigation: *Less than Significant Impact; Component 11*

Implementation of standard practice SP-33 and recommended mitigation measures GW-1A and GW-1B will reduce potential impacts to groundwater quality from Component 11 to a level of less than significant. ~~The impacts are considered significant until groundwater monitoring results support conclusions of less that significant impacts.~~

The District will follow the Surface and Ground Water Protection Plan (SP-33) for continued characterization of groundwater quality for the project area. Should groundwater Nitrate-Nitrogen concentrations approach 7 mg/L, the ~~trigger~~ proposed action concentration level, the District will amend or suspend irrigation with recycled water as appropriate to reduce impacts to ground water ~~to a level of less than significant~~.

In order to determine the hydraulic loading based on nitrogen for the Diamond Valley Ranch NMP, Wood Rodgers consulted "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). Wood Rodgers set a conservative "red-flag" threshold level of 7 mg/l for C_p, as is common practice in developing a Nevada Effluent Management Plan (EMP). This was done to insure that the receiving groundwater resource will not be degraded to a point where it is no longer useable (please refer to the Appendix F, Assimilation Capacity-Technical Report 4). The District understands that Lahontan and the State Board can impose a more stringent trigger value if an additional factor of safety is desired.

~~To continue cattle grazing in the Diamond Valley Ranch in conjunction with application of recycled water, the carrying capacity of the crop must be determined and livestock use be limited to a moderate level on a rotation system. Carrying capacity is defined in the Diamond Valley Ranch NMP as the maximum stocking rate possible that is consistent with maintaining or improving vegetation or related resources.~~ Recommended mitigation measure GW-1A requires an amendment to the grazing regime and/or manure management to reduce Nitrogen loading if recycled water is used for irrigation. ~~The Grazing Options Technical Memo of the Diamond Valley Ranch NMP recommends that manure be analyzed at a statistically accurate level to provide more precise nutrient inputs.~~ In lieu of amending the grazing timeframes, crop type, and manure management necessary for a nutrient neutral grazing regime, the District will commit to removing cattle from portions of the Diamond Valley Ranch when irrigating with recycled water. The removal of cattle during a recycled water irrigation regime is determined to result in deficiencies in the "whole ranch nutrient balance" for Phosphorus, Potassium, and Nitrogen, which assures the protection of groundwater resources. Balancing Nitrogen inputs with crop uptake while removing manure inputs will reduce impacts to groundwater quality to a level of less than significant.

Under ~~For~~ recommended mitigation measure GW-1B, 100 days is the maximum duration of impoundment of recycled waters that will meet the needs of ~~emergency~~ temporary containment situations without creating impacts to groundwater quality. ~~Wood Rodgers recommends additional investigations be undertaken in the areas of the proposed temporary containment fields to determine the depth to groundwater during the spring, as well as during drier months.~~ The investigation of the northern Diamond Valley Ranch portion of the project area, which is the proposed location for irrigation fields and temporary containment ~~area~~, suggests that shallow confined layers will retard infiltration from the uppermost portion of the water tables into lower water bearing zones (FarrWest Engineering 2009). The study concludes that the northern portion of Diamond Valley Ranch could receive recycled water for irrigation and temporary containment with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained poorly sorted material.

A containment duration of 100 days will meet the needs of the District to temporarily contain up to 96 million gallons of recycled water exported from the WWTP during an emergency situation while protecting groundwater quality of the water bearing unit. The District worked with Farr West Engineering to predict concentrations of mixed waters during a worst case scenario of 100 days of containment during saturated soil conditions, which is typically late May through late July.

A standard one dimensional mass flux equation was used to predict potential groundwater impacts from temporary containment of recycled water of a concentration of 1.53 mg/L of Nitrate-Nitrogen, which is the median concentration measured in the recycled water exported from the WWTP over the previous 20 months. The scenario predicts a resultant Nitrate-Nitrogen concentration of 2.16 mg/L, should mixing occur. This concentration is well below the proposed action level of 7.0 mg/L and the State of California maximum drinking water level of 10.0 mg/L.

~~An adequate depth to groundwater separating the unlined bottoms of the containment fields from the unsaturated zone of the water table will assure that groundwater quality is protected during times of temporary containment and that potential impacts are reduced to a level of less than significant.~~

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 14, 21, 22, 30*

A number of the Project Components could result in migration of recycled water into groundwater, which could adversely affect groundwater quality. Implementation of Project Components 1, 2, 3, 4, 5, 6, 14, 21, 22 and 30 will increase access to and application of recycled water and/or irrigation of additional lands with recycled water that contains nutrients in concentrations above those measured in local groundwater sources. If application rates exceed site-specific hydraulic loading limits, recycled water will interact with shallow groundwater sources and groundwater quality could be degraded.

Conveyance components 2, 3, 4, 5 and 6 will improve and expand the existing systems and additional lands will be irrigated with recycled water. Component 2 will make recycled water available to irrigators in Nevada. Under Component 3 the capacity of the Diamond Ditch system will be improved and the District will be able to provide uninterrupted flows. Components 4, 5 and 6 develop infrastructure appropriate to provide recycled water under pressure to irrigators, which allows for the irrigation of lands not currently irrigated but also allows for sprinkler irrigation as opposed to practices of flood and furrow irrigation.

Component 14 pipes recycled water to minimize setbacks and human contact. Component 22 parallels a recycled water pipeline along the existing Diamond Ditch. By piping the recycled water, the District will have greater control over the quantity of water delivered to any site. If irrigation rates exceed the site-specific hydraulic loading limits, recycled water has the potential to percolate past the root uptake zones of vegetation and mix with shallow groundwater. This is a significant impact.

Application components 1, 21 and 30 will construct infrastructure for irrigation and application of recycled waters. Changing native rangeland to irrigated pasture under Components 1 and 30 could cause adverse impacts to groundwater, depending on site conditions such as depth to groundwater, depth to restrictive layer, hydraulic loading limits, crop uptake capacity and grazing practices.

Component 21 develops tailwater control systems that include tailwater detention basins to reduce the likelihood of tailwater flowing off permitted lands and degrading surface water quality. The tailwater will either percolate and evaporate from detention basins or be pumped back to the irrigation ditches for re-application. All inputs into groundwater must be balanced with site-specific assimilative capacities (e.g. Nitrogen loading) to avoid and minimize impacts to groundwater quality.

NMPs are necessary to determine application rates that balance site-specific hydraulic loading limits to ensure the protection of groundwater quality in the project area and ultimately the Carson Groundwater Basin.

Mitigation: **SP-33. Surface and Ground Water Protection Plan**

After Mitigation: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 14, 21, 22, 30*

Components 1, 2, 3, 4, 5, 6, 14, 21, 22 and 30 will be located in portions of the project area that have not been studied as part of the Diamond Valley Ranch NMP. NMPs, as outlined in SP-33, Surface and Ground Water Protection Plan, will be completed for these portions of the project area. To adequately convey, apply and manage average daily flows projected for 2028, these portions of the project area must be able to assimilate approximately 1.0 MGD of recycled waters exported from the District's WWTP. This is the difference between the 5.8 MGD projected for daily flows in 2028 and the 4.8 MGD total flow (71.89 in/yr or 5.99 acre-feet/acre) that can be applied effectively on the 904 irrigable acres in Diamond Valley Ranch with no calculated risk to groundwater quality. This application rate exceeds the current 2008 discharge from the District's WWTP, but does not adequately address projected discharge through 2028.

Improving the Diamond Ditch System (Component 3) will result in increasing the capacity of the system to transport higher volumes of recycled water. By stabilizing these segments of the system, erosion and flooding will be alleviated. Unlined portions of the system will be lined or piped. These system upgrades will decrease losses to groundwater due to flooding and leaks. The construction of conveyance infrastructure such as new underground lines to the Fredricksburg area, Wade Valley and the Ranchettes (Components 4, 5, and 6) and for piping recycled water to minimize setbacks and human contact (Component 14) will involve trenching across alluvial fans that may contain groundwater resources. Component 1 will provide recycled water to new non-irrigated, permitted land and Component 2 involves pursuing the permitting of land in Nevada by NDEP for receipt of recycled water from HPR, which will involve the construction of new underground lines and may also involve trenching activities. Trenching construction activities will require a NPDES permit, which includes surface water protection measures but not defined ground water protection measures. The recycled water will be delivered to users under pressure which will allow the irrigators to use sprinkler irrigation instead of the less efficient flood irrigation. A more structured application rate and volume will avoid potential impacts to groundwater by allowing for more controlled applications of recycled water that are matched to the hydraulic loading levels of the site.

Tailwater control systems will be constructed under Component 21 that will improve surface water quality and indirectly groundwater quality. Component 30 will spray irrigate the portion of the project area referred to as the "jungle" with recycled waters. This portion of the project area is located on the alluvium of the West Fork of the Carson River floodplain. Misapplication of recycled waters in the jungle could impact shallow groundwater sources.

Component 22 parallels a recycled water pipeline along the existing Diamond Ditch. By piping the recycled water, the District will have greater control over the quality of water delivered to any site. The recycled water will be delivered to users under pressure, which will allow the irrigators to use sprinkler irrigation instead of less efficient flood irrigation. A more structured application rate will avoid potential impacts to groundwater by allowing for more controlled applications of recycled water that do not not impact the root zones of crops.

To date, groundwater monitoring results have not measured degradation of groundwater quality in these portions of the project area, and as discussed above, a number of Project Components will improve upon existing recycled water infrastructure, reducing transmissive losses and unmanaged surface water and groundwater interactions. Regardless of the potential benefits expected to result from construction and operation of Components 1, 2, 3, 4, 5, 6, 14, 21, 22 and 30, site-specific hydraulic loading limits have not been determined for these portions of the project area and optimized application rates have not been calculated. Until site-specific NMPs are developed which outline the appropriate application rates for water balance with hydraulic loading rates, the potential impact to groundwater quality remains significant.

Analysis: *Significant Impact; Components 9, 10, 12, 13, 15, 16, 19, 29*

A number of the Project Components could result in migration of recycled water into groundwater, which could adversely affect groundwater quality. Implementation of Project Components 9, 10, 12, 13, 15, 16, 19 and 29 will increase access to and application of recycled water and/or irrigation of additional lands with recycled water that contains nutrients in concentrations above those measured in local groundwater sources. If application rates exceed site-specific hydraulic loading levels, recycled water will interact with shallow groundwater sources and groundwater quality could be degraded.

Application components 1, 9, 10, 12, 13, 15, 16, 18, 19, 21 and 29 will construct infrastructure for irrigation and application of recycled waters. Changing native rangeland to irrigated pasture or sod, seed and pulp production areas under Components 1, 12, 13, 15 and 29 could cause adverse impacts to groundwater, depending on site conditions such as depth to groundwater, depth to restrictive layer, hydraulic loading limits, crop uptake capacity and grazing practices.

The use of pesticides for cultivation of biomass crops and sod farms (Components 12 and 13) may occur. Pesticide application will be regulated by the District through its contracts for use of recycled water, but improper application of chemicals could impact groundwater resources. Application components 9 and 10 will construct infiltration basins and zero-discharge basins, respectively, and will facilitate the migration of recycled water into the soil profile and eventually groundwater. Component 21 develops tailwater control systems that include tailwater detention basins to reduce the likelihood of tailwater flowing off permitted lands and degrading surface water quality. The tailwater will either percolate and evaporate from detention basins or be pumped back to the irrigation ditches for re-application. All inputs into groundwater must be balanced with site-specific assimilative capacities to avoid and minimize impacts to groundwater quality.

SP-33. Surface and Ground Water Protection Plan

~~GW-1A. Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ GW-1A. Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water

After Mitigation: *Less than Significant Impact; Components 9, 10, 11, 12, 13, 15, 16, 19, 29*

Components 9, 10, 12, 13, 15, 16, 19 and 29 will impact the Diamond Valley Ranch portion of the project area through application of recycled water. The District worked with Wood Rodgers, Inc. to develop a NMP specific to site conditions of the Diamond Valley Ranch and in fulfillment of the State Board's forthcoming Recycled Water Policy. Potential impacts to groundwater quality in the Diamond Valley will reduced to a level of less than significant through adherence to the application rates and volumes calculated for these sites along with implementation of surface and groundwater protection measures and monitoring outlined in the NMP and SP-33.

The Diamond Valley Ranch is presently flood irrigated with freshwater from Snowshoe Thompson No. 1 ditch and portions are grazed with approximately 1000 head of cattle in the late spring to early fall. Components 9 and 10 will apply recycled water through groundwater recharge infiltration basins and zero discharge basins, respectively. For the protection of groundwater quality, the application and recharge rates will be in concert with those calculated in the NMP. Nutrient uptake will result through growing biomass crops for pulp production and wetland sod and seed productions (Components 12 and 13, respectively), and the use of pesticides for these Project Components is not recommended. Component 16 installs subsurface recycled water irrigation in public contact or buffer areas, while Component 19 pursues permitting of more land in Alpine County. Component 29 will irrigate the District's pasture land. Maximum application rates and volumes recommended for these Project Components are discussed below.

The Diamond Valley Ranch NMP is developed primarily for use by the re-user and secondarily as a reporting mechanism for Lahontan. The purpose of the NMP is to provide guidance for irrigating with recycled water as listed:

- Provide a description of the recycled water delivery system and ancillary system components to inform responsible personnel of the system operation and capabilities;
- Identify responsibilities of the permittee/operator on the operation, maintenance and management of the recycled water reuse on the permitted site;
- Instruct system operators in the purpose and intended operation of components within the irrigation system under normal operating conditions and during emergency conditions, including procedures for emergency response and notification; and
- Annual monitoring and reporting requirements.

Wood Rodgers determined the area of potentially irrigable lands using recycled water on Diamond Valley Ranch as 904 acres. The irrigable acres are delineated in Figure 2 of Appendix F. Areas that are currently irrigated with fresh water and/or have been irrigated historically were considered. Protection of surface water and groundwater quality are incorporated through 25-foot setbacks from the District property lines along Diamond Valley Road, from the center line of irrigation ditches, and from the edge of stream courses. Areas of high groundwater are identified based upon field visits, aerial photography, the results of August 2008 soil sampling and the District's groundwater monitoring data.

The maximum recycled water application rate is calculated at 71.89 inches per year (in/yr), which equates to 5.99 AF/yr for the 904 irrigable acres or a total flow of 1,765 million gallons per year (Mgal/yr) or 4.8 MGD. As stated in the Executive Summary of the Diamond Valley Ranch NMP (Appendix F, p.i), this is the maximum allowable application rate that will meet the crop requirements for alfalfa as well as the District's objective to use the maximum recycled water for irrigation purposes. This application rate currently exceeds the District's average yearly daily flow of 4.0 MGD or 1460 Mgal/yr, which equates 4.95 AF/yr with no net annual storage in HPR. ~~These~~ This average yearly daily flow is reported to Lahontan in quarterly monitoring and annual monitoring reports. This total water volume is then used as the starting point to calculate the total available amount of recycled water that can be applied each month and to develop the Nitrogen balance for maximum assimilative capacity and uptake.

The recommended application rate calculated for growing alfalfa (recommended crop type) with surface irrigation is 66.80 in/yr or 5.99 acre-feet/acre for the 904 irrigable acres. This application rate is very close to the maximum allowable application rate for growing alfalfa with spray irrigation. To be on the conservative side, the District can select an aerial irrigation method for growing alfalfa with spray irrigation, with a maximum application rate of 66.75 in/yr or 5.57 acre-feet/acre with minimal resulting tailwater (reduced surface water impacts as discussed in Chapter 8. Chapter 3.0 of the Diamond Valley Ranch NMP, Recycled Water Irrigation Planning, presents the foundation for evaluating the hydraulic loading levels.

Currently the Diamond Valley Ranch is grazed from late spring through early fall by approximately 1000 head of cattle. Livestock grazing removes nutrient from the project area through harvesting of crop while also providing nutrient input in the form of manure to the system. As stated in the NMP, the level of grazing that is occurring is moderate, dispersed and managed based on available feed. No one portion of the Diamond Valley Ranch study area (as analyzed in the NMP) will be impacted by the production of manure and associated input of nutrients under a freshwater regime. Under a recycled water irrigation regime a small excess of Nitrogen will become available. As discussed above for the analysis of component 11, to continue cattle grazing in the Diamond Valley Ranch under a recycled water irrigation regime, the carrying capacity of the crop must be determined and livestock use be limited to a moderate level on a rotation system.

To reduce potential impacts to groundwater to a level of less than significant, under recommended mitigation measure GW-1A, the District will discontinue cattle grazing under a recycled water irrigation regime. The removal of cattle on the portions of the project area that are irrigated with recycled water will result in a deficit for Phosphorus, Nitrogen and Potassium. The calculations for the "whole ranch nutrient balance" under a recycled water irrigation regime including and excluding inputs from manure are detailed in Grazing Options tech Memo of Appendix F.

The monitoring program implemented under standard practice SP-33 will continue to offer concrete responses when baseline nutrient and salt concentrations from groundwater monitoring wells show degradation of groundwater quality attributable to the recycled water program. Chapter 8.0 of the Diamond Valley NMP outlines monitoring and reporting requirements, including: recycled water volumes; recycled water quality; groundwater quality; Nitrogen balances; standard reporting procedures; emergency reporting; monitoring wells; recycled water sampling; flow monitoring; soils; and vegetation. The plan includes measures to curtail recycled water flows onto the project area either temporarily or permanently, and reduce the impacts to groundwater quality from recycled water application to a less than significant level.

Analysis: *Less than Significant Impact; Components 7, 8, 17, 18, 20, 23, 24, 31, 32*

Components 7 and 8 will potentially provide a benefit to groundwater resources by respectively establishing non-flood irrigation application systems and improving the quality of recycled water exported from the WWTP in South Lake Tahoe, CA. Improved quality of recycled water supplied to irrigators will decrease the likelihood of groundwater degradation from irrigation. Transitioning from flood irrigation practices to more efficient sprinkler and sub-surface irrigation provides for more controlled application of recycled water and reduces the potential for tailwater flowing off of the intended reuse area.

Component 17 involves upgrades to the existing Snowshoe Thompson No. 1 systems. The Snowshoe Thompson No. 1 is an unlined open channel along the entire length. District personnel indicate that transmissive losses in the Snowshoe Thompson No. 1 are high. Increasing the capacity of the ditch will allow the District to convey full entitlement of water diverted from the West Fork of the Carson River. Increasing the conveyance capacity of the ditch can be accomplished by replacing the open channel with a pipeline or my making improvements to the existing open channel system. This system conveys freshwater diverted from the West Fork of the Carson River and does not pose a threat to groundwater quality because the freshwater conveyed is of comparable or superior water quality.

A recycled water allocation system will be developed for Component 18 for maximization of the volume of applied recycled water and minimization of the threat to groundwater and surface water quality. Optimization assures that there are no losses other than those intended (e.g. evapotranspiration and regulated percolation).

Component 20 involves the improved operations and maintenance of the Diamond Ditch system by determining whether ownership of portions of the ditch and appurtenances or modifications of existing easements best support the District's interest. Expanded control over the delivery schedule for recycled waters will improve management of water levels in HPR but will not impact groundwater quality.

Components 23 and 24 involve the management of fresh waters in ICR that will not impact groundwater quality. Component 32 will construct a spillway channel for ICR that conveys reservoir spillage around HPR to Indian Creek. This channel will route fresh water from ICR to Indian Creek and will not degrade groundwater quality as a result.

Component 31 will involve constructing a ditch to divert storm waters. The capture rate is estimated at 100 cfs for the diversion of storm water and drainage flows that currently flow into HPR. This freshwater will be captured and diverted to ICR. This diversion of freshwater will not degrade groundwater quality.

Mitigation: *No mitigation is needed. Components 7, 8, 17, 18, 20, 23, 24, 31, 32*

Impact: GW-2. Will the Project Components cause groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment?

Analysis: *No Impact; Components 2, 3, 4, 5, 6, 8, 14, 17, 20, 22, 23, 24, 31, 32*

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will implement improvements to existing systems by constructing lined ditches or pipelines or improving operations and maintenance and will not contribute to groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment.

These components will move fresh or recycled waters from one physical area to another. Conveyance infrastructure will be visually inspected annually (SP-35 Conveyance Infrastructure Maintenance Plan) for damage and leaks, but even with transmissive losses and leaks, the conveyance system will not contribute waters in volumes large enough to result in groundwater mounding or significantly increase groundwater levels. Conveyance components that include unlined ditches will be designed to eliminate groundwater interception.

Water management components 8, 23 and 24 will not result in groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment. These components improve the quality of recycled water being exported from the WWTP (Component 8) and reroute or store additional fresh water in ICR (Components 23 and 24).

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 8, 14, 17, 20, 22, 23, 24, 31, 32*

Analysis: *Less than Significant Impact; Components 1, 7, 9, 10, 11, 12, 13, 15, 16, 18, 19, 21, 29, 30*

Application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 and temporary containment component 11 will increase application of recycled water within the project area. If application rates are in excess of site-specific assimilative capacity, surface water and groundwater interactions will result. Specifically, components 9, 10 and 11 will create impoundment and infiltration basins and fields that will result in increased inputs of recycled water into groundwater. A site must have sufficient capacity to assimilate water in excess of natural infiltration, as insufficient capacity may result in significant groundwater mounding on low hydraulic conductivity lens or elevate the water table, which could alter saturated flow direction or reach the surface. Groundwater mounding, lateral spreading and potential breakout on ground surface or side slopes depends on the characteristics of the subsurface.

The Alisto report (2008) interpreted groundwater flow direction and potentiometric contour maps for monitoring events in September and December 2007 and in March and June 2008. Monitoring data interpretations conclude:

"It is apparent that the shallow groundwater bearing unit beneath Diamond Valley, Wade Valley and Carson Valley is hydraulically connected as one hydrogeologic unit. The volcanic and volcanistic blocks between Diamond Valley and Wade Valley are not acting as hydraulic barriers to groundwater flow for the south (Diamond Valley) towards Carson Valley and the California-Nevada border."

The District has performed monthly groundwater monitoring and completed quarterly and annual reporting within and in the vicinity of the project area since 1981. The September 2008 *Recycled Wastewater Monitoring Program Evaluation Repor*t (Appendix H) prepared for Alpine County discusses the regional hydrogeology of the project area. Soil borings were drilled to depths of 770 feet in Diamond Valley during hydrogeologic reconnaissance conducted by the District. Volcanic rock (andesite) was encountered as shallow as 45 feet bgs and as deep as 405 feet bgs and 770 bgs. The andesite encountered in these borings was interpreted as defining the bottom of the potentially water-bearing sands, gravels and other basin fill deposits in the project area. A shallow groundwater level of no less than 45 feet is inferred from soil boring results in the Diamond Valley. Groundwater mounding is not expected to occur with this depth to water table.

Groundwater wells in Wade Valley and Carson Valley were drilled in unconsolidated alluvial fan or basin-fill deposits. Groundwater monitoring results report that the infiltration of surface water through stream beds and ditches and percolation of recycled wastewater from the flood-irrigated fields have maintained the shallow water table beneath much of the valley floor. The water table level and the degree to which these levels fluctuate are influenced by the characteristics of the zone of saturation and hydraulic conductivities of soils.

Results from geologic logging, aquifer testing and water level monitoring, determine that the uppermost portion of the zone of saturation is confined on the west side of Diamond Valley (Component 30). Groundwater levels beneath alluvial fans on the west side of the valley increase to greater than 200 feet within one mile of the valley floor and depth to water reaches 200 feet on the eastern side of the valley approximately three miles from the valley floor (Alisto 2008). Additions to groundwater at these depths will not result in groundwater mounding or surface break-out.

The monitoring locations near the center of Diamond Valley (Components 9, 10, 11, 12, 13, 15 and 19) and Indian Creek measure the uppermost portion of the zone of saturation as unconfined. Groundwater level data suggests that the zone of saturation may be semi-confined in Wade Valley (Components 7 and 18), while the uppermost portion of the zone of saturation in the Carson Valley portion of the project area (Components 1, 7, 18 and 21) is unconfined. Groundwater mounding will not occur in these semi-confined and unconfined areas. The portions of the project area with shallow groundwater have been identified during hydrogeologic reconnaissance and will be avoided or studied further during future project-level analysis.

~~Perched water table has been identified overlying the zone of saturation in the northern portion of Diamond Valley and depth to groundwater is less than five feet in some areas. Groundwater levels beneath alluvial fans on the west side of the valley increase to greater than 200 feet within one mile of the valley floor and depth to water reaches 200 feet on the eastern side of the valley approximately three miles from the valley floor (Alisto 2008). Additions to groundwater at these depths will not result in groundwater mounding or surface break-out.~~ Misapplication of recycled waters to portions of the project area with shallow groundwater and soils with low hydraulic conductivities could result in surface breakout. Project-level analysis completed for Component 11, identified a perched water table was identified overlying the zone of saturation in the northern portion of Diamond Valley Ranch (Component 11)at a depth of 32 to 37 ft bgs. A confining layer comprised of silt with variable gravel was encountered from 37 to 57 ft bgs. The water bearing zone was then encountered a depths of 57 ft bgs to the boreholes total depth of 73.5 ft bgs. A shallow alluvial and a lower alluvial zone are identified under this portion of the project area. Wells ACMW-08D, ACMD-09 and ACMW-12 are screened to measure the lower alluvial zone. Hydraulic mounding posed by infiltration and radial flow from the temporary containment and irrigation fields is not predicted because the hydraulic gradient represented by these wells will continue to the east during most conditions (Farr West Engineering 2009). This project-level analysis is supported by the potential for recharge from the Snowshoe Ditch #2 to the northeast, the probability that the lateral moraine deposits to the northwest are less permeable and that the water levels in the lower alluvial zone are more similar to Indian Creek (at 5550 ft msl) than the West Fork of the Carson River (at 5350 ft msl).

In conclusion of past and current groundwater monitoring results with consideration of site-specific hydraulic loading levels for the Diamond Valley Ranch, the soils and site conditions of the project area are not expected to produce incidences of groundwater mounding or increase groundwater levels that cause surface water discharge in a non-stream environment. The level of impact is less than significant.

Mitigation: *No mitigation is needed. Components 1, 7, 9, 10, 11, 12, 13, 15, 16, 18, 19, 21, 29, 30*

Impact: GW-3. Will the Project Components lower groundwater levels at existing wells?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 and 32*

The impact analysis for GW-2 serves as a reference for the following analysis concerning the lowering of groundwater levels.

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will implement improvements to existing systems by constructing lined ditches or pipelines or improving operations and maintenance and will not decrease groundwater levels. Upgraded systems will decrease transmissive losses currently occurring from aging infrastructure. Groundwater levels are not directly tied to these singular recharge areas but respond to the actions occurring within the project area as a whole. These components will move fresh or recycled waters from one part of the project area to another but not to a different groundwater basin, as the Carson, Wade and Diamond Valleys are determined to be hydrologically connected (McGraw 2006; Alisto Engineering Group 2008). Conveyance components that include unlined ditches will be designed to eliminate groundwater interception through design and location of facilities.

The application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will not lower levels of groundwater. Levels may be maintained, especially during drought, from application of recycled waters.

The temporary containment under component 11 will not lower levels of groundwater as a result irrigating fields with fresh or recycled water or by temporarily containing recycled waters as a response to emergency situations. The water management components 8, 23, and 24 will not lower groundwater levels as a result of improving recycled water quality, routing winter flows through ICR or transferring additional water rights to ICR, respectively.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

7.7 Cumulative Impacts

There is one significant Project impact identified in the Groundwater chapter: degradation of groundwater quality should application rates exceed hydraulic loading limits for portions of the project area. The standard practices for the Project will avoid and reduce impacts to mitigate cumulative impacts on groundwater. Groundwater protection monitoring will continue to assess and report trends in groundwater quality and levels. If cumulative impacts to groundwater occur, the District will be in noncompliance with WDRs and application of recycled water may be suspended.

As stated in the Diamond Valley Ranch NMP, the maximum volume of recycled water than can be applied in Diamond Valley Ranch portion of the project area is 1,765 Mgal/yr or 4.8 MGD. Currently, the District's discharge from the WWTP is 4.0 MGD. The projected discharge volume by 2028 is 5.8 MGD. If the approximately 1.8 MGD cannot be applied to reuse areas in the Carson and Wade Valley portions of the project areas, misapplication of recycled water could occur and cumulative impacts could result.

NMPs prepared for these portions of the project area will calculate site-specific hydraulic loading levels and corresponding recycled water application rates.

No cumulative effect is observed in the calculations for Nitrogen loading and Wood Rodgers concludes that the assimilative capacity of receiving waters will not be impacted when irrigating recycled water discharged from the WWTP. The trigger threshold of 7.0 mg/L for Nitrate-Nitrogen concentrations as measured for the monitoring of groundwater quality grants adequate opportunity and time to address potential impacts to groundwater from reuse of recycled water.

Alpine County has no projects in the planning or design stages within or in the vicinity of the project area to consider towards cumulative impacts.

7.8 Summary of Significant Impacts and Mitigation Measures

7.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 7-6 summarizes the significant impacts by Project Component and identifies the mitigation measures required for each impact.

Table 7-6

Summary of Significant Impacts and Mitigation Measures – Surface Water

Impact	Level of Significance	Mitigation Measure
Project Components		
GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade and Diamond Valleys?	1, 2, 3, 4, 5, 6, ~~11,~~ 14, 21, 22, 30 ● 11 ⊙	**SW-33.** Surface and Groundwater Protection Plan **GW-1A.** ~~Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water **GW-1B.** ~~Determine Maximum Duration for Temporary Containment~~ Do Not Exceed A Maximum Duration of Temporary Containment (100 Days)

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

7.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

The significant impacts identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3) are listed below. A discussion follows as to why the impact is significant and how the impact is mitigated to a level of less than significant. If impacts are significant and unavoidable, an explanation is provided.

GW-1. Will the Project Components degrade groundwater quality in the Carson Wade or Diamond Valleys?

The impact is considered significant because operation of Project Components 3, 4, 6, 11, 22 and 30 that comprise Alternative 3 could result in degradation to groundwater. Project Components 3, 4, 6, 22 and 30 will be located in portions of the project area that have not been studied as part of the Diamond Valley Ranch NMP. To date, groundwater monitoring results have not measured degradation of groundwater quality in these portions of the project area, and as discussed above, a number of Project Components will improve upon existing recycled water infrastructure, reducing transmissive losses and unmanaged surface water and groundwater interactions. Regardless of the potential benefits expected to result from construction and operation of components 3, 4, 6, 22 and 30, site-specific hydraulic loading limits have not been determined for these portions of the project area and optimized application rates have not been calculated. Until site-specific NMPs are developed which outline the appropriate application rates for water balance with hydraulic loading rates, the potential impact to groundwater quality remains significant.

8 Surface Water

8 Surface Water Quality

This section describes the effects of the Project Components on the water quality of the surface waters in the Carson, Wade and Diamond Valley watersheds.

8.1 Impacts Evaluated in Other Chapters

The following items are related to the Surface Water Quality chapter but are evaluated in other chapters of this document:

- Biological Resources. The issues related to biological resources are discussed in Chapter 11, Biological Resources.
- Groundwater. The issues related to groundwater are discussed in Chapter 7, Groundwater.
- Hydrology. The issues related to hydrology are discussed in Chapter 9, Hydrology.
- Land Use. Land use concerns associated with surface water quality may be found in Chapter 4, Land Use.
- Agriculture. Agricultural concerns associated with surface water quality may be found in Chapter 5, Agriculture.

8.2 Affected Environment (Setting)

The surface and subsurface waters of the Upper Carson River Basin are generally of good quality. Because of the high quality, the California State Board, Lahontan, Nevada Department of Environmental Protection (NDEP), and various other State agencies have identified a number of beneficial uses. Such beneficial uses include those for municipal and domestic supply, agricultural supply, groundwater recharge, freshwater replenishments, water-contact recreation, non-water-contact recreation, cold freshwater habitat, wildlife habitat, preservation of rare and endangered species, hydropower generation, and industrial service supply.

In the Upper Carson River Basin, which includes parts of California and Nevada, each state is responsible for developing and enforcing its own standards, which must be at least as stringent as the minimum standards set by the USEPA. Section 13241, Division 7, of the CWC stipulates that Lahontan shall establish water quality objectives to protect beneficial uses and to prevent water quality degradation. Water quality objectives for the project area are enumerated in the Water Quality Control Plan Report for the North Lahontan Basin in California (Basin Plan 1995). In Nevada, the Bureau of Water Quality Planning of the NDEP establishes surface water quality criteria for the Carson River and its major tributaries through a public review process.

In 1975 the state of Nevada, with the Carson River Basin Council of Governments, developed a water quality management plan for the Carson River in response to federally mandated statewide planning obligations. This publication lists current Nevada state standards, which are essentially "nondegradation" standards based on existing water quality. The plan was submitted in June 1978 to the State, which then certified the plan and sent it to USEPA in December 1978. USEPA found the plan deficient in many areas in June 1979.

As required by federal law, the responsibility for establishing interstate stream standards within the boundary of a state is allocated to the appropriate state authority and to the administrator of the USEPA.

Interstate standards vary within and between the states and are formulated to represent the conditions of separate streams.

The quality of surface waters in the Upper Carson River Basin is generally excellent. Because the Carson River originates as snowmelt and natural springs, the headwaters contain low mineral concentrations and satisfy NDEP water quality standards. Pollutants are added to the river at numerous downstream points in surface and subsurface irrigation return flows and urban sewage. These pollutants and seasonal low flows have increased the danger of water quality degradation in the Carson River and its tributaries.

Areas of concern, as defined by the Carson River Basin Council of Governments after comparing existing state water quality standards for the Carson River to available water quality data, include:

- Low dissolved oxygen concentrations;
- High temperatures;
- High ammonia concentrations;
- Large suspended solid (sediment) loads;
- High metal concentrations; and
- Accelerated eutrophication.

Potential sources of pollution include the disturbance of vegetation as a result of land development and the use of septic tanks in areas not geologically suitable for percolation of effluent. Land development has caused stream siltation problems in the Upper Carson River Basin and large sediment loads along reaches of the Carson River. The results have been high turbidity and excessive nutrients in waters of the river. Low dissolved oxygen, high temperatures, and high concentrations of suspended solids (sediments) are directly related to low summer flows. Concentrated sediment loads can result in accelerated eutrophication and a rise in free ammonia to toxic levels. As a result, fish kills and migration blocks can occur during the summer.

8.2.1 Alpine County, California

Non-point sources, which are often attributable to farming and ranching practices, may affect the quality of surface water in Alpine County. These sources are probably major contributors to any elevated nutrient levels in surface water quality. Existing tailwater from the use of recycled water for crop irrigation may also affect surface water quality.

In addition, background nutrient levels in ICR, once used as a repository for tertiary-treated wastewater, are exacerbated by the influx of nutrients from non-points sources in runoff from surrounding rangeland, and from fish stocking and public use of the reservoir. ICR now stores fresh water from the West Fork of the Carson River, but operates towards compliance with a total maximum daily load (TMDL) for total phosphorus (Lahontan 2005).

The limiting nutrient in ICR is phosphorus. As phosphorus is introduced into the water column, primarily from the sediments, an increase in the resident algal population results. Excessive algal photosynthetic activity results in carbon dioxide and alkalinity imbalances, which cause a rise in the pH of the reservoir and the release of dissolved phosphorus in the form of orthophosphate from bottom sediments under anaerobic conditions. During the spring and fall, bottom nutrients mix with surface waters and increase algal growth and orthophosphate concentrations. Low dissolved oxygen levels may also occur in the bottom waters of the reservoir during certain times of the year.

8.2.2 Douglas County, Nevada

The County Master Plan acknowledges that non-point agricultural sources are possibly the largest contributors to aquatic pollutant loads in Douglas County. Urban point sources, which are all downstream of the project area, include discharges near Muller Land Bridge on the East Fork Carson River from the Minden-Gardnerville Sanitation District and the Douglas County Sewer Improvement District, discharges near Candlebough Bridge from the Incline Village General Improvement District during the winter months, and continual discharges from Carson City. Carson City is the largest single contributor of urban sewage discharged into the river. In stream reaches below Carson City, dissolved oxygen concentrations can fall below levels needed to support fish life, and toxic ammonia concentrations have been detected directly downstream from the dischargers.

8.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Surface Water Quality Chapter the following subsections provide descriptions of applicable requirements.

8.3.1 State Water Resources Control Board

The primary responsibility for the protection of both surface water and groundwater quality in California rests with the State Board and nine RWQCBs. The responsibilities of the State Board and RWQCBs are also discussed in Chapter 7, Groundwater. As discussed in Chapter 7, the District is required to comply with the California General Permit for Discharges of Storm Water Associated with federal Clean Water Act Section 402 Construction Activities (NPDES General Permit CAS000002) adopted by the State Board. The Permit, because the project area is greater than one acre, requires that the construction contractor develop and implement a site-specific SWPPP to prevent storm water and groundwater pollution caused by construction activities. At a minimum, the SWPPP shall prevent debris, soil, silt, sand, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from construction or operation from entering into the West Fork of the Carson River, Indian Creek and their tributaries and adjacent wetlands. The SWPPP will outline erosion control measures to be taken as well as BMPs to be implemented to control and prevent to the maximum extent practicable the discharge of pollutants to surface waters and groundwater. All ground disturbing activities that occur in creeks or in upland areas that could cause soil erosion into creeks shall be conducted during the dry season to minimize siltation. The SWPPP will have a plan for responding to and managing accidental spills during construction and a plan for management and storage of pumped groundwater. The SWPPP will address overall management of the construction project such as designating areas for material storage, equipment fueling, concrete washout, and stockpiles.

The State Board ~~is developing~~ developed a statewide Recycled Water Policy to establish more uniform requirements for recycled water projects. ~~The State Board is establishing a mandate to increase the use of recycled water in California by 200,000 AF/yr by 2020 and by an additional 300,000 AF/yr by 2030~~. The policy was adopted under Board Order Resolution NO. 2009-0011 in February 2009. The adopted goals include:

- Increase the use of recycled water over 2002 levels by at least one million acre-feet per year (afy) by 2020 and by at least two million afy by 2030.
- Increase the use of stormwater over use in 2007 by at least 500,000 afy by 2020 and by at least one million afy by 2030.
- Increase the amount of water conserved in urban and industrial uses by comparison to 2007 by at least 20 percent by 2020.

- Included in these goals is the substitution of as much recycled water for potable water as possible by 2030.

The purpose of the Recycled Water Policy is to increase the use of recycled water from municipal wastewater sources that meets the definition in Water Code section 13050(n), in a manner that implements State and federal water quality laws. To date, the State Board has adopted policies specific to landscaping and groundwater recharge projects. The State Water Board intends to develop additional policies to encourage the use of stormwater, encourage water conservation, encourage conjunctive use of surface and groundwater, and improve use of local supplies. When used in compliance with the Recycled Water Policy, Title 22 and all applicable State and federal water laws, the State Board finds that recycled water is safe for approved uses and strongly supports recycled water as a safe alternative to potable water for such approved uses.

The intent of the Recycled Water Policy is that salts and nutrients from all sources be managed on a basin-wide or watershed-wide basis in a manner that ensures attainment of water quality objectives and protection of beneficial uses. The ultimate goal of the policy is to provide an incentive for development of salt (including nutrient) management plans by recycled water dischargers in groundwater basins that are threatened by salts. The State Board finds that the appropriate way to address salt and nutrient issues is through the development of regional and subregional salt and NMPs rather than through imposing requirements solely on individual recycled water projects.

In general, NMPs are required for irrigation projects when recycled water exceeds three mg/L for total nitrogen. The District recycled water averages 17 ~~20~~ mg\L for T~~t~~otal N~~n~~itrogen. For purposes of recycled water application, nutrient management means consideration of nutrient concentrations present in the recycled water when calculating fertilizer application rates. The timeframe for development of NMPs is five years after the date of the RWQCB finding that a particular groundwater basin is threatened by salts, with a possible five-year extension. The NMP must include as description of the best practicable treatment or control measures necessary to prevent salt or nutrient-related pollutant treatment or control measures necessary to prevent salt or nutrient-related pollution or nuisance.

Appendix A of the District's Master Plan further outlines the environmental regulations and planning needs for the NMPs. Appendix F of this EIR contains the NMP prepared for the Diamond Valley Ranch portion of the project area, as prepared by Wood Rodgers (2009). When used in compliance with the Recycled Water Policy, Title 22 and all applicable federal and State water quality laws, the State Board finds that recycled water is safe for approved uses, such as irrigation application in the project area, and supports recycled water as a safe alternative to potable water for such approved uses (November 4, 2008 Draft).

8.3.2 Lahontan Regional Water Quality Control Board

The State Board administers State and federal regulations that pertain to water quality including Sections 401 and 402 of the federal Clean Water Act. The Lahontan is one of the nine RWQCB in California. The nine RWQCBs maintain Basin Plans that include comprehensive lists of water bodies in each area, as well as detailed language about the components of applicable water quality standards. As authorized by the USEPA, the State Board and nine RWQCBs implement the Section 402 Clean Water Act NPDES Permitting Program and requirements in California. Clean Water Act Section 401 requirements generally relate to State certification of federal permits, including those issued by a federal agency under Clean Water Act Section 404. In addition, the Lahontan regulates waste discharges under the California Water Code, Section 13263.

Lahontan implements the Basin Plan, which recognizes natural water quality, existing and potential beneficial uses, and water quality problems associated with human activities in Alpine County (Lahontan 1995). The Lahontan also has regulatory authority to enforce the requirements of the Clean Water Act and the California Water Code. This includes the regulatory authority to enforce the implementation of TMDLs, the adoption of WDR to ensure compliance with surface water quality standards, and groundwater management (as confirmed by the November 6, 2001 and February 5, 2009 letter from the Lahontan responding to the Notice of Preparations for this EIR).

Lahontan originally established WDR for the District's treatment and discharge facility under Order No. 6-79-43, which was adopted on December 6, 1979. Subsequent updates to the WDR included Order No. 6-84-24, adopted February 9, 1984, Order No. 6-90-14, adopted February 8, 1990, and Order No. 6-95-65 adopted on June 8, 1995. In 2004, Lahontan adopted Revised Order No. R6T-2004-0010 as an update to the WDRs for the District's WWTP in South Lake Tahoe, CA, El Dorado County and the wastewater application areas in Alpine County. The uses of recycled water is restricted by the Board Order to irrigation of seed and fiber crops, and fodder crops for non-milking animals. The Order also prohibits the use of recycled water for crop irrigation within 100 feet of an active domestic water supply well and spray irrigation within 100 feet of a residence, school or public place to prevent exposure to the public.

Because project construction results in the disturbance of an area greater than five acrea (to be reduced to one acre according to the letter submitted by Lahontan on February 5, 2009), the District will be required to comply with the California General Permit for Discharges of Storm Water Associated with Construction Activities (NPDES General Permit CAS000002) adopted by the State Board. The Permit requires that the construction contractor develop and implement a site-specific SWPPP to prevent storm water and groundwater pollution caused by construction activities. Although the SWPPP focuses primarily on protection of surface waters, it also contains a plan for responding to and managing accidental spills during construction and a plan for management and storage of pumped groundwater. The SWPPP addresses overall management of the construction project such as designating areas for material storage, equipment fueling, concrete washout, and stockpiles.

Under CEQA, Lahontan is a responsible agency with regard to the project. The CWC section 13050(e) reads as follows: "Waters of the State means any surface water or groundwater, including saline waters, within the boundaries of the state." State waters include irrigation canals and surface impoundments (other than those solely constructed for wastewater), wetlands, and waters of the United States (a subset of State waters). Lahontan's policies concerning wetland protection are stated in chapter four of the Basin Plan as outlined under sub-section Wetlands Protection and Management (pages 12-8 to 12-14).

8.3.3 Nevada Division of Water Resources

The NDWR has the authority to permit the use of any water within the State including the use of recycled water. Any person who desires to appropriate public water in the State needs, prior to performing any work, to make application to the State Engineer to change the place of diversion or change in manner or place of use. NDWR also administers permits for the conservation of water resources and for the quantities and manner of use of the various water resources, including the use of effluent. The role of the NDWR in regulating the use of recycled water is to set maximum quantities of recycled water that may be used for specific purposes as part of the State's water conservation efforts.

8.3.4 Nevada State Division of Environmental Protection

NDEP is a division of the State of Nevada Department of Conservation and Natural Resources. NDEP's mission is "to protect and enhance the environment of the state, consistent with the public health and enjoyment, the propagation and protection of terrestrial and aquatic life, the operation of existing industries, the pursuit of agriculture, and economic development of the state." For surface water resources, NDEP sets water quality standards, determines TMDLs, promotes control of non-point sources, monitors ambient water quality and runs a laboratory certification program.

8.3.5 Nevada State Bureau of Water Quality Planning (BWQP)

BWQP of NDEP is responsible for several water quality protection functions which include collecting and analyzing water data, developing standards for surface waters (which are listed in Chapter 445a of the Nevada Administrative Code), publishing informational reports, providing water quality education and implementing programs to address surface water quality. BWQP is divided into three branches: water quality standards, monitoring and non-point source and groundwater protection.

8.3.6 Nevada State Bureau of Water Pollution Control (BWPC)

BWPC of the NDEP is responsible for regulating discharges into the waters of the State. This is accomplished by issuing discharge permits, enforcing the State's water pollution control laws and regulations, and by providing technical and financial assistance to dischargers.

BWPC issues NPDES permits for discharge to surface waters, ground water permits for discharges that may impact subsurface waters, UIC permits for injection through wells and storm water permits.

8.4 Surface Water Quality Goals, Objectives and Policies

Table 8-1 identifies goals, objectives, and policies that provide guidance for development in relation to surface water quality in the project area. The table also indicates which criteria in the Surface Water Quality Section are responsive to each set of policies.

Alpine County, California's General Plan contains several goals and policies, pertinent to the topic of water quality, that apply to the formulation of evaluation criteria and impact analysis for the project (Alpine County 2005). The Douglas County, Nevada's Master Plan contains goals for water resources that apply to resources of the area, including water quality (Douglas County 1996). The policies of this state of Nevada document are applicable to the present analysis for those components affecting Nevada at the state line.

Table 8-1

General Plan Goals, Objectives and Policies – Surface Water Quality

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria
Alpine County General Plan	Conservation Element Water: Surface water quality	Goal 6	Improve and maintain the quality of surface water resources in cooperation with the Lahontan and Central Valley Regional Water Quality Control boards.	1, 2, 3, 4, 5

Table 8-1

General Plan Goals, Objectives and Policies – Surface Water Quality

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria
Douglas County Master Plan	Water Resources	Goal 4.09 Goal 4.10 Goal 4.11	The County shall identify and protect the functions and values of surface water systems, which include fish and wildlife habitat, aquifer recharge and discharge, and recreational opportunities. Programs shall be implemented to prevent impacts to surface water systems, to encourage private property owners to preserve surface water systems, and to promote the utilization of stormwater best management practices. Douglas County shall coordinate a regional approach to water resource development and management.	1, 2, 3, 4, 5

Source: Hauge Brueck Assoc. 2009

1 The evaluation criteria are provided in Table 8-3.

8.4.1 Surface Water Quality Criteria

The states of California and Nevada have developed water quality criteria to protect the beneficial uses of their respective state's water resources. A comparison of these state water quality criteria for selected sites (see Table 3-14 on page 3-39 of the Basin Plan) is shown in the following Table 8-2 and compared with the average effluent levels reported for the District's disinfected secondary-23 effluent and HPR. These data are for water years 1989 through 2008.

Table 8-2

A Comparison of Selected State Water Quality Criteria with District Effluent Characteristics for selected Sites in Alpine and Douglas Counties

Location	State	TDS (mg/L)	Cl (mg/L)	SO4 (mg/L)	Total P (mg/L)	B (mg/L)	SAR (Ratio)	Total N (mg/L)	TKN (mg/L)	NO3-N (mg/L)
West Fork Carson River at Woodsford	California[2]	55	1	2	0.02	0.02	1	0.15	0.13	0.02
West Fork Carson River	California	70	2.5	2	0.03	0.02	1	0.25	0.22	0.03
at Stateline	Nevada[3]	15	3	--	0.16	--	--	--	--	0.1
Indian Creek Reservoir	California	305	24	--	0.04	--	--	4	--	--
East Fork Carson River	California[4]	80/100	4/6	4/8	0.02/0.03	0.12/0.25	2	0.2/0.3	--	--
Bryant Creek Basin	California[4]	140/200	15/25	35/50	0.02/0.03	0.2/0.5	1	0.2/0.3	--	--

Table 8-2

A Comparison of Selected State Water Quality Criteria with District Effluent Characteristics for selected Sites in Alpine and Douglas Counties

Location	State	TDS (mg/L)	Cl (mg/L)	SO4 (mg/L)	Total P (mg/L)	B (mg/L)	SAR (Ratio)	Total N (mg/L)	TKN (mg/L)	NO3-N (mg/L)
West Fork Carson River at Woodsford	California[2]	55	1	2	0.02	0.02	1	0.15	0.13	0.02
West Fork Carson River	California	70	2.5	2	0.03	0.02	1	0.25	0.22	0.03
at Stateline	Nevada[3]	15	3	--	0.16	--	--	--	--	0.1
Indian Creek Reservoir	California	305	24	--	0.04	--	--	4	--	--
East Fork Carson River	California[4]	80/100	4/6	4/8	0.02/0.03	0.12/0.25	2	0.2/0.3	--	--
Bryant Creek Basin	California[4]	140/200	15/25	35/50	0.02/0.03	0.2/0.5	1	0.2/0.3	--	--

Source: Hauge Brueck Assoc. 2009

ns No sample
1 Based on mean of monthly mean, unless specified otherwise
2 Based on criteria from the Lahontan Basin Plan
3 Based on criteria from the Nevada Administrative code 445A
4 Annual Average Value/90th percentile value
5 Average effluent concentrations for the period 1989 to 2008

The trend analysis in Chapter 5 of the District's Master Plan discusses slightly increasing trends over the past 10 years for Biological Oxygen Demand (BOD), Nitrate-nitrogen, Total Kjeldahl Nitrogen (TKN) and Total Phosphorus (TP). Using these trends to project future (2028) average recycled water concentrations gives a BOD concentration of 8.2 mg/L, a Nitrate-nitrogen of 0.49 mg/L, a TKN of 31 mg/L and a TP of 4.6 mg/L. At the 5.8 MGD projected flow for 2028, these concentrations calculate to daily loads of 397 lbs for BOD, 23.7 lbs for Nitrate-nitrogen, 1,501 lbs for TKN, and 223 lbs for TP. These parameters are operationally-controlled and can be decreased when necessary by applying additional oxygen, bringing unused aeration basins on line, or modifying aeration basin operational parameters.

8.5 Evaluation Criteria with Points of Significance

The evaluation criteria for surface water quality are presented in Table 8-3. (The use of the term "Nitrate-Nitrogen" throughout this section refers to Nitrogen expressed as N). These criteria are drawn from a review of the relevant literature on water quality, including a review of local, tribal, state of California, state of Nevada, and federal agency policies and procedures, adapted when necessary to reflect CEQA requirements.

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A surface water impact is considered significant if implementation of the Project exceeds the point of significance shown in Table

Table 8-3

Evaluation Criteria with Points of Significance – Surface Water Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. The Project may cause numeric criteria to be exceeded at West Fork Carson River at Woodfords.			
Nitrate-nitrogen	mg/L	0.02	Lahontan Basin Plan
Total Kjeldahl Nitrogen	mg/L	0.13	Lahontan Basin Plan - TMDL Adopted
Total Nitrogen	mg/L	0.15	Lahontan Basin Plan
Total Phosphorus	mg/L	0.02	Lahontan Basin Plan
Total Dissolved Solids	mg/L	55	Lahontan Basin Plan
Chloride	mg/L	1.0	Lahontan Basin Plan
Sulfate	mg/L	2.0	Lahontan Basin Plan
Boron	mg/L	0.02	Lahontan Basin Plan
Sodium	Percent	20	Lahontan Basin Plan - TMDL Adopted
SAR	Ratio	1	Lahontan Basin Plan - Amendment
2. The Project may cause numeric criteria to be exceeded at West Fork Carson River at Stateline.			
Nitrate-nitrogen	mg/L	0.03	Lahontan Basin Plan
Total Kjeldahl Nitrogen	mg/L	0.22	Lahontan Basin Plan
Total Nitrogen	mg/L	0.25	Lahontan Basin Plan
Total Phosphorus	mg/L	0.03	Lahontan Basin Plan
Total Dissolved Solids	mg/L	70	Lahontan Basin Plan
Chloride	mg/L	2.5	Lahontan Basin Plan
Sulfate	mg/L	2.0	Lahontan Basin Plan
Boron	mg/L	0.02	Lahontan Basin Plan
Sodium	percent	20	Lahontan Basin Plan
PH	pH units	7.4 – 8.4	Nevada Admin Code 445A
Total Phosphorus	mg/L	0.16	Nevada Admin Code 445A
Nitrogen Species	mg/L	0.40	Nevada Admin Code 445A
Total Suspended Solids	mg/L	0.15	Nevada Admin Code 445A - TMDL Adopted
Turbidity	NTU	3	Nevada Admin Code 445A - TMDL Adopted
Total Dissolved Solids	mg/L	70	Nevada Admin Code 445A
Chlorides	mg/L	3	Nevada Admin Code 445A
Sodium	mg/L	1	Nevada Admin Code 445A
Fecal Coliform Bacteria	Nos/ml	105	Nevada Admin Code 445A

Table 8-3			
Evaluation Criteria with Points of Significance – Surface Water Quality			
Evaluation Criteria	**As Measured by**	**Point of Significance**	**Justification**
3. The Project may cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California.			
Algal Growth Potential	Mean of monthly algal growth potential	10%	Lahontan Basin Plan Alpine County General Plan Appendix F
Biostimulatory Substances	Increase in aquatic biomass	10%	Lahontan Basin Plan Alpine County General Plan Appendix F
Color	Platinum cobalt Unit mean of monthly means	13	Lahontan Basin Plan Alpine County General Plan Appendix F
Dissolved Oxygen	Percent saturation mg/L	Not less than 70% Not less than 7.0 mg/L	Lahontan Basin Plan Alpine County General Plan Appendix F
PH	Change	0.5 units	Lahontan Basin Plan Alpine County General Plan Appendix F
Species Composition	Change	10%	Lahontan Basin Plan Alpine County General Plan Appendix F
Taste and odor	Change	No change	Lahontan Basin Plan Alpine County General Plan Appendix F
Turbidity	Increase above mean of monthly means	2 NTU	Lahontan Basin Plan Alpine County General Plan Appendix F
SAR	Ratio	1	Lahontan Basin Plan - Amendment
4. The Project may cause TMDLs to be exceeded at ICR.			
TMDLs	Increase	No change	Lahontan Basin Plan
5. The Project may cause narrative-based criteria to be exceeded in Indian Creek below HPR.			
Nitrate-Nitrogen	Change	Shall not exceed 10 mg/l	Lahonton Basin Plan
Coliform bacteria	Cell counts	Not to exceed a log mean of 20/100 ml during any 30-day period	Lahontan Basin Plan
Biostimulatory Substances	Excessive algal blooms	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growth cause nuisance or adversely affect the water for beneficial uses	Lahontan Basin Plan

Table 8-3

Evaluation Criteria with Points of Significance – Surface Water Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
Total Residual Chlorine	Median values shall be based on daily measurements taken within any six-month period	Shall not exceed either a median value of 0.002 mg/l or a maximum value of 0.003 mg/l.	Lahontan Basin Plan
Color	Color changes	Waters shall be free of coloration that causes nuisance or adversely affects the water for beneficial uses.	Lahontan Basin Plan
Dissolved Oxygen	Percent saturation of oxygen	As percent saturation shall not be depressed by more than 10 percent nor shall the minimum dissolved oxygen concentration be less than 80 percent of saturation	Lahontan Basin Plan
Floating Materials	Visual or photographic evidence	Waters shall not contain floating material including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect the water for beneficial uses	Lahontan Basin Plan
Oil and Grease	Visual or photographic evidence	Waters shall not contain oils, greases, waxes or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses	Lahontan Basin Plan
Pesticides	Concentration (ppM)	Shall not exceed the lowest detectable levels	Lahontan Basin Plan
Hydrogen ion concentration	pH	Shall not exceed 0.5 ph units	Lahontan Basin Plan
Radioactivity	Alpha and beta particle emissions	Shall not be present in concentrations which are deleterious to human, plant, animal, or aquatic life	Lahontan Basin Plan
Sediment	Changes in beneficial human use	Suspend sediment load and suspended sediment discharge rate shall not be altered in such a manner as to cause nuisance or adversely affect the water for beneficial uses	Lahontan Basin Plan
Settleable Materials	Secchi disk	Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or that adversely affects the water for beneficial uses	Lahontan Basin Plan

Table 8-3

Evaluation Criteria with Points of Significance – Surface Water Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
Suspended Materials	Secchi disk	Waters shall not contain suspended materials in concentrations that cause nuisance or that adversely affects the water for beneficial uses.	Lahontan Basin Plan
Taste and Odor	Changes in beneficial human use	Waters shall not contain taste or odor-producing substances in concentrations that impart undesirable tastes or odors to fish or other edible products of aquatic origin, that cause nuisance, or that adversely affect the water for beneficial uses	Lahontan Basin Plan
Temperature	Degrees Celsius	The natural receiving water temperature of all waters shall not be altered	Lahontan Basin Plan
Toxicity	Plant and animal mortality greater than normal life cycles	All waters shall be maintained free of toxic substance in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life	Lahontan Basin Plan
Turbidity	Waters shall be free of changes in turbidity that cause nuisance or adversely affect the water for beneficial uses	Increases in turbidity shall not exceed natural levels by more than 10 percent	Lahontan Basin Plan

Source: State Board 1995; Hauge Brueck Assoc. 2009.

8.6 Environmental Consequences (Impacts) and Recommended Mitigation

8.6.1 No Project Components

Table 8-4 presents potential surface water quality impacts, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 8-4

Surface Water Quality Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
SW-1. Will the No Project Components cause numeric criteria to be exceeded at West Fork Carson River at Woodfords?	Exceeds numeric criterion				NP-1, NP-2
SW-2. Will the No Project Components cause numeric criteria to be exceeded at West Fork Carson River at Stateline?	Exceeds numeric criterion	NP-2		NP-1	
SW-3. Will the No Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	Exceeds stated limits	NP-2		NP-1	
SW-4. Will the No Project Components cause TMDLs to be exceeded at Indian Creek Reservoir (ICR)?	Exceeds numeric criterion				NP-1, NP-2
SW-5. Will the No Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?	Exceeds stated limits	NP-2			NP-1

Source: Hauge Brueck Assoc. 2009

Impact: **SW-1. Will the No Project components cause numeric criteria to be exceeded at West Fork Carson River at Woodfords?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components have no discharge facilities in the drainage of the West Fork of the Carson River upstream from Woodfords.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: **SW-2. Will the No Project Components cause numeric criteria to be exceeded at West Fork Carson River at Stateline?**

Analysis: *Significant Impact; NP-2*

By 2028 the volume of recycled water that is applied by the District is project to be 5.8 MGD, a 32% increase as compared to 2007 volumes. This increase assumes buildout of development permitted by the adopted General Plans of South Lake Tahoe and El Dorado County as modified by the TRPA's Code of Ordinances and Plan Area Statements. The approach is explained in Chapter 5 of the Master Plan.

Increases in the volume of recycled water projected by 2028 will cause impacts to the reliability of the Diamond Ditch system during emergency situations and flooding that could result in significant impacts to water quality of the West Fork of the Carson River at Stateline. Tailwater, if uncontrolled, will impact surface water quality. The No Project Components for recycled water (NP-2) do not allow for the construction and operation of project components that will alleviate flooding and tailwater impacts. This is a significant impact to surface water quality in the West Fork of the Carson River at Stateline.

Mitigation: *No mitigation is possible. NP-2*

After Mitigation *Significant impact; NP-2*

No new conveyance, application, temporary containment or water management facilities will be constructed under the No Project Components. Because no mitigation is possible under the No Project Components for recycled water (NP-2), the impact remains significant.

Analysis: *Less than Significant Impact; NP-1*

The increase in the volume of water projected by 2028 will cause impacts to the reliability of the Snowshoe Thompson No. 1 system during emergency situations. This system conveys freshwater and will not significantly degrade water quality of the West fork of the Carson River at state line.

Mitigation: *No mitigation is needed. NP-1*

Impact: SW-3. Will the No Project Components cause narrative-based criteria to be exceeded at West Fork Carson River in California?

Analysis: *Significant Impact; NP-2*

By 2028 the volume of recycled water that is applied by the District is project to be 5.8 MGD, a 32 percent increase as compared to 2007 volumes. This increase assumes buildout of development permitted by the adopted General Plans of South Lake Tahoe and El Dorado County as modified by the TRPA's Code of Ordinances and Plan Area Statements. The approach is explained in Chapter 5 of the Master Plan.

Increase in the volume of water projected by 2028 will cause impacts to the reliability of the Diamond Ditch and Dressler On-Farm systems during emergency situations and could result in flooding and significant impacts to surface water quality of the West Fork of the Carson River in California. Tailwater, if uncontrolled, will impact surface water quality.

Mitigation: *No mitigation is possible. NP-2*

After

Mitigation: *Significant Impact; NP-2*

No mitigation is possible because no new conveyance, application, temporary containment or water management facilities will be constructed under the No Project Components. Because no mitigation is possible under the No Project Components for recycled water (NP-2), the impact remains significant.

Analysis: *Less than Significant Impact; NP-1*

The increase in the volume of water projected by 2028 will cause impacts to the reliability of the Snowshoe Thompson No. 1 system during emergency situations and flooding could result. This system conveys freshwater and flooding will not significantly degrade water quality of the West Fork of the Carson River in California.

Mitigation: *No mitigation is needed. NP-1*

Impact: SW-4. Will the No Project Components cause TMDLs to be exceeded at Indian Creek Reservoir (ICR)?

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will not cause TMDLs to be exceeded at ICR. ICR is a freshwater body that is not impacted by recycled water conveyance or application. Additionally, the ICR Oxygenation Project was installed in 2008, which is implemented as a project separate from the Master Plan. This project directly addresses the TMDL for phosphorus for ICR.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: SW-5. Will the No Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?

Analysis: *Significant Impact; NP-2*

Under existing conditions, the potential exists for recycled waters stored in HPR to over top the dam and impact water quality in Indian Creek. The No Project Components for recycled water (NP-2) will not construct facilities or implement water management changes to address this significant impact.

Mitigation: *No mitigation is possible. NP-2*

After Mitigation: *Significant Impact; NP-2*

No mitigation is possible because no new conveyance, application, temporary containment or water management facilities will be constructed under the No Project Components. Because no mitigation is possible under the No Project Components for recycled water (NP-2), the impact remains significant.

Analysis: *No Impact; NP-1*

The freshwater components of the No Project Components (NP-1) will have no impact on narrative-based water quality criteria in Indian Creek. Currently, winter flows in Indian

Creek are used as flushing flows to improve the water quality of ICR, as water is diverted from Indian Creek into the Upper Dressler Ditch and is passed through the reservoir back to Indian Creek. Under the No Project Components, NP-1, these freshwater flows will not be altered.

Mitigation: *No mitigation is needed. NP-1*

8.6.2 Project Components

Table 8-5 presents surface water quality impacts, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 8-5

Surface Water Quality Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
SW-1. Will the Project Components cause numeric criteria to be exceeded at West Fork Carson River at Woodfords?	Exceeds numeric criterion				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18,19, 20, 22, 23, 24, 29, 30, 31, 32
SW-2. Will the Project Components cause numeric criteria to be exceeded at West Fork Carson River at Stateline?	Exceeds numeric criterion			1, 2, 4, 6, 7, 18, 21, 30	3, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 19, 20, 22, 23, 24, 29, 31, 32
SW-3. Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	Exceeds stated limits	30		1, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 29, 31, 32	2, 8, 15, 23, 24
SW-4. Will the Project Components cause TMDLs to be exceeded at Indian Creek Reservoir (ICR)?	Exceeds numeric criterion		31	23, 24, 32	1, 2, 3, 4, 5, 6, 7. 8. 9. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30
SW-5. Will the Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?	Exceeds stated limits		31, 32	11, 15, 22, 23, 24	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13 14, 16, 17, 18, 20, 21, 29, 30

Source: Hauge Brueck Assoc. 2009

Impact: **SW-1. Will the Project Components cause numeric-based criteria to be exceeded at West Fork Carson River at Woodfords?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18,19, 20, 22, 23, 24, 29, 30, 31, 32*

No impacts to surface water quality of the West Fork of the Carson River at Woodfords will occur as a result of construction or operations of the conveyance, application, temporary containment or water management components because the facilities are located downstream.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30, 31, 32*

Impact: **SW-2. Will the Project Components cause numeric-base criteria to be exceeded at West Fork Carson River at Stateline?**

Analysis: *Less than Significant Impact; Components 1,2, 4, 6, 7, 18, 21, 30*

Through implementation of Component 1, the District will provide recycled water to new non-irrigated, permitted land (472 acres) in California to receive recycled water for irrigation purposes. New conveyance systems will be necessary. Due to proximity of lands to the West Fork of the Carson River, incorrect application of recycled water by irrigators could create tailwater and impact surface water quality at the Stateline. The potential impact will be avoided and reduced to a level of less than significant through implementation of the standard practices described below.

Through implementation of Component 2, the District will make recycled water available to irrigators in Nevada. The District will pursue permitting through NDEP of land in Nevada to receive recycled water from HPR, as currently only a secondary irrigator (tailwater) user agreement is in place to administer waters from the District's system entering Nevada. New conveyance systems will be necessary. Due to proximity of lands to the West Fork of the Carson River, incorrect application of recycled water by irrigators could create tailwater and impact surface water quality at the state line. The potential impact will be avoided or reduced through implementation of the standard practices described below.

Under Component 4, the District will provide pressurized recycled water to the Fredricksburg system by constructing an inverted siphon from Wade Valley to the system. The lands in this area are currently permitted to receive recycled water, but the upgraded system will also allow the District to convey recycled waters across the West Fork of the Carson River at the Paynesville Bridge to irrigate lands above the existing Fredricksburg system pending permitting of additional lands. Due to proximity of lands to the West Fork of the Carson River, incorrect application of recycled water by irrigators could create tailwater and impact surface water quality at the state line. The potential impact will be avoided or reduced through implementation of the standard practices described below.

Components 30 will irrigate the "Jungle" with recycled water. Because of location, topography and/or pipeline or ditch orientation, operation of this application system will not involve discharge of recycled water to the West Fork of the Carson River at the Stateline. Incorrect application of recycled waters in this area could result in tailwater that reaches the surface waters in the West Fork of the Carson River in California, which may be detectable at the state line. The potential impact will be avoided or reduced through implementation of the standard practices described below.

The Project will include construction and implementation of non-flood irrigation application systems under components 6 and 7 and tailwater controls under Component 21. Under Component 18, application rates will be optimized on existing irrigated lands, which will minimize the potential for surface water quality impacts from tailwater. The purpose of these Project Components is to avoid and minimize the impacts on surface waters. Surface water quality at state line may improve as a result of these Project Components.

To reduce potential impacts to surface water quality to a less than significant level, the District will implement the following standard practices as part of the Project:

- SP-34. Application and Temporary Containment Infrastructure Maintenance and Monitoring Plan;
- SP-11. Erosion Control/Stormwater Pollution Prevention Plan; and
- SP-33. Surface and Ground Water Protection Plan.

Implementation of the Application and Temporary Containment Infrastructure Maintenance and Monitoring Plan (SP-34) will minimize the potential for spills of recycled water into local streams ditches, and adjacent rangeland. Slopes and levees may become undercut by rapid runoff from snowmelt or summer monsoonal storms or may fail if saturated. Regular quarterly inspection of these facilities and inspection during and immediately after high runoff events will minimize the chance of adverse impacts to surface water quality.

Most Project Components will include activities involving over one-acre of disturbance and will require application for a NPDES permit, currently State Board General Permit Order No. 99-08-DWQ. Potential impacts to surface water quality from constructing the Project Components will be reduced to a level of less than significant through implementation of the required SWPPP and erosion control plan (SP-11) during construction.

The BWPC of the NDEP governs recycled water reuse in Nevada, issues NPDES permits and requires that effluent management plans be prepared by all recycled water users. Effluent management plans are similar to the nutrient or salt management plans and identify acceptable application rates and methods in concert with particular soil and crop types. Preparation and implementation of these effluent management plans along with construction and operation of more efficient sprinkler irrigation systems will reduce the potential for tailwater and will reduce this impact to surface water quality to a level of less than significant for Component 1.

Impacts from constructing the conveyance component 6 will be reduced to a level of less than significant through compliance with the SWPPP during construction. Because of location, topography and/or pipeline or ditch orientation, operation of this conveyance system will not involve discharge recycled water to the West Fork of the Carson River at the state line. Incorrect application of recycled waters in this area could result in tailwater that reaches the surface waters in the West Fork of the Carson River in California, which may be detectable at the state line. The potential impact will be avoided or reduced through implementation of the tailwater controls outlined in SP-33.

The Monitoring Plan, developed as part of standard practice SP-33, outlines monitoring protocols for compliance with the WDR and measuring and responding to potential impacts to surface water as well as groundwater. The District will develop NMPs for the Carson and Wade Valley portions of the project area to the satisfaction of the ~~forthcoming~~ State Board Recycled Water Policy (Board Order NO. 2009-0011) to further reduce potential impacts to surface water quality. Nutrient management is the act of managing the amount, source, placement, form and timing of the application of plant nutrient and soil amendments. In the context of recycled water irrigation, the plan considers nutrient and salt concentrations present in recycled water when calculating fertilizer and irrigation application rates. The delineation and confirmation of the presence or absence of state waters is completed as part of the plan. The plan must include a description of the best practicable treatment or control measures necessary to prevent nutrient or salt-related pollution or nuisance. The plan will outline an approach towards education of contract irrigators regarding application of recycled water in an amount not exceeding that can be used by planted crops.

The NMP offers concrete responses when baseline nitrate and phosphorus levels show degradation of water quality attributable to reuse of recycled water. The plan includes actions to control tailwater and curtail recycled water flows on to the project area either temporarily or permanently to reduce the impact of recycled water application to a less than significant level at the state line.

Mitigation: *No mitigation is needed. Components 1, 2, 4, 6, 7, 18, 21, 30*

Analysis: *No Impact; Components 3, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 22, 23, 24, 29, 31, 32*

Components 3, 5, 8, 9, 10, 11, 12, 13, 15, 16, 17, 19, 20, 22, 23, 24, 29, 31 and 32 pose no impacts to surface water quality of the West Fork of the Carson River at state line. Components 9, 10, 12, 13, 15, 16, 19, 23, 24, 29, 31 and 32 are located in the Indian Creek watershed and topographically isolated from the West Fork of the Carson River. Component 8 involves improving recycled water quality at the District's WWTP in South Lake Tahoe, CA. Construction of components 3, 5, 14, 20 and 22 may result in temporary impacts to surface waters, primarily from erosion, that will be addressed by the State-required SWPPP. These components pose no impacts to surface waters at the state line because of their location within the project area.

The temporary containment Component 11 will be built in the Indian Creek watershed and not the West Fork of the Carson River catchment. No impacts to surface water quality of the West Fork of the Carson River will occur from the construction and operation of this Project Component.

Mitigation: *No mitigation is needed. Components 3, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 22, 23, 24, 29, 31, 32*

Impact: SW-3. Will the Project Components cause narrative-based criteria 3 to be exceeded at West Fork Carson River in California?

Analysis: *Significant Impact; Component 30*

Under Component 30, 150 acres of lands located northwest of Snowshoe Thompson No. 2 Ditch and north of Millich Ditch will be irrigated with recycled water. This area is referred to as the "Jungle" and at the nearest point the jungle is approximately 1,100 feet from the West Fork of the Carson River and characterized as sloping and bottom valley land. Spray irrigation methods will be used and recycled water will be supplied under pressure from a pipeline branching off the existing C-Line or from the pressurized line proposed for pumping water back to HPR. If recycled water is not optimally applied, tailwater will potentially enter the West Fork of the Carson River. Excessive irrigation will result in recycled water percolating past the active root zones of existing vegetation and entering shallow groundwater.

Unconsolidated sediments that form alluvial fans underlie the floodplain of the Carson River basin and can be present in thickness of up to 5,000 feet. The California Division of Mines and Geology map, Walker Lake Sheet, indicates the presence of alluvium in the northwestern and Diamond Valley portions of the Carson River Basin. Consolidated granitic and metamorphic bedrock surrounding and underlying portions of the Carson Valley are relatively impermeable to groundwater flow. The semi-consolidated Tertiary sediments, lens of sand and gravel that have been found in the project area during soil borings transmit most of the groundwater. and the general flow of groundwater in the Carson Valley is towards the north and towards the Carson River channel. If recycled water enters the shallow groundwater of the alluvial fans, surface water quality of the West Fork of the Carson River in California could be impacted as groundwater recharges surface water flows.

Misapplication or overuse of recycled water could cause degradation of water quality, violation of standards applicable to ground and surface waters and violation of permit requirements. The hydrogeologic characteristics of the region were considered in developing the ACGMP, which has the objective of assessing impacts of present and future recycled water application and discharges on groundwater quality within the project area and addressing the protection of water supply sources in the region.

Because a site-specific NMP has not been completed for the Jungle, the impacts to surface and ground water quality remain potentially significant until site-specific hydraulic loading levels and corresponding recycled water application rates are determined

Mitigation: **SW-3. Develop Project-Specific Nutrient Management Plan for the Jungle**

After Mitigation: *Significant Impact; Component 30*

The delineation and confirmation of the presence or absence of State waters is necessary for this portion of the project area. A NMP and associated tailwater controls have not been developed for the 140 acres referred to as the Jungle. Given that site-specific management of nutrients has not been determined and the close proximity of Project Component to the West Fork of the Carson River, the potential impact of Component 30 remains significant.

Analysis: *Less than Significant Impact; Components 1, 3, 4, 5, 6, 7, 14, 17, 18, 20, 21, 22*

Component 1 will provide recycled water to 472 acres of non-irrigated, permitted land. The infrastructure to convey water from the Fredricksburg Ditch will be constructed. Impacts to surface water quality during construction and from recycled water application during operation are possible but less than significant because of implementation of standard practices of the Project combined with the distance of Component 1 from the West Fork of the Carson River.

Although components 3 and 17 will result in an increase in the capacity of the Diamond Ditch and Snowshoe Thompson Ditch No.1, these actions will not divert additional freshwater away from the West Fork of the Carson River or significantly impact surface water quality. Furthermore, the existing ditches will be lined or replaced with pipeline to reduce transmissive losses. The flood control structures will be replaced, resulting in increased system capacity and alleviation of flooding and erosion issues. The District is currently diverting its full entitlement, but is conveying most of the freshwater to the Millich Ditch, rather than to ICR. If the capacity of the lower portion of the Snowshoe Thompson Ditch No.1 is increased, the water that now goes to the Millich Ditch will be sent to ICR, without any change in the amount of water being diverted from the Carson River.

Sprinkler and sub-surface irrigation are proven to be more efficient than flood irrigation and provide for much greater control over application rates and volumes. Components 4, 5 and 6 will provide pressurized water to the Fredricksburg ditch, Wade Valley, and Ranchettes, respectively, allowing for sprinkler irrigation rather than flood irrigation at these sites. Component 7 encourages the use of sprinkler irrigation of other application methods in lieu of flood irrigation when using recycled water. The use of aerial irrigation systems for the application of recycled waters is expected to reduce misapplication and the potential for tailwater impacts to surface water quality.

Component 14 converts open channel flow in the Upper and Lower Fredericksburg and Diamond Ditch systems to a buried pipe distribution system. The upgraded system will also allow for sprinkler irrigation. Sub-surface recycled water irrigation will be installed under Component 16. The District will install a recycled water pipeline generally along the current route of the Diamond Ditch under Component 22. By piping the recycled water, the District will have greater control over the quantity of water delivered to any site and the recycled water will be delivered under pressure, allowing for the use of sprinkler irrigation systems instead of flood irrigation. Sprinkler and sub-surface irrigation systems will allow for more controlled application of recycled waters and reduce the potential for tailwater to reach the West Fork of the Carson River in California.

Component 18 fulfills NMP requirements for recycled water irrigators and develops a recycled water allocation system that will both maximize the volume of applied recycled water and minimize the threat to groundwater and surface water quality by balancing the application rates with the hydraulic loading levels and crop nutrient needs within the project area. Component 20 involves improved control of operations through ownership determinations. The District will assist irrigators with tailwater controls (Component 21), installing either percolation or evaporation basins or pumping waters back to irrigation systems for reapplication.

Components 1, 3, 4, 5, 6, 7, 14, 17, 18, 20, 21, 22 are expected to have a positive benefit to surface water quality in the West Fork of the Carson River in California.

Mitigation: *No mitigation is needed. Components 1, 3, 4, 5, 6, 7, 14, 17, 18, 20, 21, 22*

Analysis: *Less than Significant Impact; Components 9, 10, 11, 12, 13, 16, 19, 29, 31, 32*

Components 9, 10, 11, 12, 13, 16, 19, 29, 31 and 32 are located in the Indian Creek watershed and are topographically isolated from the West Fork of the Carson River. The watersheds have subsurface connections in the Carson River groundwater basin and groundwater flow direction is interpreted towards the north, generally following the flow of the Carson River. The small potential for surface water quality to be impacted during operations will be reduced to a level of less than significant through implementation of standard practices discussed above for impact SW-1.

Mitigation: *No mitigation is needed. Components 9, 10, 11, 12, 13, 16, 19, 29, 31, 32*

Analysis: *No Impact; Component 2, 8, 15, 23, 24*

Components 2, 8, 15, 23 and 24 will have no impact on surface water quality in the West Fork of the Carson River in California. Component 2 will be located downstream of the Stateline and will have no impact on surface water quality in California. Component 8 will improve recycled water quality at the District's WWTP in South Lake Tahoe, CA, which is not located in the Carson River watershed. Components 15, 23 and 24 will be implemented in the Indian Creek watershed and will involve the application or management of freshwater.

Mitigation: *No mitigation is needed. Components 2, 8, 15, 23, 24*

Impact: SW-4. Will the Project Components cause the TMDL to be exceeded in ICR?

Analysis: *Significant Impact; Components 31*

Diverting storm waters for Component 31, which originate from the small drainage east of the reservoirs, to ICR instead of HPR could impact the TMDL for ICR through the introduction of sediment into the reservoir. A method for erosion control is necessary to reduce sediment and nutrient loading to ICR from this small drainage.

Mitigation: **SW-4. Develop Erosion Control Methods for ICR**

After Mitigation: *Less than Significant Impact; Component 31*

Implementation of erosion control methods in the drainage upslope of ICR will stabilize slopes and capture sediment that may be mobilized, keeping sediment from entering ICR and potentially degrading water quality in the reservoir. The impact is reduced to a level of less than significant after mitigation

Analysis: *Less than Significant Impact; Component 23, 24, 32*

Components 23 will negotiate an agreement with owners of the Alpine Decree water rights stored in Mud Lake to route this freshwater through ICR. Implementation of this component will result in conveying Mud Lake winter flows from the West Fork of the Carson through Snowshoe Thompson No. 1 Ditch and the Upper Dressler Ditch into ICR. Component 24 will transfer existing water rights to storage in ICR by the District or other water right owners. Increased flows through ICR are expected to increase dissolved oxygen concentrations in the reservoir and transport phosphorus from the reservoir providing a benefit to surface water quality and fish habitat in the reservoir.

Under Component 32 a spillway channel will be constructed to convey reservoir spillage in a controlled manner around HPR to Indian Creek. Impacts to water quality in ICR could occur during construction. These potential impacts from construction will be reduced to a level of less than significant through compliance with the standard practices SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites and SP-11 Erosion Control/Stormwater Pollution Prevention Plan, which serve to stabilize slopes and control erosion.

Mitigation: *No mitigation is needed. Component 23, 24, 32*

Analysis: *No impact; Components 1, 2, 3, 4, 5, 6, 7. 8. 9. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30*

The facilities constructed for operation of conveyance components 2, 3, 4, 5, 6, 14, 17, 20 and 22 will be located downstream of ICR and will create no impacts to water quality in the reservoir.

Due to the location of facilities within the project area and in reference to the reservoir, there will be no impact to water quality in ICR from construction and operation of application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30.

Although Components 3 and 17 will result in an increase in the capacity of the Diamond Ditch and Snowshoe Thompson Ditch No.1, these actions will not divert additional freshwater away from the West Fork of the Carson River. Furthermore, the existing ditches will be lined or replaced with pipeline to reduce losses. The flood control structures will be replaced, resulting in increased system capacity and alleviation of flooding and erosion problems. The District is currently diverting its full entitlement, but is conveying most of the freshwater to the Millich Ditch, rather than to ICR. If the capacity of the lower portion of the Snowshoe Thompson Ditch No.1 is increased, the water that now goes to the Millich Ditch will be sent to ICR, without any change in the amount of water being diverted from the river. ICR is a freshwater reservoir and the addition of freshwater from similar sources is not expected to negatively impact water quality in the reservoir.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7. 8. 9. 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30*

Impact: SW-5. Will the Project Components cause narrative-based criteria to be exceeded in Indian Creek below HPR?

Analysis: *Significant Impact; Components 31, 32*

The influx of freshwater from the Snowshoe Thompson and Dressler system of ditches and the conveyance systems proposed for Components 31 and 32 could cause impacts to surface water quality of Indian Creek by flushing nutrients, dissolved and particulate solids, and low dissolved oxygen waters from ICR. Component 31 constructs a ditch near the southeast corner of the HPR to intercept storm water and drainage flows and divert them to ICR. The purpose is to reduce storm water flows into HPR thereby increasing the available recycled water storage volume of the HPR. The diversion of storm water to ICR is a potentially significant impact to water quality and a method of sediment control will be necessary to reduce sediment load to ICR.

Component 32 will construct a spillway channel for ICR that conveys reservoir spillage of freshwater in a controlled manner around HPR to Indian Creek. These spills have the potential to cause bank erosion in Indian Creek and increase sediments if the release is not controlled and results in bankfull flows and overtopping of the stream banks.

Potentially significant impacts from components 31 and 32 include: increased erosion and reduced water quality and habitat due to flooding and bank scour; bed scour and downcutting in primary channels; erosion of new channels to accommodate the increased flows; and damage to private and public property. Unanticipated projects to restore degraded riparian systems could be necessary.

Mitigation: **SW-4. Develop Erosion Control Methods for ICR**

SW-5. Implement Component 15 prior to Component 32

After Mitigation: *Less than Significant Impact; Components 31, 32*

Implementation of erosion control methods in the drainage upslope of ICR will stabilize slopes and capture sediment that may be mobilized, keeping sediment from entering ICR and degrading water quality in the reservoir.

The creation and proper management of riparian water treatment wetlands as a part of application Component 15 will reduce the impact due to phosphates and nitrates flushed from ICR (Component 32) and into Indian Creek to a less than significant level through capture and uptake processes performed by the treatment wetlands. The ICR TMDL project installed an oxygenation system for the improvement of fish habitat and water quality. The system has been online since May 2009. Improvements to existing conditions within ICR will benefit surface water quality, fish habitat, and beneficial uses downstream in Indian Creek. This mitigation project was implemented separately from the Master Plan.

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 14, 16, 17, 18, 19, 20, 21, 29, 30*

Components 1, 2, 3, 4, 5, 6, 14, 16, 17, 21, 29 and 30 will not impact water quality in Indian Creek below HPR due to site topography and/or location of facilities within the project area.

Components 7, 8, 18, 19 and 20 will not degrade surface water quality in Indian Creek below HPR because the Project Components will improve recycled water quality or the manner in which recycled water is conveyed and applied. Component 8 will improve the quality of recycled water exported from the WWTP in South Lake Tahoe and subsequently the quality of recycled water applied to lands in the project area. The purpose of Components 7 and 18 is to improve application methods of recycled water on lands in the project area through non-flood irrigation systems and through optimization of application rates. Component 19 pursues land permitting in Alpine County and Component 20 determines ownership of portions of the Diamond Ditch for improvement of operations and will not impact water quality in Indian Creek.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 14, 16, 17, 18, 19, 20, 21, 29, 30*

Analysis: *Less than Significant Impact; Components 9, 10, 11, 12, 13, 15, 22, 23, 24*

Components 9, 10, 12, 13, 15 involve application of recycled water in the project area through infiltration basins and treatment wetlands and pose negligible impact to surface waters in Indian Creek below HPR if Project Components function properly. To further reduce impacts to surface water quality to a less than significant level, the District will implement the following standard practices as part of the Project:

- SP-34. Application and Temporary Containment Infrastructure Maintenance and Monitoring Plan;
- SP-11. Erosion Control/Stormwater Pollution Prevention Plan; and

- SP-33. Surface and Ground Water Protection Plan.

These standard practices are detailed above in the analysis for impact SW-1.

Under Component 11 impacts to surface water may occur due to overfilling of temporary containment areas with recycled water or misapplication of recycled water on irrigation fields. Tailwater could result or berms may breach and result in runoff into Indian Creek. Implementation of Standard practice SP-34, Application and Temporary Containment Maintenance and Monitoring Plan, will minimize the impacts from spillage of impounded recycled water into Indian Creek.

Slopes of ditches and levees may become undercut by rapid runoff from snowmelt or summer monsoonal storms or may fail if saturated. Regular quarterly inspection of these facilities and inspection during and immediately after high runoff events will minimize the chance of adverse impacts to surface water quality of Indian Creek. The District will prepare and implement a maintenance plan to monitor application and temporary containment infrastructure using water meters, coupled with quarterly visual inspection of pipelines and levees, and inspection during and immediately after high runoff events. Public works projects must be subject to periodic maintenance to prevent degradation of surface water quality from slope and levee failure or temporary containment spills.

There is a small chance that slope failure at the site of the temporary containment facilities (Component 11) could cause localized flooding but will not impact the West Fork of the Carson River or Indian Creek. The temporary containment areas will require implementation of SP-16, Slope Stabilization Design, to ensure stability of the structures. Requirements of standard design measure SP-16 reduces impacts to a less than significant level by implementing standard geotechnical practices as part of project design to stabilize slopes. SP-34, Surface and Ground Water Protection Plan includes requirements for the protection of surface water quality in Indian Creek. These requirements outline 25-foot setbacks from District property lines, center lines of irrigation ditches and the edge of streams when determining irrigable acreages and selection of irrigation methods.

During project planning the District will retain a licensed geotechnical engineer to conduct a construction-level geotechnical investigation for physical facilities such as pipeline routes, irrigation systems and embankment locations. Results from this investigation will be used to refine the final project design. Compliance with this standard design measure will avoid and minimize adverse environmental impacts from unstable slopes. The temporary containment facilities will be designed with additional freeboard to reduce the risk of overtopping in the event of a seismic event and subject to standard practice SP-21, Temporary Containment and Impoundment Siting and Design. Embankments and berms will be inspected seasonally for structural integrity and maintained as needed to avoid slope failures and resultant flooding.

By implementing Component 22, the District will install a recycled water pipeline generally along the current route of the Diamond Ditch and will gain greater control over the quality of water delivered to any portion of the project area. The recycled water will be delivered to users under pressure and allow for irrigators to use sprinkler irrigation, which is more efficient than flood irrigation. The risk of a pipe burst is inherent. The potential for pipe burst is reduced to a level of less than significant through implementation of standard practice SP-17 Pipeline Design Features in Active Fault Zones, which requires automatic values that will cut off waters more quickly in the event of a pipe burst. Trenching impacts will be reduced through adherence with the requirements and practices outlined in the State-required SWPPP (SP-11).

Impacts to surface water quality of Indian Creek may occur during the flushing of nutrients, dissolved and particulate solids, and low dissolved oxygen waters from ICR when diverting freshwater flows destined for Mud Lake (from the Millich Ditch into the Snowshoe Thompson and Dressler system of ditches) and delivering to ICR (Component 23). The transfer of existing water rights into ICR will also increase the flushing of nutrients, and dissolved and particulate solids, and low dissolved oxygen waters from ICR into Indian Creek (Component 24). The Mud Lake water right entitlements cannot be stored in ICR; therefore, an equal flow from the ICR outlet structure will be released into Indian Creek below HPR. The ICR TMDL Project (not a part of the Master Plan) installed an oxygenation system for the improvement of fish habitat and water quality in the reservoir. The system has been online since August 2008. Improvements to existing conditions within ICR will benefit surface water quality and beneficial uses downstream in Indian Creek. This mitigation project was implemented outside of the Master Plan.

Mitigation: *No mitigation is needed. Components 9, 10, 11, 12, 13, 15, 19, 22, 23, 24*

8.7 Cumulative Impacts

There are three Project impacts – significant and less than significant after mitigation – on surface water quality due to potential exceedance of water quality criteria in the West Fork of the Carson River, Indian Creek and ICR. Misapplication or overuse of recycled water could cause degradation of water quality, violation of standards applicable to ground and surface waters and violation of permit requirements.

State water quality objectives and TMDLs (i.e., the exceedance of numeric or narrative criteria at specified locations) consider cumulative impacts on the bodies of water for the protection of beneficial uses. The standard practices adopted as part of the Project, determination of site-specific hydraulic loading level, implementation of tailwater controls, and compliance with NPDES permit requirements will reduce cumulative project impacts to a less than significant level. Monitoring and reporting for WDR and NMPs will identify changes in surface and groundwater quality and allow for the District to take corrective actions prior to significant contribution to cumulative impacts.

Alpine County does not identify future or foreseeable projects in the vicinity of the project area that could contribute to cumulative impacts to surface water quality.

The three significant impacts on surface water quality under the No Project Components cannot be mitigated without facility improvements and replacements and will contribute to cumulative water quality impacts.

8.8 Summary of Significant Impacts and Mitigation Measures

8.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 8-6 summarizes the significant impacts by Project Component and identifies the mitigation measures required for each impact.

Table 8-6

Summary of Significant Impacts and Mitigation Measures – Surface Water

Impact	Level of Significance	Mitigation Measure
No Project Components		
SW-2. Will the No Project Components cause numeric criteria to be exceeded at West Fork Carson River at Stateline?	NP-2 ●	No mitigation can be implemented under the No Project Alternative
SW-3. Will the No Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	NP-2 ●	No mitigation can be implemented under the No Project Alternative
SW-5. Will the No Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?	NP-2 ●	No mitigation can be implemented under the No Project Alternative
Project Components		
SW-3. Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	30 ●	**SW-3.** Develop Project-specific Nutrient Management Plan for the Jungle
SW-4. Will the Project Components cause TMDLs to be exceeded at Indian Creek Reservoir (ICR)?	31 ⊙	**SW-4.** Develop Erosion Control Methods for ICR
SW-5. Will the Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?	31, 32 ⊙	**SW-4.** Develop Erosion Control Methods for ICR **SW-5.** Implement Component 15 prior to Component 32

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

8.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

The significant impacts identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3) are listed below. A discussion follows as to why the impact is significant and how the impact is mitigated to a level of less than significant. If impacts are significant and unavoidable, an explanation is provided.

SW-3. Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?

The level of this significant impact is reduced through implementation of the following recommended mitigation measure for the Project:

- SW-3. Develop Project-Specific Nutrient Management Plan for the Jungle.

The recommended mitigation measure is detailed in Appendix D.

The impact is significant for Project Component 30 of Alternative 3. Under Project Component 30, 150 acres of lands located northwest of Snowshoe Thompson No. 2 Ditch and north of Millich Ditch will be irrigated with recycled water. This area is referred to as the "Jungle" and at the nearest point the jungle is approximately 1,100 feet from the West Fork of the Carson River and characterized as sloping and bottom valley land. Spray irrigation methods will be used and recycled water will be supplied under pressure from a pipeline branching off the existing C-Line or from the pressurized line proposed for pumping water back to HPR. If recycled water is not optimally applied, tailwater will potentially enter the West Fork of the Carson River. Excessive irrigation will result in recycled water percolating past the active root zones of existing vegetation and entering shallow groundwater. The delineation and confirmation of the presence or absence of State waters is necessary for this portion of the project area. A NMP and associated tailwater controls have not been developed for the 140 acres referred to as the Jungle. Given that site-specific management of nutrients has not been determined and the close proximity of project component to the West Fork of the Carson River, the potential impact of Component 30 remains significant.

SW-4. Will the Project Components cause the TMDL to be exceeded in ICR?

The level of this significant impact is reduced through implementation of the following recommended mitigation measure for the Project:

- SW-4. Develop Erosion Control Methods for ICR.

The recommended mitigation measure is detailed in Appendix D.

Diverting storm waters for Component 31, which originate from the small drainage east of the reservoirs, to ICR instead of HPR could impact the TMDL for ICR through the introduction of sediment into the reservoir.

Mitigation: SW-4. Develop Erosion Control Methods for ICR. Implementation of erosion control methods in the drainage upslope of ICR will stabilize slopes and capture sediment that may be mobilized, keeping sediment from entering ICR and potentially degrading water quality in the reservoir. The impact is reduced to a level of less than significant after mitigation.

SW-5. Will the Project Components cause narrative-based criteria to be exceeded in Indian Creek below HPR?

The level of this significant impact is reduced through implementation of the following recommended mitigation measure for the Project:

- SW-4. Develop Erosion Control Methods for ICR; and
- SW-5. Implement Component 15 prior to Component 32.

The recommended mitigation measures are detailed in Appendix D.

Potentially significant impacts from components 31 and 32 of Alternative 3 include: increased erosion and reduced water quality and habitat due to flooding and bank scour; bed scour and downcutting in primary channels; erosion of new channels to accommodate the increased flows; and damage to private and public property. Unanticipated projects to restore degraded riparian systems could be necessary. The creation and proper management of riparian water treatment wetlands as a part of application Component 15 will reduce the potential impact from phosphates and nitrates flushed from ICR (Component 32) and into Indian Creek to a less than significant level through capture and uptake processes performed by the treatment wetlands. The ICR TMDL project installed an oxygenation system for the improvement of fish habitat and water quality. The system has been online since September 2008. Improvements to existing conditions within ICR will benefit surface water quality and beneficial uses downstream in Indian Creek. This mitigation project was implemented separately from the Master Plan.

9 Hydrology

9 Hydrology

This section describes the effects of the Project on the hydrology of the Carson Valley, Diamond Valley and Indian Creek watersheds.

9.1 Impacts Evaluated In Other Chapters

- Biological Resources. The issues related to wetlands are discussed in Chapter 11, Biological Resources.

- Groundwater. The issues related to groundwater are discussed in Chapter 7, Groundwater.

- Surface Water. The issues related to surface water are discussed in Chapter 8, Surface Water.

- Land Use. Land use concerns associated with surface water quality may be found in Chapter 4, Land Use.

- Agriculture. Agricultural concerns associated with surface water quality may be found in Chapter 5, Agriculture.

9.2 Affected Environment (Setting)

The hydrologic cycle begins with precipitation. For the project area, most precipitation (about 81 percent of the total) falls in the form of snow from Pacific Ocean weather fronts moving east across the Sierra Nevada. Weather fronts from the Great Basin drop two percent of the total precipitation (mostly in late spring and late fall), and weather fronts from the Gulf of California contribute eight percent in the form of summer thundershowers. Run-off and percolation from precipitation is captured in geologic basins. The one geologic basin in the project area is the Carson River Basin.

The Carson River Basin encompasses an area of approximately 3,966 square miles (2,538,230 acres) in the states of California and Nevada. The basin stretches in a generally north and then northeast direction from its headwaters located south of the Lake Tahoe Basin and just north of Sonora Pass in the Sierra Nevada Mountains to its terminus in the Nevada desert. The Carson River Basin lies south of the Lake Tahoe and Truckee River basins and north of the Walker River Basin. The upper portion of the Carson River Basin, which is drained by the Carson River's East and West forks, is mostly contained within Alpine County, which forms part of California's North Lahontan Hydrologic Region of California. The Carson River's two forks merge in the northern part of Carson Valley, located in Douglas County, NV, and form the Carson River mainstem, which then continues on towards the river system's terminus in the Carson Sink. Of the Carson River Basin's total surface area, approximately 606 square miles (387,840 acres), or just over 15 percent lie within the state of California, while the remaining 3,360 square miles (2,149,680 acres), or almost 85 percent, lie within the state of Nevada. The project area lies within the state of California. All baseline conditions are compared to the state of California regulations, standards and waste discharge requirements. Because the project area is adjacent to the state line and irrigators in Nevada may potentially receive recycled waters from the District, State of Nevada regulations are stated.

In 1968, the state of California passed the Porter-Cologne Act, which contains statutes that wastewater be exported out of the Tahoe Basin. ICR was constructed in 1969-70 on an ephemeral tributary of Indian Creek, a tributary to the East Fork, to store the tertiary wastewater effluent. The largest exporter comes from the southern end of Lake Tahoe, where the District conveys treated effluent in a pipeline over Luther Pass into Alpine County. The water is then delivered to selected agricultural operations for use as a supplemental irrigation supply. ICR became euthrophic during the 1970’s and was placed on California’s

Section 303(d) list in the 1980's. The District discontinued wastewater disposal to the reservoir in 1989 and acquired water rights to maintain a minimum reservoir level to support recreation uses.

The District constructed HPR in 1989 for use in storing the Tahoe Basin wastewater. HPR has a capacity of 3,800 acre-feet (AF) that includes 800 AF of flood storage. There is an additional 200 AF of dead storage that is located below the outlet pipe and is not included in the 3,800 AF reservoir capacity (Brown and Caldwell 2006). Reuse facilities are located on various ranches in Diamond Valley, Wade Valley, Carson Valley and Fredricksburg for crop irrigation. The operation of both reservoirs are controlled by agreements between the District and Alpine County, and the use of the effluent for irrigation is limited to specific areas (Carson River Watershed Comprehensive Management Plan 2007).

9.2.1 Alpine County, California

9.2.1.1 West Fork Carson River

Most of the watershed of the West Fork of the Carson River lies in Alpine County, CA. Two miles into Hope Valley, the Carson River West Fork merges with Maxwell Creek, which brings with it the waters of Scotts Lake (8,012 feet). Two miles below Maxwell Creek, the West Fork merges with Willow Creek, which comes down from the north just below Freel Peak (10,881 feet) and passes through Horse Meadow. After traveling a total of some five miles through Hope Valley, the West Fork enters the steep West Carson (Woodfords) Canyon where it falls nearly 1,460 feet over a distance of five miles (5.5 percent grade) on its way to the canyon's mouth at Woodfords. Within the West Carson Canyon, the West Fork picks up a number of smaller tributary streams intermittently flowing from Horsethief Canyon, Hidden Canyon, Deep Canyon, Cloudburst Canyon, Merk Canyon, Acorn Canyon, and Cary Canyon.

From Woodfords, the West Fork travels due east 3.5 miles to where it comes abreast of the townsite of Paynesville (located near the junction of U.S. Route 88 and Foothill Road), at which point it enters the southwest corner of Carson Valley. From this point the West Fork heads practically due north for nearly 14 miles along the western side of Carson Valley towards its confluence with the Carson River East Fork near Walley's Hot Springs.

To the north of Woodfords and along the Carson Range's eastern slope in Carson Valley, a number of smaller tributary streams and creeks, some of which are either ephemeral or intermittent, drain the steep canyons, subsequently flowing either into the West Fork or into the extensive canal and slough system which crisscrosses the valley's floor. Some of the more prominent of these include (from south to north) the intermittent streams of Stuard and Larson Canyons and Fredericksburg Canyon.

9.2.1.2 Flooding

Two kinds of floods are known to Alpine County: wet mantle and dry mantle floods. Wet mantle floods are winter and spring occurrences that result from warm rains falling on snowpack, causing rapid snowmelt and catastrophic runoff. Dry mantle floods are the result of monsoonal thunderstorms, which have the potential of depositing heavy precipitation on arid lands that are often depleted of vegetative cover. Since vegetation and thin erosive soils cannot allow percolation of rainfall, heavy, catastrophic runoff occurs.

Unlike neighboring Douglas County, NV, Alpine County has no record of flash flood occurrences, though several dams have the potential to fail during significant flood or earthquake events. Of specific concern to the Project is a catastrophe involving failure of the dam forming ICR (Alpine County 1999). The Project addresses this concern through standard practice SP-1 Dam Safety.

9.2.1.3 Freshwater Diversion Systems and Irrigation

The primary use of Carson River water is for agricultural purposes and, as a result, diversion structures exit throughout the river system. In Alpine County, the irrigation diversion structures are limited to the West Fork in the Diamond Valley area (MACTEC 2004). Before leaving the West Carson Canyon at Woodfords, the first irrigation ditches divert water from the West Fork Carson River for irrigating Diamond Valley, a small valley area lying to the south and east between the West and East forks of the Carson River. These diversion ditches include Snowshoe Thompson Ditch No. 1 and No. 2. These ditches also take winter water to Mud Lake via Indian Creek.

Freshwater is diverted by the District from the West Fork of the Carson River by the Thompson Ditch No. 1 listed above, and by the Upper Dressler ditches. Water is also diverted from Indian Creek into the Upper Dressler Ditch. Freshwater is also diverted from the West Fork of the Carson River in the vicinity of Paynesville into the Upper and Lower Fredricksberg ditches where it is mixed with recycled water from the Diamond Valley Ditch system before being applied to lands west of the river.

ICR is the largest freshwater impoundment in the Alpine County portion of the Carson River Basin. The maximum pool elevation is 5,600 feet above sea level (Kennedy/Jenks Consultants 2001).

9.2.2 Douglas County, Nevada

Numerous studies have been undertaken to provide data on the quantity and quality of water in Douglas County, according to the Douglas County Master Plan. The literature is summarized in the 1994 Carson Valley Comprehensive Water Plan (Douglas County 1996).

9.2.2.1 Carson River and Indian Creek

Much of the precipitation on the east slopes of the Carson Range and Sierra Nevada of California makes its way into Nevada. Precipitation in the Nevada portion of the Carson Valley and Pine Nut Mountains, while not insignificant, is either lost to evaporation or serves to recharge groundwater reserves. All of this precipitation eventually finds its way down the numerous tributary creeks of the mountains ringing the Carson Valley into the State of Nevada.

The main tributary creeks include: Indian Creek; Luther Creek, flowing from Fay Canyon; and Sheridan and Barber creeks, which flow into the Park and Bull Slough. These contribute to the water resources of Carson Valley, as do the flows from Mott Canyon, Daggett Creek flowing out of Haines Canyon and the Kingsbury Highway (Grade) drainage area, and the creeks flowing out of Genoa Canyon and Sierra Canyon.

The two forks of the Carson River emerge from adjacent subwatersheds (the West Fork watershed to the north) and flow east in a neighboring drainage parallel to Indian Creek into the lower Carson Valley. The two forks meander through the valley floor in a network of ditches and sloughs before finally commingling east of Genoa to form the mainstream of the Carson River.

Most surface water flowing through the Carson Valley originates in the California watersheds and the Carson Range. Flows in the Carson River fluctuate according to the season. Flows in the West Fork can range from nearly zero in late summer to almost 400 cubic feet per second (cfs) during spring runoff. Flows in the East Fork can range from below 100 cfs in late summer to above 1,200 cfs in May. The net outflow of the Carson River can fall below the flows of its two forks from March to November when its flow can drop to less than 80 cfs. During high water months, the same reach of stream can flow at 1,500 cfs. Water stored in the watershed amounts to 6,500 acre-feet. This does not include the 2,800 acre-feet capacity of ICR, which stores freshwater from the West Fork of the Carson River.

Below HPR, the Indian Creek flows unrestricted (except by agricultural diversion dams) through the Carson Valley and Diamond Valley to Mud Lake Reservoir. Mud Lake Reservoir is the largest reservoir in the Carson Valley, with a capacity of 4,700 AF.

9.2.2.2 Flooding

The Douglas County Master Plan reports that flooding is similar to the types that occur in Alpine County, with two kinds of floods: wet mantle and dry mantle floods.

Damaging floods have occurred in the Douglas County portion of the Carson River Basin. These are a result of spring runoff and wet mantle storms. According to the 1996 Douglas County Master Plan all of the major floods of the East and West Forks of the Carson River, with the exception of the 1890 flood, have been caused by wet mantle storms. The flood of 1890 was a result of snowmelt from the harsh winter of 1889-1890.

Despite the lack of reliable flood records prior to 1937 in Douglas County, there have been 25 significant flood events. The flood event of December 1955 was caused by heavy rainfall on snow. This was the heaviest sustained downpour in the history of the state of Nevada (Douglas County 1996). The Carson Valley also has a history of flash floods during the summer months. Flash floods have occurred along the short streams flowing from the Sierra Nevada (Carson Range) and the Pine Nut Mountains (USEPA 1979).

Channel capacity data are vague for the Nevada portion of the Carson River and its tributaries. This is due to the nature of the channels and their fluvial geology including natural obstructions (such as brush and trees), slope, and potential accumulation of ice that forms dams that impede flood flow and exacerbate flooding.

Obstructions to flood flow may also be due to human factors including under-engineering of bridges, irrigation diversion structures, and culverts. During high flows, the man-made obstructions can raise water levels to the extent that both local flooding and erosion of creek banks may occur. Public roadways, often raised above the flat plain of the Carson Valley in Douglas County, may also block and divert flow, causing more flooding (Douglas County 1996).

9.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Hydrology Chapter the following subsections provide descriptions of applicable requirements.

9.3.1 Bureau of Indian Affairs

Washoe Tribal Lands make up a significant portion of Douglas County, NV, and a small portion in California. The ten parcels of Indian land are Upper Clear Creek, Lower Clear Creek, Carson, Stewart, Stewart Ranch, Silverado, Dresslerville and Washoe Ranch, Woodfords, Wade, and Frank Allotment.

The Washoe Tribe Comprehensive Master Plan was completed in 1999 (Douglas County 1999). The Master Plan’s goals and policies cover a number of issues, including water resources. The goal is to insure that tribal water supplies are adequate and of high quality. Specific policies apply to water rights issues, and the rights of the Washoe Tribe to have input on regional projects that may affect water resources.

9.3.2 California State Water Resources Board

The California Code of Regulations, Title 23. Waters contains the regulations for the administration of water rights. These, together with water quality regulations, are the responsibility of the State Board. Please refer to Chapter 8 on Surface Water Quality for a disclosure on the Lahontan.

Surface waters on the eastern slope of the Carson Range in Alpine County have been adjudicated (Kennedy/Jenks Consulting 2001). This involves a federal judicial ruling on the Truckee-Carson Pyramid Lake Water Settlement Act of 1990. According to the Alpine County General Plan, California riparian law governs the use of water adjacent to streams. The potential exists for future land developments drawing surface water from streams that already pose inadequate supply for downstream users (Alpine County 1999). The use of recycled waters to supplement or replace the use of potable water for irrigation purposes is supported by the County and the State, as recycled water is a primary component in California's plan for meeting the State's growing water demand. The State Board is developing statewide Recycled Water Policy to establish more uniform requirements for recycled water projects. The State Board Division of Water Rights has primary authority over California surface water rights (i.e. those water rights that are not federally adjudicated).

9.3.3 Nevada Division of Water Resources

NDWR has the authority to permit the use of any water within the State. The Project proponent will be required to make application to the Nevada State Engineer to change places of diversion, or to change the manner or place of use of water. This State agency also administers permits for the conservation of water resources and for the quantities and forms of use of these resources.

Conflicts over the waters of the Carson River in Nevada may be traced to the late 1850's. Early conflicts were between mining concerns and ranchers in the Carson Valley. Historical precedent was developed from the Anderson-Bassman Decree of 1905 and the Price Decree of 1921. In the early 1900's the boom of mines such as the Comstock Lode came to an end, and the need for water for the mills diminished. During that era, Nevada State Senator Francis G. Newlands, a proponent of irrigation projects in the western United States, fostered the "Newlands Project" that led to building of Lahontan Dam in the lower watershed of the Carson River.

Later water rights decrees included the Orr Ditch Decree of 1925; a decree promulgated by the federal government to regulate flows on the Truckee and Carson rivers, and the Alpine Decree, finalized in 1980, which adjudicated water rights to the Carson River. A detailed account of water rights issues may be found in the Technical Memorandum No. 7 dealing with water rights (Kennedy/Jenks Consulting 2001).

Water rights totaling about 35,000 AF are granted to the municipalities of Minden, Gardnerville, Indian Hills, and Douglas County. Groundwater rights for industrial, stockwater, recreation, wildlife, environmental, and fire protection total about 13,000 AF. The majority of these water rights are owned by the Lahontan Fish Hatchery with rights totaling 7,360 AF (Douglas County 1996).

9.4 Hydrology Goals, Objectives and Policies

Table 9-1 identifies goals, objectives, and policies that provide guidance for development in relation to hydrology in the project area. The table also indicates which criteria in the Hydrology Section are responsive to each set of policies.

Alpine County, California's General Plan adopted several goals and policies that apply to the formulation of evaluation criteria and impact analysis for the Project. These are stated in the Conservation and Safety elements of the General Plan (Alpine County 2005). Douglas County, NV has a number of local Master Plan goals and policies that are relevant to analysis of Project Component impacts in Nevada. These are applicable to the Conservation Element in the sections on "Flooding and Drainage" and "Open Space" (Douglas County 1996).

Table 9-1

General Plan Goals, Objectives, and Policies – Hydrology

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria
Alpine County General Plan	Conservation Element Water: Surface water	Goal 4 Policy 4a Policy 4b Policy 4c Policy 4d	Maintain adequate supplies of surface water for all current and foreseeable needs; oppose reduction in quantities of surface water presently administered to users in the County; maintain present supply of surface water runoff; and acquire and maintain water rights to protect the County's interest and future needs.	4, 5
Douglas County Master Plan	Water Resources	Goal 4.09 Policy 4.09.01 Policy 4.09.02 Policy 4.09.03	Identify and protect the functions and values of surface water systems, which include fish and wildlife habitat, aquifer recharge and discharge, and recreational opportunities. Prohibit disposal of wastewater, solid waste, and creation of unstable fills which are inappropriate to the function of surface water systems or which may result in water pollution. Prohibit activities that interfere with an aquatic system's function as a groundwater recharge area. Prohibit activities that cause an increase in the intensity and duration of frequency of water level fluctuations within surface water systems.	1, 2, 3, 6
Douglas County Master Plan	Water Resources	Goal 4.10 Policy 4.10.01 Policy 4.10.02 Policy 4.10.03 Policy 4.10.04	Prevent impacts to surface water systems, encourage private property owners to preserve surface water systems, encourage preservation and utilization of stormwater best management practices. Maintain historic storm water discharge rates and volumes into surface water systems. Develop, update, and promote best management practices related to storm water management and aquatic system protection. Develop criteria and standards to minimize potential impacts to surface water systems.	1, 2, 3
Douglas County Master Plan	Water Resources	Goal 4.11 Policy 4.11.01	Coordinate a regional approach to water resource development and management, working with the Carson Water Sub-conservancy District, the Carson Valley Water Authority, the improvement districts, Washoe Tribe, and other appropriate water purveyors.	4, 5

Source: Hauge Brueck Assoc. 2009

1 The hydrology evaluation criteria are provided in Table 9-2.

9.5 Evaluation Criteria with Points of Significance

The impact evaluation criteria for hydrology are presented in Table 9-2. These criteria are drawn from a review of the relevant literature on hydrologic resources and include a review of local, tribal, state of California, state of Nevada, and federal agency policies and procedures, as adapted to reflect CEQA requirements.

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A hydrology impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 9-2. Note that CEQA Checklist G Criteria for VIII, Hydrology and Water Quality, are also addressed in the Surface Water Quality and Groundwater Chapters.

Table 9-2

Evaluation Criteria with Points of Significance - Hydrology

Evaluation Criteria[1]	As Measured by	Point of Significance	Justification
1. Will Project cause flooding?	Increase in the peak water surface elevation.	Greater than 1 foot increase	CEQA Checklist VIII(d, h)
2. Will Project cause stream bank erosion?	Increases in the average power in the stream.	Greater than 2 percent increase	CEQA Checklist VIII(c, e) A 2 percent power increase is considered minimal and insignificant. Any resulting erosion increase will be small relative to natural erosion rate variations.
3. Will the Project cause flooding due to rupture of ditches, pipelines, and impoundments?	Bank-full capacity of local waterway.	If release of water exceeds bank-full capacity of local waterway	CEQA Checklist VIII(i) If the capacity of the local water is insufficient to contain the flow from the rupture, then flooding would result and this would be considered significant.
4. Will the Project reduce quantities of surface water available to users?	Reduction in acre-feet of surface water flow	Greater than zero acre-feet of surface water flow	Any reduction in the amount of surface water available to users with bona-fide water rights would be considered significant
5. Will the Project interfere with the maintenance of water rights?	Adjudication that changes existing water rights decisions to transfer rights	Greater than one unfavorable adjudication and transfer in excess of 100 acre-feet	Alpine Decree of 1980 Truckee-Carson Pyramid Lake Water Settlement Act of 1990 Alpine County General Plan Douglas County Master Plan Washoe Tribe Comprehensive Master Plan

Table 9-2			
Evaluation Criteria with Points of Significance - Hydrology			
Evaluation Criteria[1]	As Measured by	Point of Significance	Justification
6. Will the Project expose people or structures to inundation by seiche, tsunami or mudflow?	Structures or facilities located in areas subject to seiche, tsunami, or mudflow	Any new structure or facility located in areas subject to seiche, tsunami or mudflow	CEQA Checklist VIII(j)

Source: Hauge Brueck Assoc. 2009

1 CEQA Checklist G Criteria for VIII, Hydrology and Water Quality, are also addressed in the Surface Water Quality and Groundwater Chapters.

9.6 Environmental Consequences (Impacts) and Recommended Mitigation

9.6.1 No Project Components

Table 9-3 presents potential hydrologic impacts, outlines the point of significance, level or impact and type of impact and also ranks the level of significance for the No Project Components.

Table 9-3					
Hydrology Impacts – No Project Components					
		Level of Significance by Component			
Impact	Point of Significance	Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
HYDRO-1. Will the No Project Components cause flooding?	Greater than 1 foot increase in the peak water surface elevation	NP-1, NP-2			
HYDRO-2. Will the No Project Components cause stream bank erosion?	Greater than 2 percent increase	NP-1, NP-2			
HYDRO-3. Will the No Project Components cause flooding due to rupture of ditches, pipelines, and impoundments?	If release of water exceeds bank-full capacity of local waterway			NP-1, NP-2	

Table 9-3

Hydrology Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component: Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
HYDRO-4. Will the No Project Components reduce quantities of surface water available to users?	Greater than zero acre-feet of surface water flow				NP-1, NP-2
HYDRO-5. Will the No Project Components interfere with the maintenance of water rights?	Greater than one unfavorable adjudication and transfer in excess of 100 acre-feet				NP-1, NP-2
HYDRO-6. Will the No Project Components expose people or structures to inundation by seiche, tsunami or mudflow?	Any new structure or facility located in areas subject to seiche, tsunami or mudflow			NP-1, NP-2	

Source: Hauge Brueck Assoc. 2009

Impact: **HYDRO-1. Will the No Project Components cause flooding?**

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components will involve no new construction or physical facilities. If the existing system is not upgraded and expanded to meet future export demands of 5.8 MGD, then flooding could occur. This is a significant impact.

Mitigation: *No mitigation is possible. NP-1, NP-2*

After Mitigation: *Significant Impact; NP-1, NP-2*

The impact remains significant because Project Components necessary to convey, apply, contain and manage projected increases in recycled water volumes will not be constructed under the No Project Components. The threat of uncontrolled releases and flooding will persist.

Impact: **HYDRO-2. Will the No Project Components cause stream bank erosion?**

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components will involve no new construction or physical facilities. If the existing system is not upgraded and expanded to meet future export demands, then flooding or unplanned releases of waters could occur and result in stream bank erosion in The West Fork of the Carson River and Indian Creek. This is a significant impact.

Mitigation: *No mitigation is possible. NP-1, NP-2*

After Mitigation: *Significant Impact; NP-1, NP-2*

The impact remains significant because Project Components necessary to convey, apply, contain and manage projected increases in recycled water volumes will not be constructed under the No Project Components. The threat of stream bank erosion as a result of uncontrolled releases and flooding will persist.

Impact: HYDRO-3. Will the No Project Components cause flooding due to rupture of ditches, pipelines, and impoundments?

Analysis: *Less than Significant Impact; NP-1, NP-2*

The No Project Components will involve no new construction or physical facilities. The existing system will be maintained, but there is the potential for localized flooding due to ruptured ditches, pipelines and impoundments in the aging infrastructure.

All public works projects are subject to periodic maintenance to prevent destruction of private property, injury to persons, and to prevent loss of human life. Standard practice SP-35 Conveyance Infrastructure Maintenance Plan requires annual inspection of conveyance infrastructure and monitoring of sensing devices to comply with local General Plans and policies. The District institutes a maintenance and monitoring plan to monitor, inspect, and repair conveyance infrastructure. Annual maintenance reduces the chance of flooding due to rupture of existing conveyance structures (NP-1, NP-2) to a level of less than significant.

Pipelines are constructed with automatic shut off valves that are activated in the instance of a pipe burst, and ditches will be built or improved to increase conveyance capacities. The potential for pipe line rupture can be minimize and resultant flooding reduced to a less than significant level. Pipe sizes are small and automatic shut-off valves on systems allow any discharges to be stopped quickly. No flooding beyond the existing flood irrigation practices is expected to result from irrigation systems, even in the event of a rupture.

Mitigation: *No mitigation needed. NP-1, NP-2*

Impact: HYDRO-4, HYDRO-5. Will the No Project Components reduce quantities of surface water available to users or interfere with the maintenance of water rights?

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no new construction or physical facilities. The capacity of the Snowshoe Thompson No. 1 ditch varies greatly and is the limiting factor in diverting the full water right entitlement to irrigated lands and to ICR. The District has transferred surface water rights from lands adjudicated under the Alpine Degree into storage in ICR to support the minimum pool elevation and enhance cold water fishery habitat. The direct transfer of water to storage reduces the amount of water that can be diverted from the West Fork of the Carson River to the consumptive use of the water right. As land is needed for recycled water application on the water-righted portions of Diamond Valley Ranch, the existing surface water right may placed in storage in ICR. Continued operation of the existing systems could divert additional surface water but will not interfere with the maintenance of water rights.

Water transfers do not hinder the ability of any other water right holder to receive their due entitlement. Waters of the West Fork of the Carson River are fully adjudicated; and no new allocations of water can be made, nor can any additional diversions not listed in the Alpine Decree be allowed. The one potential impact resulting from this action is the loss of tailwater resources to downstream users, who have no legal right to this water. This impact is mitigated by the Court's transfer process. The U.S. District Court Water Master will only allow the transfer of the consumptive use portion (2.5 AF/acre) of the water right, thereby ensuring that diverted water in excess of the consumptive use (additional 1.0 AF/acre) be used and then released to support downstream users. Thus, there will be no significant hydrological impact to other water right holders because the mechanism of transfer prescribed by the District Court ensures that the transfer of a water right not harm the integrity of other rights.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: HYDRO-6. Will the No Project Components expose people or structures to inundation by seiche, tsunami or mudflow?

Analysis: *Less than Significant Impact; NP-1, NP-2*

The No Project Components will involve no new construction or physical facilities. ICR and HPR are reservoirs containing freshwater and recycled water, respectively. These facilities pose an extremely small threat of a seiche during a large seismic event. Controlled release of waters from the reservoirs will alleviate the threat of inundation, reducing the impact to a less than significant level.

Mitigation: *No mitigation is needed. NP-1, NP-2*

9.6.2 Project Components

Table 9-4 presents potential hydrologic impacts, outlines the point of significance, level or impact and type of impact and also ranks the level of significance for the Project Components.

Table 9-4

Hydrology Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
HYDRO-1. Will the Project Components cause flooding?	Greater than 1 foot increase in the peak water surface elevation.			2, 3, 4, 5, 6, 11, 14, 17, 20, 22, 31, 32	1, 7, 9, 8, 10, 12, 13, 15, 16, 18, 19, 21, 23, 24, 29, 30
HYDRO-2. Will the Project Components cause alter stream bank erosion?	Greater than 2 percent increase			8, 23, 24, 32	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17,18, 19, 20, 21, 22, 23, 24, 29, 30, 31
HYDRO-3. Will the Project Components cause flooding due to rupture of ditches, pipelines, and impoundments?	If release of water exceeds bank-full capacity of local waterway			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
HYDRO-4. Will the Project Components reduce quantities of surface water available to users?	Greater than zero acre-feet of surface water flow			23, 24	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32
HYDRO-5. Will the Project Components interfere with the maintenance of water rights?	Greater than one unfavorable adjudication and transfer in excess of 100 acre-feet			23, 24	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32
HYDRO-6. Will the Project Components expose people or structures to inundation by seiche, tsunami or mudflow?	Any new structure or facility located in areas subject to seiche, tsunami or mudflow			32	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 21, 22, 23, 24, 29, 30, 31

Source: Hauge Brueck Assoc. 2009

Impact: **HYDRO-1. Will the Project Components cause flooding?**

Analysis: *Less than Significant Impact; Components 2, 3, 4, 5, 6, 11, 14, 17, 20, 22, 31, 32*

Conveyance components 2, 4, 5, 6, 14 and 22 will not involve construction of above ground facilities that will increase the peak surface water elevation and contribute to flooding.

Conveyance components 3, 17, 20 and 22 will improve condition and operation of existing above ground infrastructure by increasing capacity, lining or piping unlined reaches, and securing maintenance costs. Improved structural integrity and increases in conveyance capacity will decrease the likelihood of flooding within the project area and downstream.

Components 31 will divert storm waters to ICR upstream of HPR and Component 32 will involve construction of a spillway channel for ICR that conveys reservoir spillage around HPR to Indian Creek downstream. This component has an added benefit of intercepting storm water flow entering the east side of the HPR and thereby increasing storage capacity in the reservoir for recycled water. Implementation of these two components is based on the likelihood of very large flood events and will reduce the potential of emergency spills from HPR and the associated flood risk.

Component 11 will construct five irrigation fields that will be irrigated with central pivot irrigation systems and two irrigation fields that will be surrounded with six foot high berms and used for temporary containment of recycled waters during emergency situations, most likely during flood events.

The temporary containment facilities of Component 11 are not proposed in areas with slopes greater than 30 percent, as sited on Figure 2-6. The majority of the site has slopes of less than 2 percent, which accommodates irrigation practices and the function of a common sump pump to facilitate draining and water management of the area. Basins and impoundments may create embankments with slopes greater than 30 percent, and these areas will require implementation of SP-16, Slope Stabilization Design, to ensure stability of the structures. Requirements of standard design measure SP-16 reduces impacts to a less than significant level by implementing standard geotechnical practices as part of project design to stabilize slopes. During project planning the District will retain a licensed geotechnical engineer to conduct a construction-level geotechnical investigation for physical facilities such as pipeline routes, irrigation systems and embankment locations. Results from this investigation will be used to refine the final project design. Compliance with this standard design measure will avoid and minimize adverse environmental impacts from unstable slopes.

The temporary containment facilities are located on three Alquist-Priolo earthquake fault zones and cross the end of a fourth. Surface fault rupture associated with seismic activity could cause a breach in the substrate of the irrigation field or overtopping of the embankment. The temporary containment facilities will be designed with additional freeboard to reduce the risk of overtopping in the event of a seismic event and subject to standard practice SP-21, Temporary Containment and Impoundment Siting and Design. Embankments and berms will be inspected seasonally for structural integrity and maintained as needed to avoid slope failures and subsequent flooding.

The potential of the occurrence of an earthquake within the project area does exists and standard practices are identified to reduce the effects to structures and facilities from ground shaking and ground rupture. The temporary containment facilities will impound water during times of emergency for purposes of avoiding flooding of downstream infrastructure and streams. The likelihood of a high magnitude earthquake occurring while water is being temporarily contained and causing structural failure and flooding is inherently low. If slope failure results, flooding will be localized and will not significantly impact peak flows in the West Fork of the Carson River or Indian Creek.

Review of the Flood Emergency Management Agency (FEMA) maps for the project area indicates that the Master Plan planning level footprint, when extrapolated to a volume of displacement of the 100-year floodplain, is unlikely to cause more than a one-foot increase in flooding. The level of impact of components 2, 3, 4, 5, 6, 11, 14, 17, 20, 22, 31, and 32 on flooding in the 100-year floodplain along the West Fork of the Carson River and Indian Creek is less than significant.

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 11, 14, 17, 20, 22, 31, 32*

Analysis: *No Impact; Components 1, 7, 9, 8, 10, 12, 13, 15, 16, 18, 19, 21, 23, 24, 29, 30*

Application components 1, 7, 9, 10, 12, 13, 15, 16, 19, 29, 30 will not involve construction of above ground facilities that will increase the peak surface water elevation. Component 18, Optimize Application Rates on Irrigated Lands, will ensure that application rates are optimized, thus reducing the potential for runoff. Implementation of tailwater controls under Component 21, Develop Tailwater Control System, will ensure that tailwater does not result in flooding problems. The level of impact of application components on flooding in the 100-year floodplain along the West Fork of the Carson River and Indian Creek is less than significant.

Water management components 8, 23 and 24 will not involve construction of new above ground facilities. No impact will occur because increases in peak surface water elevation and flooding will not result from improve recycled water quality entering the project area of from rerouting and storing freshwater in ICR.

Mitigation: *No mitigation is needed. Components 1, 7, 9, 8, 10, 12, 13, 15, 16, 18, 19, 21, 23, 24, 29, 30*

Impact: HYDRO-2. Will the Project Components cause stream bank erosion?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,18, 19, 20, 21, 22, 23, 24, 29, 30, 31*

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22 and 31 and water management component 8 will not cause stream bank erosion, as these components do not involve stream channels. Ditch erosion in open channels does occur. Unlined channels of the Diamond Ditch will be lined and Snowshoe Thompson No. 1 will be improved or replaced with a pipeline (Components 3, 17).

The application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will have no direct impacts on stream bank erosion, as these components do not involve stream channels. Tailwater control systems, developed under Component 21, will avoid indirect impacts to stream bank. Tailwater control systems will intercept runoff for percolation and evaporation in detention ponds or pumping back to irrigation ditches for re-application.

Temporary containment, under component 11, will have no impacts on stream bank erosion. There is a small chance that slope failure at the site of the impoundment facility could cause local flooding but will not impact stream banks of West Fork of the Carson River or Indian Creek due to the location of the temporary containment areas within the project area.

Mitigation: No mitigation is needed. *Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17,18, 19, 20, 21, 22, 29, 30, 31*

Analysis: *Less than Significant Impact; Component 23, 24, 32*

Discharges to Indian Creek could result during extremely large flood events (Component 32) and cause stream bank erosion if emergency discharges are greater than bankfull discharge and result in overtopping and scouring of stream banks. The ICR spillway channel will assure that only freshwater is discharged to Indian Creek and that discharge occurs at a controlled rate that will not result in flooding of the stream channel or stream bank erosion.

The water management components 23, and 24 could have minor impacts on flooding or stream bank erosion if there are uncontrolled releases from ICR. Component 23 simply reroutes existing flows within the watershed through existing ditch systems for storage in ICR. Component 24 transfers additional water rights to storage in ICR. Increased flows into Indian Creek will be through controlled release. The potential for flooding from ICR is controlled through a spillway channel to be constructed under Component 32, which reduces the impact to a less than significant level.

Mitigation: *No mitigation is needed. Component 23, 24, 32*

Impact: HYDRO-3. Will the Project Components cause flooding due to rupture of ditches, pipelines, impoundments?

Analysis: *Less than Significant Impact; Components 1, 2. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Rupture or slope failure of proposed conveyance infrastructure could cause increased localized flooding. Components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will involve increases in the conveyance capacity of ditches and spillways, conversion of the type of water flowing through them, or entail moving fresh water and recycled water through pipelines.

All public works projects are subject to periodic maintenance to prevent destruction of private property, injury to persons, and to prevent loss of human life. Standard practice SP-35 Conveyance Infrastructure Maintenance Plan requires annual inspection of conveyance infrastructure and monitoring of sensing devices to comply with local General Plans and policies. The District institutes a maintenance and monitoring plan to monitor, inspect, and repair conveyance infrastructure. Annual maintenance reduces the chance of localized flooding due to rupture of conveyance structures to a level of less than significant.

Pipelines will be constructed with automatic shut off valves that are activated in the instance of a pipe burst, and ditches will be built or improved to increase conveyance capacities. The potential for pipe line rupture can be minimize and resultant flooding reduced to a less than significant level. Increases in capacity of the system is expected to alleviate the potential for flooding.

Irrigation systems (Components 7, 16, 29 and 30) do not pose significant risks of flooding, even in the event of a pipeline rupture. Pipe sizes are small and automatic shut-off valves on systems allow any discharges to be stopped quickly. Flooding is not expected to result from irrigation systems, even in the event of a rupture.

The water management components could have minor impacts on flooding if there are uncontrolled releases from ICR. Component 8 addresses the quality of water exported from the WWTP in South Lake Tahoe. Component 23 shuttles existing flows within the watershed through existing ditch systems for storage in ICR. Component 24 transfers additional water rights to storage in ICR. Increased flows into Indian Creek will be through controlled release. The potential for flooding from ICR is reduced to a less than significant level through construction of the spillway channel (Component 32).

The temporary containment components will have a less than significant impact on hydrology. There is a small chance that slope failure at the site of the temporary containment facilities (Component 11) could cause localized flooding but will not impact the West Fork of the Carson River or Indian Creek. The temporary containment areas will require implementation of SP-16, Slope Stabilization Design, to ensure stability of the structures. Requirements of standard design measure SP-16 reduces impacts to a less than significant level by implementing standard geotechnical practices as part of project design to stabilize slopes. During project planning the District will retain a licensed geotechnical engineer to conduct a construction-level geotechnical investigation for physical facilities such as pipeline routes, irrigation systems and embankment locations. Results from this investigation will be used to refine the final project design. Compliance with this standard design measure will avoid and minimize adverse environmental impacts from unstable slopes. The temporary containment facilities will be designed with additional freeboard to reduce the risk of overtopping in the event of a seismic event and subject to standard practice SP-21, Temporary Containment and Impoundment Siting and Design. Embankments and berms will be inspected seasonally for structural integrity and maintained as needed to avoid slope failures and resultant flooding.

Mitigation: *No mitigation is needed. Components 1, 2. 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: HYDRO-4 and HYDRO-5. Will the Project Components reduce quantities of surface water available to users or interfere with the maintenance of water rights?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31 and 32 will not affect water availability to downstream users or erode water rights. These components convey, apply, temporarily contain and manage existing fresh water diversions and exported recycled water but will not divert additional waters from the West Fork of the Carson River or change existing water rights.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Analysis: *Less than Significant Impact; Components 23 and 24*

Component 23 proposes the transfer of Alpine Decree water rights stored in Mud Lake for routing through ICR. Component 24 involves the transfer of existing water rights to storage in ICR by the District or other water right owners.

These transfers do not hinder the ability of any other water right holder to receive their due entitlement. Waters of the West Fork of the Carson River are fully adjudicated, and thus, no new allocations of water can be made, nor can additional diversions not listed in the Alpine Decree be allowed. The one potential impact resulting from this action is the loss of tailwater resources to downstream users, who have no legal right to this water. This impact is mitigated by the Court's transfer process. The U.S. District Court Water Master will only allow the transfer of the consumptive use portion (2.5 AF/acre) of the water right, thereby ensuring that diverted water in excess of the consumptive use (additional 1.0 AF/acre) be used and then released to support downstream users. There will be no significant hydrological impact to water right holders because the mechanism of transfer prescribed by the District Court ensures that the transfer of a water right not harm the integrity of other rights.

Mitigation: *No mitigation is needed. Components 23 and 24*

Impact: HYDRO-6. Will the Project Components expose people or structures to inundation by seiche, tsunami or mudflow?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 21, 22, 23, 24, 29, 30, 31*

Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 21, 22, 23, 24, 29, 30, and 31 will not expose people or structures to inundation by seiche, tsunami or mudflow due to the nature of the facilities and the location within the landscape of the project area.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20 21, 22, 23, 24, 29, 30, 31*

Analysis: *Less than Significant Impact; Component 32*

Component 32 will be located adjacent to ICR, which poses an extremely small threat of a seiche during a large seismic event. The spillway, constructed to release waters from ICR in a controlled manner, will alleviate the threat of inundation and reduce the impact to a less than significant level.

Mitigation: *No mitigation is needed. Component 32*

9.7 Cumulative Impacts

There are two impacts from the No Project Components – significant – identified in the Hydrology section. These impacts are related to: flooding due to rupture of ditches, pipelines or impoundments and stream bank erosion.

Flooding and incidental stream bank erosion, which are identified as significant impacts for the No Project Components will be localized and addressed according to site specific maintenance needs and will not contribute to long term or cumulative impacts. Any flooding due to a rupture of a ditch, pipeline or impoundment will also be localized and an isolated occurrence and also will not contribute to cumulative impacts.

Potential impacts on water rights from Project Components 23 and 24 will be specific to individual properties, will be fully mitigated and will not contribute to cumulative impacts.

9.8 Summary of Significant Impacts and Mitigation Measures

9.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 9-5 summarizes the significant impacts by the No Project Component and identifies the mitigation measures required for each impact.

Table 9-5		
Summary of Significant Impacts and Mitigation Measures – Hydrology		
Impact	**Level of Significance**	**Mitigation Measure**
No Project Components		
HYDRO-1. Will the No Project Components cause flooding?	NP-1, NP-2 ●	No mitigation is possible under the No Project Alternative
HYDRO-2. Will the No Project Components cause stream bank erosion?	NP-1, NP-2 ●	No mitigation is possible under the No Project Alternative

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

9.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to hydrology are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

10 Public Safety and Health

10 Public Health and Safety

This chapter discusses public health and safety issues associated with the use of recycled water for irrigation, potential to expose workers or the public to hazards from a known hazardous waste site, potential release of hazardous materials, construction safety hazards, disease vectors and fire hazards. Policies and regulations regarding water recycling, hazardous materials and hazardous waste management, construction hazards, vector control and fire hazards are presented.

10.1 Impacts Evaluated in Other Chapters

The following items are related to public health and safety but are evaluated in other sections of this EIR:

- Flooding hazards. Project facilities include ponds and embankments that present flood hazards. The potential for flooding is addressed in Chapter 9, Hydrology.

- Geologic hazards. Geologic hazards are discussed in Chapter 6, Geology, Soils and Seismicity.

- Water quality impacts. These issues are evaluated in Chapter 7, Groundwater and Chapter 8, Surface Water.

- Effects on emergency response. Construction of pipelines in roadways can affect emergency response routes and times. These issues are addressed in Chapter 12, Traffic and Circulation.

10.2 Affected Environment (Setting)

Dry summers, topography and high fuel loading vegetation create an annual wildlife fire hazard in Alpine County. The California Department of Forestry (CDF) provides wildlife fire protection on timberlands and rangelands in Alpine county. The U.S. Forest Service is under contract for protection services for non-structures. All structure fires in Alpine county are the responsibility of volunteer fire departments. The CDF rates the entire county as “high hazard” according to the Fire Hazard Severity Classification System which takes into consideration the amount of combustible vegetation , weather and slope.

The area surrounding the project has a history of wildfire. Three major wildfires have occurred in Alpine county since 1981: the Indian Creek Fire (1984, 17,000 acres); unnamed adjacent to Fredericksburg (1986, 3,000 acres and 2 structures) and; the Acorn Fire (1987, 6,000 acres and 26 structures), (Alpine County General Plan, 2005).

There are two sites in the project area that are listed on California’s Hazardous Waste and Substances Sites List (the Cortese List). OPR compiles the Cortese List annually pursuant to Government Code §65962.5. The list identifies sites with potential and confirmed environmental contamination by hazardous waste. The sites on the Cortese List are Caltrans Woodfords Facility and the Diamond Valley School, both of which are listed as leaking underground storage tanks. The Diamond Valley School site is listed as closed as of 2001, but the Woodfords site is listed as open on the California Waterboard “geotracker” site (www.geotracker.waterboards.ca.gov accessed on September 2, 2008). Other sites in the project area include several leaking underground storage tank sites, all of which are now closed, and none of which were reported as resulting in groundwater contamination. There are also two solid waste landfills, the Turtle Rock Park Disposal site and the Emigrant Trail site, both of which are reported as closed sites with no apparent health hazards.

10.3 Regulatory Environment

This section focuses on policies and regulations regarding public health and safety. The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Public Health and Safety Chapter the following subsections provide descriptions of applicable requirements.

10.3.1 Water Reuse Regulations

10.3.1.1 California

The recycled water produced by the District conforms to the state of California's recycled water regulations, which are contained in Title 22 of the California Code of Regulations (Title 22, California Code of Regulations §60301, et seq.). Untreated wastewater contains bacteria, viruses, and parasites that must be removed to allow safe use of recycled water. Title 22 criteria are intended to prevent exposure to these organisms by any of the possible mechanisms: skin contact; ingestion; inhalation of infectious agents in water; or by direct contact with a contaminated object. Recycled water is treated to an appropriate level to protect surface water and to prevent transmission of pathogens through aerosols (small particles of water suspended in air) from spray irrigation. Conventional and widely practiced water and wastewater treatment processes are capable of reducing microorganisms to acceptable levels.

The potential for pathogenic contamination from fecal sources is expressed as the number (measured by the Most Probable Number [MPN]) of coliform bacteria present in water sources. Coliform bacteria occur naturally in the intestines of warm-blooded animals and are easy to identify. Although they are not pathogenic, untreated wastewater contains high concentrations of coliform, up to 10 to 20 million coliform bacteria per 100 milliliters (10 to 20 million MPN per 100 milliliters). Primary and secondary wastewater treatment processes usually remove 90 percent or more of the pathogenic organisms in wastewater. Disinfection removes the majority of the remaining organisms.

The District's wastewater treatment plant is currently permitted as producing "disinfected secondary-23" recycled water. Title 22 defines this as "recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a MPN of 23 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period." Oxidation stabilizes organic matter, reduces odor and adds oxygen to the wastewater. Filtration clarifies the water by removing small particles. Disinfection removes microorganisms that may cause disease. The District's treatment process consists of screening, grit removal, primary clarification, activated sludge, secondary clarification, mixed media filtration, and chlorination.

In addition to pathogens, raw wastewater contains chemical constituents including heavy metals and organic compounds. Wastewater treatment processes remove almost all the heavy metals in wastewater. Treatment processes successfully remove biodegradable organic compounds, but stable organic compounds are resistant to conventional methods of wastewater treatment. Levels of stable organic compounds are minimized by controlling industrial dischargers. The quality of the treatment plant's effluent and disinfected secondary recycled water with regards to metals and organic compounds is discussed in Chapter 8, Surface Water Quality.

Recycled water produced by the District consistently exceeds requirements for disinfected secondary-23 recycled water and the plant has consistently met the "disinfected secondary 2.2" criteria for the last several years. The plant could be re-permitted to meet secondary 2.2 recycled water requirements with the implementation of a slightly higher disinfection dosage and more polymer addition to enhance filtration efficiency to ensure that the plant does not violate the lower coliform limits (Kennedy/Jenks

2001). The regulations specify that disinfected secondary-2.2 recycled water must have a median coliform level that does not exceed 2.2 MPN per 100 milliliter over a period of seven days, and a maximum coliform level that does not exceed 23 MPN per 100 milliliter more than once in a 30-day period.

Uses approved by Title 22 for disinfected secondary-23 recycled water include irrigation of fodder and fiber crops and pasture for animals including dairy cattle, orchards and vineyards where the recycled water does not contact the fruit, cemeteries, freeway landscaping, and restricted access golf courses (Title 22, California Code of Regulations §60304). Recycling of water for other purposes, including commercial applications, industrial process water and nonstructural fire fighting, is also allowed by California regulations (Title 22, California Code of Regulations §60307) and is widely practiced.

In 2004, Lahontan adopted Revised Order No. R6T-2004-0010 as an update to the WDR for the District's WWTP in South Lake Tahoe, CA, El Dorado County and the recycled water application areas in Alpine County. The uses of recycled water is restricted by the Board Order to irrigation of seed and fiber crops, and fodder crops for non-milking animals. The Order also prohibits the use of recycled water for crop irrigation within 100 feet of an active domestic water supply well and spray irrigation within 100 feet of a residence, school or public place to prevent exposure to the public. The District may also authorize other incidental recycled wastewater use such as dust control outside of the Lake Tahoe Basin in accordance with California Code of Regulations Title 22, §60307 (b).

10.3.1.2 Nevada

NDEP, Bureau of Water Pollution Control regulates recycled water use in Nevada. Regulations for water recycling are contained in the Nevada Administrative Code, §445A.275 through 445A.280. Recycled water must receive at least secondary treatment, defined as biological oxidization of the sewage to a point where the sewage has a 5-day inhibited BOD concentration of 30 mg/L or less. The District wastewater treatment plant produces recycled water that meets the requirements for Category "B" recycled water: a fecal coliform level with a 30-day geometric mean of 23 MPN/100 ml, and a maximum daily number of 240 MPN/ml.

Uses allowed for Category B recycled water include irrigation of pasture, and golf course, cemetery or greenbelt where public access is controlled. Category B recycled water requires a minimum buffer zone of 100 feet around the use area.

10.3.2 Hazardous Wastes

Hazardous substances that are released to the environment (e.g. due to spills and leaking underground storage tanks) have the potential to adversely affect public health if encountered unexpectedly during the construction phase of the project or during operations over the project's lifetime. At the federal level, the storage and handling of hazardous substances are regulated under the Resource Conservation and Recovery Act (RCRA), which follows hazardous substances from "cradle to grave" and regulates hazardous waste generators, transporters, and treatment, storage and disposal facilities.

California and Nevada are authorized by the USEPA to administer state developed and approved RCRA programs. The cleanup of sites contaminated by releases of hazardous substances and wastes is regulated primarily by the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), which was amended by the Superfund Amendment and Reauthorization Act of 1986 (Superfund), and by similar state laws. Known hazardous waste release sites are subject to oversight by federal, state, and/or local agencies.

10.3.3 Hazardous Materials Storage, Use and Disposal

Materials such as fuels, motor oils, and paints are used during construction of new buildings, digesters, storage ponds and other facilities. While these are commonly used materials, if handled improperly (fuels, for example, are flammable) they could endanger workers and the public, and are considered hazardous materials. Compliance with Federal and State hazardous materials laws and regulations minimizes the risk to the public presented by these potential hazards.

Laws and regulations include California's statutes such as the Accidental Release Prevention and Hazardous Waste Control Laws, Nevada's regulations for Highly Hazardous Substances, and Federal statues such as the RCRA (discussed above), the Emergency Preparedness and Community Right-to-Know Act and the Clean Air Act.

In California the Accidental Release Prevention Law regulates the storage and use of "acutely hazardous materials" and is intended to protect the public from materials that produce toxic clouds after fires, explosions or other accidents. Since 1996 this law has provided consistency with the Federal Emergency Preparedness and Community Right-to-Know and Clean Air Acts, allowing local oversight of both the State and Federal programs. California's Accidental Release Prevention Program addresses both federally regulated substances and a number of additional chemicals identified by the State.

The Alpine County Public Health Department provides permits, approvals and monitoring relating to hazardous materials regulations in the California portion of the project area. The county can issue citations or take other appropriate enforcement actions in the event that they discover a violation.

In Nevada, the Hazardous Waste Management Program administered by NDEP's Bureau of Waste Management is responsible for permitting and inspecting hazardous waste generators and disposal, transfer, storage and recycling facilities. NDEP is also responsible for enforcing state hazardous waste statutes and regulations and is authorized to enforce Federal hazardous waste regulations in lieu of the USEPA. The state also manages a Chemical Accident Prevention Program.

10.3.4 Vector Control

Mosquitoes are pests and vectors of disease to humans and animals. Mosquito populations can increase rapidly, especially during the warmer summer months. Mosquitoes have the potential to breed and reproduce as a result of the construction and operation of Project Components (e.g., wetlands and storage ponds).

The California Health and Safety Code provides authority for mosquito abatement districts to advise and control mosquito production on private and public lands and to assess the landowner for the cost of that control. The districts also have the authority to hold hearings and assess civil penalties to abate nuisance and potential health threats to the general public (California Health and Safety Code, §2270-2294).

The Alpine County Health Department is responsible for mosquito prevention program within Alpine County. The primary objective is to suppress the mosquito population below the threshold level required for disease transmission or nuisance tolerance level. Douglas County has a Mosquito Control Department, which is responsible for controlling mosquitoes in the Nevada portion of the project area.

10.3.5 Fire Risk

The Insurance Services Office rates rural fire protection service on a scale of 1 to 10, with 1 being the best service. Services of the major population centers in Carson Valley are rated between 6 and 8. Sparsely populated areas of Carson Valley and Alpine County have marginal services rated at 9. The CDF is responsible for providing wild land fire protection in Alpine County. The CDF designates all of Alpine

County as a high hazard area under the Fire Hazard Severity Classification System (Alpine County General Plan). The Nevada Division of Forestry (NDF) has jurisdiction over forest and range fires in Douglas County. The USDA Forest Service (Forest Service) also has jurisdiction throughout the project area.

10.4 Public Health and Safety Goals, Objectives and Policies

Table 10-1 identifies goals, objectives, and policies that provide guidance for development in the project area in relation to public health and safety. The table also indicates which criteria in the Public Health and Safety Section are responsive to each set of policies. Douglas County does not have any policies that deal with the issues evaluated in this section.

Table 10-1

General Plan Goals, Objectives, and Policies – Public Health and Safety

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Safety Element	Goal No. 25 Policy 25a Policy 25b	Ensure that hazardous waste materials are properly handled and that hazardous waste is properly planned for handling, treatment, and disposal	1, 2, 3
Alpine County General Plan	Safety Element	Goal No. 20 Objective 20 Policy 20	Require fire safety standards that minimize wild land and structure fire hazards	6

Source: Hauge Brueck Assoc. 2008

1. The public health and safety evaluation criteria are provided in Table 10-2.

10.5 Evaluation Criteria with Points of Significance

The evaluation criteria for public health and safety impacts are based on standards promulgated by the Federal Government and by the States of California and Nevada, as presented in Table 10-2. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A public health and safety impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 10-2.

Table 10-2

Evaluation Criteria with Points of Significance – Public Health and Safety

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project create a public health risk due to its use of recycled water?	Proposed measures not in compliance with California Title 22 and Nevada Administrative Code regulations for the use of recycled water or the treatment plant's NPDES permit	Exceedance of applicable standards	California Title 22 and Nevada Administrative Code Regulations governing the use of recycled water Clean Water Act and State of California Recycled Water Policy

Table 10-2
Evaluation Criteria with Points of Significance – Public Health and Safety

Evaluation Criteria	As Measured by	Point of Significance	Justification
2. Will the Project expose workers or the public to hazards from a known hazardous waste site?	Ground disturbance near a hazardous waste site(s)	Less than 500 feet	CEQA Checklist VII-a Resource Conservation and Recovery Act Comprehensive Environmental Response Compensation and Liability Act (as amended by the Superfund Amendments and Reauthorization Act)
3. Will the Project increase potential exposure of the public to hazardous materials due to a chemical release?	Increase in use or storage of hazardous materials not in accordance with State and Federal hazardous materials or waste regulations	Greater than 0 occurrences	CEQA Checklist VII-b, c California, Nevada and Federal hazardous materials and waste regulations (including handling of materials containing lead-based paint or asbestos during construction or demolition) Public Safety sections of local General Plans
4. Will the Project expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or creation of accessible excavations (trenches, pits, or borings); or creation of an accessible open body of water?	Use of heavy machinery, vehicles or equipment; or creation of excavations in public areas not in accordance with State construction safety regulations	Greater than 0 occurrences	California Construction Safety Regulations
5. Will the Project increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?	Creation of mosquito habitat	Greater than 0 acres of new mosquito habitat	California Health and Safety Code- Sections 2270-2294
6. Will the Project expose people or structures to fire hazards?	Location of project within area rated as a high fire hazard severity zone without implementation of appropriate fire protection measures	Greater than 0 occurrences	CEQA Checklist VII-h California Government Code §51175-51189

Source: Hauge Brueck Assoc. 2009

10.6 Environmental Consequences (Impacts) and Recommended Mitigation

10.6.1 No Project Components

Table 10-3 presents potential impacts to public health and safety, outlines points of significance, level of impact, type of impact and also ranks the level of significance for components of the No Project Components.

Table 10-3

Public Health and Safety Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PHS-1. Will the No Project Components create a public health risk due to its use of recycled water?	Exceedance of applicable standards	NP-2			NP-1
PHS-2. Will the No Project Components expose workers or the public to hazards from a known hazardous waste site?	Less than 500 feet				NP-1, NP-2
PHS-3. Will the No Project Components increase potential exposure of the public to hazardous materials due to a chemical release?	Greater than 0 occurrences				NP-1, NP-2
PHS-4. Will the No Project Components expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or creation of accessible excavations (trenches, pits, or borings); or creation of an accessible open body of water?	Greater than 0 occurrences				NP-1, NP-2
PHS-5. Will the No Project Components increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?	Greater than 0 acres of new mosquito habitat.				NP-1, NP-2

Table 10-3						
Public Health and Safety Impacts – No Project Components						
Impact	Point of Significance	Level of Significance by Component				
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PHS-6. Will the No Project Components expose people or structures to fire hazards?	Greater than 0 occurrences				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: PHS-1. Will the No Project Components create a public health risk due to its use of recycled water?

Analysis: *Significant Impact; NP-2*

The recycled water produced by the District's WWTP conforms to the state of California's recycled water regulations, which are contained in Title 22 of the California Code of Regulations (Title 22, California Code of Regulations §60301, et seq.). The No Project Components for recycled water (NP-2) potentially impact public health and safety for drinking water due to elevated concentrations for nitrates. Results from monthly groundwater monitoring do not report nitrate levels in District wells that threaten the State drinking water standard (10 mg/L) for Nitrogen. Existing application of recycled water within the project area is not measured to be degrading groundwater resources.

A risk to public health will occur if tailwater are not confined to permitted land, reach stream courses and degrade surface water quality. Under the No Project Components for recycled water (NP-2) application rates may not be optimized and tailwater may reach surface waters in the West Fork of the Carson River and Indian Creek. Recycled water produced by the District's WWTP contains high levels of Total Nitrogen, at times around 20 mg/L. Although the assimilative capacity and hydraulic loading levels of the project area are adequate to protect the drinking water quality of groundwater resources, surface and drinking water standards for the West Fork of the Carson River and Indian Creek will be compromised if tailwater enter these surface waters. Drinking water quality in Indian Creek will also be impacted by recycled water from HPR in the event of a spill from the reservoir.

Mitigation: *Under the NP-2, no mitigation will be possible because new facilities will not be constructed to optimize application rates and control tailwater.*

After Mitigation: *Significant Impact; NP-2*

The impact remains significant because mitigation of tailwater is not possible.

Analysis: *No Impact; NP-1*

The No Project Components for fresh water (NP-1) will not pose a public health risk or impact water quality. because these components do not convey or apply recycled water. Introduction of fresh water to stream courses will not impact drinking water quality.

Mitigation: *No mitigation is needed. NP-1*

Impact: PHS-2, PHS-3, PHS-4, PHS-5 and PHS-6. Will the No Project Components impact public health and safety based on evaluation criteria 2 through 6?

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction of new facilities. There will be no potential exposure to hazardous waste sites during construction, and no new operations that result in a chemical release. There will be no hazards associated with maintenance activities or the creation of open water bodies that will create hazards or are suitable for vector habitat. Existing exposure to fire hazards remains unchanged.

Mitigation: *No mitigation is needed. NP-1, NP-2*

10.6.2 Project Components

Table 10-4 presents potential impacts to Public Health and Safety, outlines points of significance, level of impact, type of impact and ranks the level of significance for the Project Components.

Table 10-4

Public Health and Safety Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PHS-1. Will the Project Components create a public health risk due to their use of recycled water?	Exceedance of applicable standards			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32	
PHS-2. Will the Project Components expose workers or the public to hazards from a known hazardous waste site?	Less than 500 feet			16	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32

Table 10-4

Public Health and Safety Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PHS-3. Will the Project Components increase potential exposure of the public to hazardous materials due to a chemical release?	Greater than 0 occurrences			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32	
PHS-4. Will the Project Components expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or creation of accessible excavations (trenches, pits, or borings); or creation of an accessible open body of water?	Greater than 0 occurrences			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32	
PHS-5. Will the Project Components increase the potential exposure of the public to disease vectors (i.e., mosquitoes)?	Greater than 0 acres of new mosquito habitat.			9, 10, 11, 13, 15	1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32
PHS-6. Will the Project Components expose people or structures to fire hazards?	Greater than 0 occurrences			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32	

Source: Hauge Brueck Assoc. 2009

Impact: **PHS-1 Will the Project Components create a public health risk due to their use of recycled water?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32*

Neither construction nor operation of or improvements to conveyance facilities will increase releases of recycled water to the environment, and there will be no increase in risk to public health. Existing open ditch systems will remain, but recycled water exposure will be reduced through improvements such as lining the ditches. Some ditches will be replaced by pipelines, which minimize the need for setbacks and reduce the potential for human contact. Conveyance components for recycled water (Components 4, 5, 6, 14 and 22) will be buried pipelines, which have lower potential for human exposure than the existing open ditches. Components 31 and 32 will install new open ditches but will convey fresh water from ICR and have no new impact to public health and safety.

Temporary exposure of the public to runoff in the event of rupture of new pipelines could result in very brief exposure to any chemicals or microorganisms in recycled water. The chemicals in recycled water that present a significant health risk are nitrates, and health effects result only from consumption of large quantities of recycled water. Exposure to nitrates during pipeline rupture does not present a significant risk. Microorganism concentrations in recycled water are below levels set by the State for irrigation, and inadvertent exposure during a pipeline rupture will not pose a significant risk to those affected.

Recycled water will be used for agricultural irrigation for application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29, and 30 using either the existing method (flood irrigation) or through sprinkler or sub-surface irrigation. Tailwater controls will be implemented to keep recycled waters from entering surface waters and posing a risk to drinking water quality. Persons could be exposed to chemicals or microorganisms in recycled water via inhalation, dermal absorption or inadvertent ingestion of spray irrigation. Persons could also be temporarily exposed to ponded recycled water from an accidental release, pipeline break or over watering.

Temporary containment of recycled water under Component 11 will be subject to the same requirements as the application components described above. With the required safeguards, public health risk will not be significant.

The water management components 8, 23 and 24 do not entail additional use of recycled water. With the required safeguards, public health risk will not be significant.

As recognized in recent literature, water recycling in the United States has not been documented as the cause of any disease outbreaks (National Research Council 1996). Water recycling has been practiced in California since 1929, when the City of Pomona began using recycled water for irrigation. Since that time no incidence of disease caused by the use of recycled water has been reported in California. The District has been providing recycled water to users in Alpine County for irrigation of pasture and forage crops since 1968.

With an appropriate level of treatment and proper operational safeguards, recycled water is demonstrated to be safe for irrigation and industrial uses. To meet the Department of Health Services treatment requirements, the District provides disinfected secondary-23 recycled water, which is described in the setting section.

Existing technology and regulatory requirements provide a high degree of reliability and safety for water recycling. The Department of Health Services Title 22 requirements for disinfected secondary-23 recycled water will continue to be followed as outlined below.

Title 22 Requirements

- No irrigation with, or impoundment of, disinfected secondary-23 recycled water shall take place within 100 feet of any domestic water supply well.
- Use of recycled water shall comply with the following:
- Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency;
- Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities; and
- Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.
- No spray irrigation of disinfected secondary-23 recycled water shall take place within 100 feet of a residence or a place where public exposure could be similar to that of a park, playground, or schoolyard.
- All use areas where recycled water is used that are accessible to the public shall be posted with signs that are visible to the public, in a size no less than 4 inches high by 8 inches wide, that include the following wording: "RECYCLED WATER - DO NOT DRINK".
- Except as allowed under section 7604 of Title 17, California Code of Regulations, no physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.
- The portions of the recycled water piping system that are in areas subject to access by the general public shall not include any hose bibs. Only quick couplers that differ from those used on the potable water system shall be used on the portions of the recycled water piping system in areas subject to public access.

Lahontan Waster Discharge Requirements

In addition to the high level of treatment required under Title 22, Lahontan established updated waste discharge requirements for the District's Wastewater Reclamation Plant (Board Order No. R6T-2004-0010) in 2004, which replace Board Order 6-95-65 and provide recycled water quality standards and operational procedures for protection of water quality and public health. Responsibilities for compliance lie with the producer of the recycled water (District) and also with individual recycled water users. Recycled water must meet the Lahontan requirements and the requirements specified in the "Water Recycling Criteria," (Title 22, California Code of Regulations §60301 et seq.). Applicable portions of the Waste Discharge Requirements for use of recycled water are summarized below:

Effluent Limitations

1. The discharge of effluent to HPR shall not exceed the following limits:

Parameter	Units	Mean[1]	Maximum
Biochemical Oxygen Demand (5 day, 20°C)[2]	mg/l	30	45
Chemical Oxygen Demand[3]	mg/l	60	300
Suspended Solids	mg/l	30	60
Settleable Solids	mg/l		0.1
Turbidity	NTU	10	20

1 The arithmetic mean of lab results for effluent samples collected in a period of 30 consecutive days
2 Biochemical Oxygen Demand (5 day, 20oC). Samples from oxidation ponds and other pond-type systems should
be filtered (using a No. 1 Whatman filter or equivalent) and reseeded with unfiltered samples. Other types of treatment units should analyze unfiltered samples.
3 Chemical Oxygen Demand

2. The treated effluent pH shall not be less than 6.5 pH units nor more than 9.0 pH units.

3. Recycled water used for fodder crop irrigation shall be at all times an adequately disinfected, oxidized wastewater. The wastewater shall be considered to be adequately disinfected if at some point in the treatment process the median number of coliform organisms does not exceed 23 MPN/100 ml for seven consecutive samples. The maximum number of coliform organisms for any two consecutive samples is 240 MPN/100 ml.

4. The effluent shall not contain trace elements, pollutants, contaminants, or combinations thereof, in concentrations that are toxic or harmful to aquatic or terrestrial plant or animal life.

General Requirements and Prohibitions for Carson River Hydrologic Units.

a. The discharge of any waste or deleterious material to surface waters of the East Fork Carson River Hydrologic Unit or West Fork Carson River Hydrologic Unit is prohibited.

b. The discharge of any waste or deleterious material in the East Fork Carson River Hydrologic Unit or West Fork Carson River Hydrologic Unit, which would cause or threaten to cause violation of any water quality objective contained in the Basin Plan, or otherwise adversely affect the beneficial uses of water set forth in the Basin Plan, is prohibited.

c. The discharge of reclaimed water to Diamond Ditch between October 15 and April 1 of each year is prohibited except for emergency releases from HPR to the Dressler On-Farm System.

d. The discharge of surface runoff containing reclaimed wastewater to surface waters of the East Fork Carson River Hydrologic Unit or West Fork Carson River Hydrologic Unit is prohibited.

e. The use of pesticides and other toxic chemicals to control plant productivity in HPR, Diamond Ditch and the Fredericksburg Ditches is prohibited without written permission from the Executive Officer.

f. HPR and the reclaimed wastewater conveyance system shall be adequately posted or have access restricted to prevent direct human contact with the reclaimed wastewater.

g. Public access to HPR is prohibited to prevent human contact with and recreational activities on HPR.

h. Reclaimed wastewater use shall be limited to irrigation of fodder, fiber, and seed crops, as well as pasture for non-milking animals.

The waste discharge requirements also include extensive monitoring requirements, including monitoring of recycled water quality, and monitoring of surface water, groundwater and soil in Alpine County. The District may also authorize other incidental recycled wastewater use such as dust control outside of the Lake Tahoe Basin in accordance with California Code of Regulations Title 22, §60307 (b).

Nevada Recycled Water Requirements

Requirements for recycled water use in Nevada are similar to those described above for California. The District produces "category B" recycled water, for which a 100-foot buffer zone between the irrigation area and public use areas is required. Other pertinent requirements and restrictions include:

1. Recycled water users must submit a plan for management of recycled water, which must be approved by the State.

2. Recycled water must receive at least secondary treatment.

3. Any person using recycled water for irrigation shall post a notice at the site of irrigation warning the general public to avoid contact with the recycled water.

4. Except as otherwise provided in this subsection, a person shall not use recycled water to irrigate crops for human consumption. A person may use recycled water for surface irrigation of fruit bearing trees and nut bearing trees.

5. A person using recycled water to irrigate sprinklers shall conduct the irrigation in a manner that inhibits the recycled water from drifting or carrying outside the buffer zone.

6. A person shall not allow recycled water used in irrigation to run off the site being irrigated.

California Department of Health Services Requirements

Before the Project begins supplying recycled water to new users, plans and specifications for the recycled water system will be submitted to Department of Health Services for review and approval. The plans must clearly indicate the means for complying with all regulations, and must also contain a contingency plan to assure that no inadequately treated recycled water is delivered to users.

With implementation of these requirements, the Project meets Title 22, State of Nevada, and Lahontan requirements. The Project will not pose unacceptable risk to human health; impacts will not be significant.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 29, 30 31, 32*

Impact: PHS-2. Will the Project Components expose workers or the public to hazards from a known hazardous waste site?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 and 32 are not located within 500 feet of any hazardous waste site.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Analysis: *Less than Significant Impact; Components 16*

Component 16, Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas, includes irrigation of District-owned property, which is in close proximity to Alpine County's school complex. The school site is listed on the Cortese List because of a leaking underground storage tank. Although the site is listed as closed, the level of remediation is not known, and there may be residual contaminant levels in soil. Construction in the vicinity of this site could result in exposure of workers and the public to toxic material, and require the removal and/or disposal of contaminated soil. The latter requires transportation of contaminated material and acceptance of waste for disposal.

SP-29, Management of Hazardous Materials/Waste During Construction, reduced the impact to a less than significant level by requiring surveys, performed by a Registered Geologist or Registered Environmental Assessor, of all pipeline alignments for contaminated soil. Where contamination is present on the District-owned property, appropriate procedures to protect the health and safety of workers and the public will be implemented in accordance with State and Federal regulations regarding the management of hazardous waste. Certified inspectors, consultants and contractors will handle contaminated materials in accordance with State regulations. Compliance with State and Federal regulations reduces the potential impact to a level that is less than significant.

Mitigation: *No mitigation is needed. Component 16*

Impact: PHS-3. Will the Project Components increase potential exposure of the public to hazardous materials due to a chemical release?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Any hazardous materials used in construction or operation of conveyance facilities will be used and stored in accordance with state and federal regulations regarding hazardous materials and reduce the impact to a less than significant level.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: PHS-4. Will the Project Components expose the public to safety hazards associated with operation of heavy machinery, vehicles, or equipment; or

creation of accessible excavations (trenches, pits, or borings); or creation of an accessible open body of water?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Construction of conveyance facilities will use heavy machinery, vehicles, and equipment. All such equipment will be operated in accordance with state regulations regarding construction safety. There is no proposed construction equipment or technique that will be unsafe if mandated safety regulations are followed.

Construction of pipelines will create excavations within public rights-of-way. All excavations will be protected from the public at all times and constructed in accordance with state regulations regarding construction safety. There are no proposed excavations that will be unsafe if mandated safety regulations are followed. No new water bodies will be created because of construction or operation of the conveyance components.

Application areas (components 1, 7, 9, 10, 11, 12, 13, 15, 18, 19, 21, 29 and 30) will be constructed in areas that are generally not accessible to the public. Temporary containment areas (Component 11) will be constructed in areas that are generally not accessible to the public but in close proximity to Diamond Valley Road. The containment areas will hold recycled water behind six foot high berms for durations of one to 60 days in emergency situations. General construction safety practices such as site fencing, barricades, or signage will protect the public from these hazards during construction activities. Construction activities will not impact public safety. Any open bodies of water such as temporary containment areas, infiltration ponds and wetlands will be fenced and signed to prevent unauthorized access.

Component 16 proposes to irrigate using sub-surface irrigation methods because of close proximity to Alpine County's school complex. A shallow underground network of perforated pipe will be installed for distribution of recycled water to reduce the potential for the public to be exposed to a level of less than significant.

Components 8, 18, 19, 23 and 24 will require no new construction. Any new facilities will be constructed in areas that are generally not accessible to the public. General construction safety practices such as site fencing, barricades, or signage will protect the public from these hazards during construction activities. Construction activities will not impact public safety.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: PHS-5. Will the Project Components increase the potential exposure of the public to disease vectors (i.e., mosquitos)?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Neither construction nor operation of conveyance facilities (Components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32) will create new mosquito habitat. Some ditches will be replaced by pipelines, which reduce areas of potential mosquito habitat. New conveyance systems (Components 4, 5, 6, 14 and 22) are buried pipelines, which do not provide mosquito habitat. Components 31 and 32 will construct and operate new ditches to move fresh water and storm water runoff away from HPR to Indian Creek during significant precipitation events. These systems will not result in standing water for mosquito habitat. Application components 1, 7, 12, 16, 18, 19, 21, 29 and 30 will not create mosquito habitat as a result of sprinkler irrigation practices. Water management components 23 and 24 reroute fresh water for storage in reservoirs and component 8 addresses recycled water quality at the WWTP in South Lake Tahoe, CA. These Project Components do not create mosquito habitat.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Analysis: *Less than Significant Impact; Components 9, 10, 11, 13, 15*

Creation of wetlands and impoundment of water in basins for capturing tailwater (components 9, 10, 13 and 15) creates potential habitat for mosquitoes. Wetlands, which have a large surface area to volume ratio and an irregular shoreline are more likely to create mosquito habitat than deeper impoundments.

Creation of temporary containment areas (Component 11) will create potential habitat for mosquitoes. Any impoundments with a large surface area to volume ratio and irregular shoreline are more likely to create mosquito habitat than deeper impoundments. Two temporary containment areas of 24 and 25 acres will be created with six foot high berms and diked. The temporary containment areas will impound recycled water during emergency situations from one to 60 days and depending on climatic conditions could create temporary mosquito habitat during times of impoundment.

Through standard practice SP-22, Mosquito Prevention, the District consults with Alpine County in designing and developing wetlands and basins and comply with requirements for mosquito prevention. Measures include proper grading of shallow water areas to facilitate drainage with ditches to provide habitat for mosquitofish or other biological controls. Biological control agents will be employed based on consultation with California Department of Fish and Game. Mosquito larvae may also be controlled with microbial insecticides such as *Bacillus thuringensis.* Performance criteria conform to the Mosquito and Vector Control Association of California standards and incorporate the California Mosquito-borne Disease/Virus Surveillance and Response Plan.

Mosquito abatement measures will reduce the potential exposure of the public to disease vectors to a less than significant level by avoiding habitat creation and managing mosquito populations.

Mitigation: *No mitigation is needed; Components 9, 10, 11, 13, 15*

Impact: PHS-6. Will the Project Components expose people or structures to fire hazards?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Although conveyance facilities (components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32) are located in an area of high fire hazard, construction and operation will not expose people to fire hazards. Neither existing nor proposed conveyance facilities will be subject to fire damage. Buried pipes will be unaffected by a fire, and open ditches contain recycled water and are made of materials that are not adversely affected in a fire.

Although application components (components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30) are located in an area of high fire hazard, construction and operation will not expose people to fire hazards. Irrigation systems, wetlands and ponds are not subject to substantial damage from fires. Buried pipes will be unaffected by a fire, and ponds and wetlands are full of recycled water and made of materials that are not adversely affected in a fire.

Although temporary containment facilities (Component 11) are located in an area of high fire hazard, construction and operation will not expose people to fire hazards. Irrigation systems, wetlands, temporary containment areas and infiltration basins are not subject to substantial damage from fires. Buried pipes will be unaffected by a fire, and ponds and wetlands are full of recycled water and made of materials that are not adversely affected in a fire.

Although water management components (components 8, 23 and 24) are located in an area of high fire hazard, operation will not expose people to fire hazards. Mechanical systems for improvement of water quality in HPR and ICR will be installed in the reservoirs themselves, and would thus be protected from fire damage.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

10.7 Cumulative Impacts

Project Components will not contribute to significant cumulative impacts associated with hazardous materials use, existing hazardous waste sites, recycled water production, construction safety hazards, disease vectors or fire risk in the project area. The No Project Components for recycled water (NP-2) do not adequately address existing concerns regarding potential nitrate contamination of groundwater which potentially impacting public health and safety for drinking water. Under NP-2, tailwater may not be confined to permitted land, reaching stream course and degrading drinking water quality downstream. This is a significant impact.

Hazardous materials and hazardous waste will be managed in compliance with Federal, State and local laws and regulations. Standard practices will reduce hazardous materials and hazardous waste impacts to levels that are less than significant. Recycled water will be handled in a manner compliant with California's and Nevada's laws and regulations governing the wastewater reuse, thus there will be no cumulative impact from increased storage and discharge of recycled water under the Project Components.

None of the identified construction safety impacts will increase cumulative safety hazards. All activities will be performed in accordance with State and Federal labor laws and regulations.

Additional basins and wetlands will be managed according to the requirements of the Douglas and Alpine Counties, as are other facilities in the project area. After mitigation the impact is less than significant and the additional basins and wetlands will not contribute to cumulative impacts.

Any new facilities with the potential for fire risk will incorporate appropriate fire protection measures and defensible space.

10.8 Summary of Significant Impacts and Mitigation Measures

10.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant public health and safety impacts are identified in this chapter.

10.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to public health and safety are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

11 Biological Resouces

11 Biological Resources

This chapter describes special-status species, vegetation communities, and wildlife habitats within the project area and addresses potential impacts to these resources. Impacts evaluated include the potential for loss of special-status (endangered, threatened, rare, or protected) species associated with habitat in the project area, potential loss of sensitive vegetation communities and wildlife habitats, blockage of major migration corridors, potential detrimental effects to nesting raptors and to wildlife resources. The chapter also identifies mitigation measures that, upon implementation, will reduce the magnitude of significant impacts.

11.1 Impacts Evaluated in Other Chapters

Impacts related to Biological Resources are evaluated in this chapter.

11.1.1 Definitions

In this document, several terms are used to describe locations of sensitive species in relation to the Project. The study areas delimited following the varying protocols for different species' habitat have differing boundaries. Locality-related references occur in this document. The following definitions are applicable:

- Project Area: Area within the project boundaries;
- Impact Area: Area within the project area that could be physically disturbed by construction activities; and
- Project Vicinity: Project area and the general region surrounding the proposed project area.

11.2 Affected Environment (Setting)

The project area for the District Recycled Water Facilities Master Plan EIR encompasses portions of Alpine County, CA and Douglas County, NV. Land uses in the Project vicinity include recreational, agricultural, and residential. The Project is located on the Carter's Station, Minden, Markleeville, and Woodfords USGS 7.5-minute quadrangles, at an approximate elevation ranging from 1,433 meters (4,700 feet) to 1,768 meters (5,800 feet).

A variety of factors, including historical and current development, have reduced the abundance and diversity of the biological resources associated with the ecosystems in the region, leading to the protection of several species (i.e., special-status species). California Department of Fish and Game (CDFG), the U.S. Fish and Wildlife Service (USFWS), Nevada Division of Wildlife, and the California Native Plant Society (CNPS) provided the lists of special-status species potentially occurring in the region. The comprehensive special-status species plant and wildlife lists generated by this process include 10 plant species and 48 wildlife species. Appendix K of this document includes these consolidated lists. Professional judgment of the Project biologists and coordination with resource experts resulted in a reduced number of special-status species deemed likely to occur within the project vicinity.

A total of 50 special-status plant and wildlife species are identified as potentially occurring in the project area. Tables 11-1 and 11-2 outline the 50 species evaluated in this EIR section.

11.2.1 Plant Communities and Associated Wildlife Species

This setting section describes the plant communities, their related wildlife assemblages, and special-status species that may occur within the project vicinity.

A list of plant communities was compiled from data obtained during reconnaissance field visits conducted on September 18, 2001, October 4, 2001, April 2007 and August 2008 and from pre-existing information for the Project area and surrounding vicinity. The plant community descriptions and nomenclature used in this analysis are based on Holland's Preliminary Descriptions of the Terrestrial Natural Communities of California (1986). Wildlife species assemblage information was based upon existing documentation and information gathered from the California Wildlife Habitat Relationships System (CDFG 1999) and A Guide to Wildlife Habitats of California (Mayer and Laudenslayer 1988). Plant communities identified within the Project area include agriculture, montane riparian scrub, Modoc/Great Basin riparian forest, piñon woodland, Jeffrey pine forest, mixed montane chaparral, Great Basin mixed scrub, Sierran mixed conifer forest, and montane freshwater marsh.

11.2.1.1 Agricultural

Current agriculture uses in the project area are confined to meadow and hay pastures. Hay pastures are commonly composed of a mixture of grasses and legumes. Cattle are pastured both on recycled and non-recycled water application areas in the hay and meadow pastures. Portions of the pasturelands and alfalfa crops are cut for hay once or twice during the irrigation season. This requires the rotation of irrigated water to allow for the drying and bailing of the hay. Horses, sheep, and other domestic livestock grazing make up the balance of the agricultural uses.

Pastures are used by a variety of wildlife depending upon geographic area and types of adjacent habitats. Ground-nesting birds, including waterfowl, nest in pastures if adequate residual vegetation is present at the onset of the nesting season. Examples of wildlife that have adapted to croplands include red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), American goldfinch (*Carduelis tristis*), wild turkey (*Meleagris galloparo*), American crow (*Corvus brachyrhynchos*), house mouse (*Mus musculus*), deer mouse (*Peromyscus maniculatus*), coyote (*Canis latrans*), gopher snake (*Pituophis melanoleucus*), and common garter snake (*Thamnophis sirtalis*).

11.2.1.2 Montane Riparian Scrub

Montane riparian scrub communities are found on relatively fine-textured alluviums that occur on low gradient reaches of snowmelt fed streams. These areas are often described as thin scrubby corridors found within montane meadows. This scrub community is composed of dense, broad-leaved, winter-deciduous shrubby riparian thickets usually dominated by willows (*Salix lemmonii* and *S. scouleri*), alder (*Alnus incana ssp. tenuifolia*), or dogwood (*Cornus sericea ssp. occidentalis*).

Montane riparian scrub, like most riparian communities, has an exceptionally high value for many wildlife species. Such areas provide water, cover, migration corridors, and diverse nesting and foraging opportunities. The range of wildlife that uses the habitat for food, cover, and reproduction include amphibians, reptiles, birds, and mammals. The rubber boa (*Charina bottae*) and the Sierra Nevada red fox (*Vulpes vulpes necator*) are among the list of wildlife that uses this habitat during their life cycles.

11.2.1.3 Modoc/Great Basin Riparian Forest

Modoc/Great Basin Riparian Forest can range from open to dense, broad-leaved, winter deciduous thickets that are dominated by shrubby willows. The open stands frequently have dense herbaceous under stories. These communities are typically found on relatively fine-grained sand and gravel bars on low, wet alluvial terraces along perennial and intermittent streams. In addition to willow, other characteristic species include big sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus nauseosus*), and rose (*Rosa woodsii*).

Wildlife typically found in this vegetation community includes the loggerhead shrike (*Lanius ludovicianus*), song sparrow (*Melospiza melodia*), northern oriole (*Icterus galbula*), belted kingfisher (*Ceryle alcyon*), Pacific tree frog (*Hyla regilla*), western toad (*Bufo boreas*), northwestern pond turtle (*Clemmys marmorata marmorata*), and raccoon (*Procyon lotor*).

11.2.1.4 Great Basin Piñon Woodland

Great Basin piñon woodland typically occurs on rocky soils that have a low nutrient content and soil forming horizons. These communities are usually dominated by piñon pine (*Pinus monophylla*), big sagebrush, and bitterbrush (*Purshia tridentata*).

Piñon nuts are important food sources for many wildlife species. Characteristic wildlife species of this habitat include bushtit (*Psaltriparus minimus*), western scrub jay (*Aphelocoma coerulescens*), Yellow-rumped warbler (*Dendroica coronata*), dark-eyed junco (*Junco hyemalis*), gopher snake, common garter snake, white-tailed antelope squirrel (*Ammospermophilus leucurus*), Panamint kangaroo rat (*Dipodomys panamintinus*), and deer mouse.

11.2.1.5 Jeffrey Pine Forest

Jeffrey pine forests are tall, open vegetation communities that are dominated by *Pinus jeffreyi*, with sparse understories of species of montane chaparral and sagebrush scrub. These communities are most commonly found on dry, well-drained slopes, ridges, or cold air basins.

Jeffrey pine forests provide habitat for wildlife species including a variety of bird species including solitary vireos (*Vireo solitarius*), dark-eyed junco, western screech-owl (*Otus kennicottii*), Great horned owl (*Bubo virginianus*), red-breasted sapsucker (*Sphyrapicus ruber*), and western wood-pewee (*Contopus sordidulus*). Mammals that inhabit this forest community include the black bear (*Ursus americanus*), red fox (*Vulpes vulpes*), and golden mantled squirrel (*Citellus lateralis*).

11.2.1.6 Sierran Mixed Conifer Forest

Sierran mixed conifer forest is similar to Jeffery pine forest, but is dominated by several species including *Abies concolor, Pinus jeffreyi*, and *P. ponderosa*. The understory is usually thick with manzanita, *ceanothus*, *Prunus*, and *Ribes* species. This community is found on moist soils, usually on north-facing slopes with an elevational margin of 3,000-6,000 feet.

Mixed conifer forests provide breeding, foraging, and nesting habitat for a wide variety of species including Golden eagle (*Aquila chrysaetos*), red-breasted sapsucker, western wood-pewee, mountain chickadee (*Parus gambeli*), raccoon, least chipmunk (*Eutamias minimus*), porcupine (*Erethizon dorsatum*), and the Great Basin spadefoot (*Scaphiopus intermontanus*).

11.2.1.7 Mixed Montane Chaparral

Mixed montane chaparral is composed of a dense, heterogeneous, sclerophyllous thicket that is dominated by manzanita, bitterbrush, big sagebrush, and ceanothus. Most plants in this community are less than 5 feet tall. Site factors include steep, usually south-facing slopes in the coniferous forest zone.

Mixed chaparral provides important cover, foraging, and breeding habitat for many wildlife species. Characteristic bird species that utilize this habitat include wrentit (*Chamaea fasciata*), bushtit (*Psaltriparus minimus*), California quail (*Callipepla californica*), California thrasher (*Toxostoma *redivivum*), western scrub jay, and northern mockingbird (*Mimus polyglottus*). Chaparral also offers valuable foraging habitat and cover for black-tailed deer (*Odocoileus nemionus*), bobcat (*Felis rufus*), coyote, brush rabbit (*Sylvilagus bachmani*), and black-tailed jackrabbit (*Lepus californicus*). Due to the relatively dry nature of the chaparral community, few if any amphibian species inhabit this community. Chaparral does provide suitable shelter, basking sites, and foraging habitat for reptiles like the western rattlesnake (*Crotalus viridis*), and mountain kingsnake (*Lampropeltis zonata*).

11.2.1.8 Great Basin Mixed Scrub

Distributed widely throughout the Great Basin deserts, Great Basin mixed scrub is dominated by big sagebrush and bitterbrush with several perennial grasses occurring between the shrubs. This scrub is found on deep, gravelly, well-drained sites.

Mixed scrub provides habitat for many bird species including California quail, wrentit, western scrub jay, piñon jay (*Gymnorhinus cyanocephalus*), sage grouse (*Centrocercus urophasianus*), black-billed magpie (Pica pica), rock wren (*Salpinctes obsoletus*), and Bewick's wren (*Thryomanes bewickii*). Mammals that are known to occur in scrub include black-tailed jackrabbit, black-tailed deer, coyote, bobcat, and the striped skunk (*Mephitis mephitis*). Common reptile species found in this community include western fence lizard (*Sceloporus occidentalis*), sagebrush lizard (*Sceloporus graciosus*), and western rattlesnake.

11.2.1.9 Montane Freshwater Marsh

The montane freshwater marsh vegetation community is scattered throughout the Project area occurring primarily in grazed agricultural lands and adjacent to riparian corridors. A dense growth of sedges (*Carex sp.*) rushes (*Juncus sp.*), leafy arnica (*Arnica chamissonis ssp. foliosa*) and Kentucky bluegrass (*Poa pratensis ssp. pratensis*) characterize this community. Montane freshwater marshes typically occur on fine-textured, permanently moist or wet soils. Seasonal snowmelt as well as springs and seeps maintain these conditions.

Freshwater marshes are among the most productive wildlife habitats in California. They provide food, cover, and water for more than 160 species of birds (U.S. Comptroller General 1979), and a variety of mammals, reptiles, and amphibians. Species that utilize freshwater marsh communities in the Project area include the pacific chorus frog, common garter snake, and western toad.

11.2.2 Special-Status Species Evaluated in the Project Area

Special-status plant and wildlife species are species that are afforded special recognition and protection by federal, state, or local resource conservation agencies and organizations. These species are generally considered rare, threatened, or endangered due to declining or limited populations. Special-status species include:

- Plants and animals that are legally protected or proposed for protection under the California Endangered Species Act (CESA) or Federal Endangered Species Act (FESA);
- Plants and animals defined as endangered or rare under the CEQA;
- Animals designated as species of special concern by the USFWS or CDFG;
- Animals listed as "fully protected" in the Fish and Game Code of California (Sections 3511, 4700, 5050 and 5515);
- Plants listed in the CNPS's Inventory of Rare and Endangered Vascular Plants of California (electronic version 1999); and

- Plants and animals designated as sensitive by the Forest Service.

A search of the computerized California Natural Diversity Database (CNDDB) (CNDDB/Rarefind September 2008), CDFG 2008 was conducted for the Carter's Station, Markleeville, Minden, and Woodfords 7.5-minute USGS topographic quadrangles.

In addition to the CNDDB/Rarefind report, the most current lists prepared by the CDFGs Natural Heritage Division were reviewed:

- *Special Animals* (February 2006);

- *State and Federally Listed Endangered and Threatened Animals of California* (August 2007);

- *Special Vascular Plants, Bryophytes, and Lichens List* (July 2007);

- *Nevada Division of Wildlife Species List*; and

- *State and Federally Listed Endangered, Threatened, and Rare Plants of California* (July 2001).

A search of the CNPS Inventory of Rare and Endangered Vascular plants of California (Electronic Version 1.5.2 1994-2007) was conducted for the same quadrangles utilized during the CNDDB/Rarefind database search.

A request was submitted to the Nevada and Sacramento Offices of the USFWS for a list of federally listed and proposed threatened and endangered species that may occur in the Project vicinity. Two official lists were received, reviewed, and entered into the catalog of data.

Tables 11-1 and 11-2 present lists of all special-status species that were identified by the sources described above as potentially occurring in the project vicinity. These tables provide the current state, federal or other agency status, a description of the habitat utilized by each of these species, and an evaluation of the potential for each species or its habitat to occur within the project area. A discussion of these species is provided in the section following Table 11-2.

Information on the biology, distribution, taxonomy, status, and other aspects of the special-status species that could occur in the project vicinity was obtained from various references on biological resources. References used for the biology and taxonomy of plants include: Abrams (1923, 1944, and 1951); Abrams and Ferris (1960); Hickman, ed. (1993); Munz (1959); and Skinner and Pavlik (1994). References used for the biology and taxonomy of wildlife include: Dunn and Garret (1997); Ingles (1965); Jameson and Peeters (1988); Mayer and Laudenslayer, Eds. (1988); McGinnis (1984), Peterson (1990); Rising (1996), Stebbins (1985); Williams (1986); and Zeiner et al. (1988, 1990a, 1990b).

Table 11-1

Special-Status Plant Species Potentially Occurring Within the Project Area

Species	Status			Habitat Description	Bloom Period	Elevational Range	Suitable Habitat Within Project Area
	Federal	State	CNPS				
Three-bracted onion *Allium tribracteatum*	FSC	--	1B	Inhabits chaparral, lower montane coniferous forest, and upper montane coniferous forest on volcanic soils	April-August	1,220-3,000m	Yes
Lavin's milkvetch *Astragalus oophorus var. lavinii*	FSC	--	N/A	Knolls, bluffs, sandy and gravelly hillsides, on volcanic substrates in the Great Basin scrub and piñon and juniper woodland	May- July	1,000-2,075m	Yes
Bodie Hills draba *Cusickiella quadricostata*	FSC	--	1B NV Watch List	Clayey or rocky slopes and flats in the Great Basin scrub	May- July	2,000-2,800m	Yes
Tahoe draba *Draba asterophora var. asterophora*	--	--	1B	Occurs on open talus slopes, rock outcrops and crevices, on decomposed granite	July-August	2,500-3,505m	No
Cup Lake draba *Draba asterophora var. macrocarpa*	FSC	--	1B	Inhabits rocky substrates in subalpine coniferous forest. Known from only two occurrences near Cup Lake and Saucer Lake below Ralston Peak	July-August	2,500-2,815m	No
Oregon fireweed *Epilobium oreganum*	FSC	--	1B	An inhabitant of bogs and fens, lower montane coniferous forest, and upper montane coniferous forest in mesic environments	June-September	500-2,240m	Yes
Webber ivesia *Ivesia webberi*	FSC	FSS NV PE	1B	Found in Great Basin scrub (volcanic), lower montane coniferous forest, piñon and juniper woodland	May- July	1,000-2,075m	Yes
Long-petaled lewisia *Lewisia longipetala*	FSC	--	1B	Occurs in alpine boulder and rock fields and subalpine coniferous forest in mesic, granitic environments	July-August	2,500-2,925m	No
Williams comleaf *Polyctenium williamsiae*	FSC	FSS NE	1B	Restricted to shores and bottoms of ephemeral lakes and ponds	March-July	1,350-2,700m	Yes

Table 11-1

Special-Status Plant Species Potentially Occurring Within the Project Area

Species	Status			Habitat Description	Bloom Period	Elevational Range	Suitable Habitat Within Project Area
	Federal	State	CNPS				
Tahoe yellow-cress *Rorippa subumbellata*	C	SE	1B	Inhabits decomposed granitic beaches within and adjacent to lower montane coniferous forest and meadows	May-September	1,895-1,900m	No

Source: Hauge Brueck Assoc. 2008

Federal Status:
FE Listed as endangered under the FESA
FT Listed as threatened under the FESA
PE Proposed for listing as endangered under the FESA
PT Proposed for listing as threatened under the FESA
CA Candidate species for listing under the FESA
FSC Species of concern as identified by the USFWS
D Delisted in accordance with the FESA
FS Forest Service sensitive species
C Candidate for federal listing

State Status:
SE Listed as endangered under the CESA
ST Listed as threatened under the CESA
CSC Species of concern as identified by the CDFG
CFP Listed as fully protected by the CDFG
Rare Species identified as rare by the CDFG

California Native Plant Society Listing Categories (CNPS 2001):
1B Plant species that are rare, threatened, or endangered in California and elsewhere
2 Plant species that are rare, threatened, or endangered in California, but are more common elsewhere
3 Plant species that lack the necessary information to assign them to a listing status
4 Plant species that have a limited distribution or that are infrequent throughout a broader area in California

Table 11-2

Special-Status Wildlife Species Potentially Occurring Within the Project Area

Species	Status		Habitat Association	Suitable Habitat Within Project Area
	Federal	State		
Invertebrates				
Carson Valley wood nymph *Cercyonis pagala carsonensis*	FSC/ BLMS	--	Inhabit large, sunny, grassy areas including prairies, open meadows, bogs, and old fields.	Yes
Carson Valley sandhill skipper *Polites sabuleti genova*	--	NV Sensitive	Occurs in alkali grasslands, moist meadows, lawns, salt marshes, sand dunes, sagebrush flats, and alpine fell-fields.	Yes
Wong's springsnail *Pyrgulopsis wongi*	FSC/ BLMS	CSC	Associated with wetland vegetation and habitats.	Yes
Carson Valley silverspot *Speyeria nokomis carsonensis*	FSC/ BLMS	--	Found in moist meadows, seeps, marshes, and stream sides.	Yes
Fish				
Lahontan cutthroat trout *Oncorhynchus clarki henshawi*	FT	--	Occurs in a wide variety of cold waters, including large alkaline lakes, small mountain lakes, major rivers, and small tributaries. Range includes Truckee, Carson, and Walker Rivers, Donner Creek, and Pyramid, Walker, Donner, Independence, and Summit Lakes.	Yes
Paiute cutthroat trout *Oncorhynchus clarki seleniris*	FT	--	Inhabit cool, well oxygenated waters; cannot tolerate presence of other salmonids; requires clean gravel for spawning.	No
Amphibians				
Mount Lyell salamander *Hydromantes platycephalus*	FSC	CSC	Inhabits rock fields in mixed conifer, red fir, lodgepole pine, and subalpine communities, utilizing rock fissures, seeps, shade, and low-growing plants. Elevational range extends from 4,000 to 11,600 feet.	No
Yosemite toad *Bufo canorus*	FSC/FSS	CSC	Inhabits wet meadows in the central Sierra Nevada, also occurs in seasonal ponds associated with lodgepole pine and subalpine conifer forests, at elevations ranging from 6,400 to 11,300 feet.	No
Mountain yellow-legged frog *Rana muscosa*	FSC/FSS	CSC	Inhabits ponds, lakes, and streams associated with montane riparian, lodgepole pine, subalpine conifer, and wet meadow communities, between elevations of 4,500 and 12,000 feet.	Yes
Reptiles				
Northwestern pond turtle *Clemmys marmorata marmorata*	FSC	CSC	Found in aquatic habitats including ponds, marshes, streams, and irrigation ditches that have abundant emergent or riparian vegetation.	Yes
Northern sagebrush lizard *Sceloporus graciosus graciosus*	FSC/ BLMS	--	An inhabitant of sagebrush, montane chaparral, hardwood, pine and fir forest, piñon-juniper woodland, and Great Basin shrub communities.	Yes

Table 11-2

Special-Status Wildlife Species Potentially Occurring Within the Project Area

Species	Status		Habitat Association	Suitable Habitat Within Project Area
	Federal	State		
Birds				
Sage grouse *Centrocercus urophasianus*	FSC	--	An inhabitant of sagebrush, bitterbrush, perennial grassland, alkali scrub, or wet meadow.	Yes
White-faced ibis *Plegadis chihi*	FSC	CSC	Breeds in dense, fresh emergent wetlands; this species has declined in California and no longer breeds regularly. Fairly widespread during migration, foraging in fresh emergent wetlands, wet meadows, and irrigated or flooded pastures and croplands.	Yes
Harlequin duck *Histrionicus histrionicus*	FSC/ BLMS	CSC	Breeds on large, turbulent mountain rivers. Previously bred throughout the Sierra; the only recent records are from the upper Mokelumne River in Amador and Calaveras counties.	No
Northern goshawk *Accipiter gentilis*	FSC/FSS	CSC	Breeds and forages in mature stands of coniferous, mixed, and deciduous forest. Nest sites often associated with north-facing aspects.	Yes
Bald Eagle *Haliaeetus leucocephalus*	D	SE	Breeds and roosts in remote coniferous forests in close proximity to a river, stream lake, reservoir, marsh, or other wetland area.	Yes
Ferruginous hawk *Buteo regalis*	FSC	CSC	A winter migrant that commonly inhabits grasslands, prairies, and brushy open country.	Yes
American peregrine falcon *Falco peregrinus anatum*	D	SE	Inhabits open country, breeding near rivers, wetlands, lakes, or other aquatic features, nests on cliffs, banks, dunes, mounds, and human-made structures.	Yes
California spotted owl *Strix occidentalis occidentalis*	FSC/FSS	CSC	Typically breeds in stands of mixed coniferous forest containing a mixture of tree sizes with usually at least two canopy layers, and a total canopy coverage in excess of seventy percent (may be as low as thirty percent at high elevations). In southern California, usually associated with oak and oak-conifer communities.	Yes
Great gray owl *Strix nebulosa*	--	SE	Resident of mixed conifer or red fir forest types, in or on edge of meadows. Typically forages within meadows. Require large diameter snags in association with high canopy closure. Elevational range extends from 4,500 to 7,500 feet.	Yes

Table 11-2

Special-Status Wildlife Species Potentially Occurring Within the Project Area

Species	Status		Habitat Association	Suitable Habitat Within Project Area
	Federal	State		
Rufous hummingbird *Selasphorus rufus*	FSC	--	A post-breeding migrant during the summer in the Cascade Range and Sierra Nevada; spring migration occurs primarily in the lowlands and foothills. Inhabits a wide range of communities that provide nectar-producing flowers; examples include riparian, valley foothill hardwood, valley foothill hardwood-conifer, and high mountain meadows.	Yes
Lewis' woodpecker *Melanerpes lewis*	FSC	--	A summer resident of Alpine County, breeds locally in Sierra Nevada in open, deciduous and conifer communities containing a brushy understory, scattered snags, and live trees for nesting and perching.	Yes
Black swift *Cypseloides niger*	--	CSC	Breeds in small colonies on cliffs behind or adjacent to waterfalls in deep canyons and sea-bluffs above surf; foraging widely.	No
Little willow flycatcher *Empidonax traillii brewsteri*	FSC	SE	In the central and southern Sierra Nevada, this species typically breeds in willow-dominated riparian vegetation along perennial streams in moist meadows or spring-fed or boggy areas.	Yes
Brewer's sparrow *Spizella breweri*	FSC	--	Breeds in extensive shrub stands with moderate canopy coverage most commonly associated with sagebrush.	Yes
Mammals				
Pale Townsend's big-eared bat *Corynorhinus townsendii pallescens*	FSC	--	Mesic sites in forests, woodlands, grasslands, meadows and deserts. Known roosting sites include caves, tunnels, and buildings.	Yes
Pacific Townsend's big-eared bat *Corynorhinus townsendii townsendii*	FSC	--	Mesic sites in forests, woodlands, grasslands, meadows and deserts. Known roosting sites include caves, tunnels, and buildings	Yes
Spotted bat *Euderma maculatum*	FSC/ BLMS	CSC	Lives in desert scrub and open forest areas. Roosts in cliff faces and rock crevices. Found in western North America, from British Columbia down into Mexico.	Yes
Small-footed myotis bat *Myotis ciliolabrum*	FSC/ BLMS	--	Inhabits relatively arid wooded and brushy uplands in close proximity to water, from sea level to about 8,900 feet. Maternity colonies may occur in buildings, caves and mines.	Yes
Long-eared myotis bat *Myotis evotis*	FSC/ BLMS	--	May be found in a variety of brush, woodland, and forest communities, from sea level to about 9,000 feet; shows a preference toward coniferous woodlands and forests. Nursery colonies located in buildings, crevices, spaces under bark, snags; night roosting in caves.	Yes

Table 11-2

Special-Status Wildlife Species Potentially Occurring Within the Project Area

Species	Status		Habitat Association	Suitable Habitat Within Project Area
	Federal	State		
Fringed myotis bat *Myotis thysanodes*	FSC/ BLMS	--	May be found in a variety of environments; valley and foothill hardwood, hardwood-conifer and piñon-juniper woodland provide optimal habitat. Maternity colonies and roosts located in caves, mines, buildings, and crevices.	Yes
Long-legged myotis bat *Myotis volans*	FSC/ BLMS	--	This species is most commonly associated with woodland and forest communities above 4,000 feet. May also forage in chaparral, coastal scrub, Great Basin shrub habitats, and in early successional stages of woodlands and forests. Occurrence records ranges from sea level to 11,400 feet. Roosts in rock crevices, buildings, under tree bark, in snags, mines, and caves.	Yes
Yuma myotis bat *Myotis yumanensis*	FSC/ BLMS	--	Optimal environments include open forests and woodlands in proximity to bodies of water used for foraging; maternity colonies in caves, mines, crevices, and buildings.	Yes
Greater western mastiff-bat *Eumops perotis californicus*	FSC/ BLMS	CSC	Many open, semi-arid to arid habitats, including coniferous and deciduous woodlands, coastal scrub, grasslands, chaparral; roosts in crevices of cliff faces, in high buildings, and in trees and tunnels.	Yes
Pygmy rabbit *Brachylagus idahoensis*	FSC	CSC	Inhabits sagebrush, bitterbrush, and piñon-juniper communities in the Great Basin.	Yes
Sierra Nevada snowshoe hare *Lepus americanus tahoensis*	FSC	CSC	Frequents early successional stages of mixed conifer, red fir, lodgepole pine forests, and deciduous riparian communities at higher elevations.	No
Sierra Nevada red fox *Vulpes vulpes necator*	C/FSS	ST	Inhabits a variety of communities from wet meadows to forested areas; preferring forests that are interspersed with meadows or alpine fell-fields. Dense vegetation and rocky areas provide cover and den sites.	Yes
California wolverine *Gulo gulo luteus*	C/FSS	ST	Occurs in a variety of communities, including subalpine conifer, alpine dwarf-shrub, barren, mixed conifer, and lodgepole pine forests at or near timberline. Typically associated with areas of low human disturbance.	No
American (=pine) marten *Martes americana*	FSC/FSS	--	Prefers multi-storied, mature mixed coniferous forests with high canopy coverage and an abundance of large snags and downed woody debris. Riparian corridors may be used for foraging and as travelways.	Yes

Table 11-2

Special-Status Wildlife Species Potentially Occurring Within the Project Area

Species	Status		Habitat Association	Suitable Habitat Within Project Area
	Federal	State		
Pacific fisher *Martes pennanti pacifica*	FSC/FSS/ BLMS	CSC	Prefers multi-storied, mature mixed coniferous forests with high (>50 percent) canopy coverage and an abundance of large snags and downed woody debris. Dense riparian corridors are utilized as dispersal corridors. Foraging often occurs in small (<2 acre) forest openings with significant ground cover.	Yes

Source: Hauge Brueck Assoc. 2008

Federal status:

FE	Listed as endangered under the FESA
FT	Listed as threatened under the FESA
PE	Proposed for listing as endangered under the FESA
PT	Proposed for listing as threatened under the FESA
CA	Candidate species for listing under the FESA
FSC	Species of concern as identified by the USFWS
D	Delisted in accordance with the FESA
FS	Forest Service sensitive species
BLMS	Listed as a Sensitive Species by the Bureau of Land Management

State Status:

SE	Listed as endangered under the CESA
ST	Listed as threatened under the CESA
CSC	Species of concern as identified by the CDFG
CFP	Listed as fully protected by the CDFG Code
Rare	Species identified as rare by the CDFG
NE	Listed as endangered in the state of Nevada
NV Sensitive	Considered a sensitive species according the state of Nevada Fish and Game

11.2.3 Special-status Species With the Potential to Occur within the Project Area

Of the species listed in Table 11-1 and Table 11-2, 6 plant species, 4 invertebrates, 1 fish, 1 amphibian, 2 reptiles, 12 birds, and 13 mammals (including 9 species of bats) have the potential to occur within the project area. In the section below, each species description includes information of status, habitat association, and potential threats causing its population decline.

Several of the birds listed by the USFWS (but not listed in Table 11-2) are migratory, non-permanent residents, including tricolored blackbird (*Agelaius tricolor*), black tern (*Chlidonias niger*), least bittern (*Ixobrychus exilis hesperis*), and white-faced ibis (*Plegadis chihi*).

11.2.3.1 Plants

Three-bracted onion

Allium tribracteatum, three-bracted onion, is a perennial herb that is listed as a federal Species of Special Concern by the USFWS and is considered Rare or Endangered in California and elsewhere by the CNPS. This species inhabits chaparral, lower montane coniferous forest, and upper montane coniferous forest on volcanic soils. This species is known from Calaveras and Tuolumne counties. A search of the databases identified no record of this species within the project area or vicinity.

Lavin's milkvetch

Lavin's milkvetch is a variety of the spindle loco or egg milkvetch species Astragalus oophorus described as *A. o. var. lavinii*. The species is indigenous to valley knolls and bluffs and open gravelly or sandy hillsides in the Great Basin sagebrush and piñon woodland zones of the Pine Nut Mountains and edges of the Carson Valley in Douglas County, NV, south to the Bodie Hills in Mono County, CA. They are diffuse perennial herbs having several ascending stems. Lavin's milkvetch is listed as a federal Species of special Concern by the USFWS (Barneby 1989).

Bodie Hills Draba

Known as *Cusickiella quadricostata*, the Bodie Hills draba is found on clay or rocky flats and hillsides in the Great Basin sagebrush zone of the Carson Valley in Douglas County, NV, south to the Bodie Hills in Mono County, CA. It is a low-growing, hairy member of the mustard family with white or yellowish flowers. According to the CNPS 2001 Inventory (CNPS 2001) it is not as common as once thought, and is on the Nevada watch list.

Oregon fireweed

Oregon fireweed, *Epilobium oreganum*, is found in lower and upper montane coniferous forests. This species is a perennial herb that blooms between June and September and is listed as a federal Species of Special Concern by the USFWS and is considered Rare or Endangered in California and elsewhere by the CNPS. The species is threatened mainly by logging activities. There are no occurrence records within the project vicinity for this species in the CNDDB or the CNPS databases.

Webber ivesia

Ivesia webberi is restricted to shallow, clayey soils with a rocky pavement-like surface. Occupied sites are restricted to mid-elevation flats, benches or terraces with no colluvial accumulation from upslope. Generally they occur on mountain slopes above large valleys. The habitat supports a sparse to moderately dense vegetation usually dominated or co-dominated by Webber ivesia and sagebrush or grass in association with a wide variety of usually dwarfed or cushion-like perennial herbs. This species is listed as a federal Species of special Concern by the USFWS and is considered Rare or Endangered in California and elsewhere by the CNPS, and is listed as Proposed Endangered in the state of Nevada. The mid-elevation bench or terrace locations of many of the habitat sites are particularly vulnerable to urban development. The sites are also attractive and convenient for access roads, off-road vehicle use, livestock supplementation and resultant trampling, and fire suppression activities.

This species has not previously been recorded within the CNDDB or CNPS for the project vicinity. Another species of ivesia, the Pine Nut Mountains ivesia, *Ivesia pityocharis*, has been indicated by the USFWS as possibly occurring in the project area.

Williams comleaf

Williams comleaf (*Polyctenium williamsiae*) is a perennial herb found in alkali marshes and swamps, playas, and vernal pools in Lassen County, Mono County, and in both the state of Oregon and Nevada. This species is considered an Endangered species in the state of Nevada, and is listed as a federal Species of Special Concern by the USFWS and is considered Rare or Endangered in California and elsewhere by the CNPS. Cause of species decline is attributed to grazing practices.

This species has not previously been recorded within the CNDDB or CNPS for the project vicinity.

11.2.3.2 Invertebrates

Carson Valley sandhill skipper

The sandhill skipper (*Polites sabuleti*) is indigenous to western North America. It is not in danger as a whole but local populations have become imperiled at the periphery of its range. It is a butterfly that feeds on the nectar of flowers during the adult phase of its life. Caterpillars feed on desert salt grass and a variety of other common grasses in the Great Basin and in the intermountain west. The species prefers alkali grasslands, moist meadows, lawns, salt marshes, sand dunes, sagebrush flats, and alpine fell fields. This species is considered Sensitive in the state of Nevada.

This species has not previously been recorded within the CNDDB for the project vicinity.

Wong's springsnail

There are many species of springsnails indigenous to western North America. During 1992 and 1993, the United States Department of the Interior, Bureau of Land Management (BLM) contributed funds to the Smithsonian Institution for surveys of springsnails and their habitats in the Great Basin. As a direct result of these surveys, springsnails were collected from nearly 400 sites. Of the 72 species collected by the University of Nevada, more than 50 are not described and new to science. As a result of these findings, the BLM produced a National Memorandum of Understanding recommending all springsnails as federal Species of Special Concern.

Springsnails are found in seeps, springs, and streams often occurring at the headwaters of the aquatic feature. Within springs these snails may be locally abundant and may be the primary herbivores in these habitats.

Springsnails are not well studied and are largely unknown. Wong's springsnail (*Pyrgulopsis wongi*) and other species (some possibly not described) may be found in the Carson Valley and in the adjacent mountains.

This species has not previously been recorded within the CNDDB for the project vicinity.

Other Invertebrates of Concern

Two other insect species, the Carson Valley wood nymph and Carson Valley silverspot are federal species of concern and BLM-sensitive species. Research information on these species is currently unavailable.

11.2.3.3 Fish

Lahontan cutthroat trout

Lahontan cutthroat trout (*Oncorhynchus clarki henshawi*) is native to the Lake Tahoe Region and Carson Valley and is federally listed as Threatened. Lahontan cutthroat trout are typically found in the headwater reaches of streams on the east slope of the Sierra Nevada. Individual creeks known to provide habitat for the species vary considerably in water temperature and habitat condition. The gradient of occupied streams ranges from a high of four percent to a low of one percent, while stream character varies from rock substrates to meadow-like reaches. Lahontan cutthroat trout, like other salmonids, require gravel riffles for spawning.

Many populations of the species have been extirpated from the Region by historical land management practices such as logging and road construction that have degraded or adversely impacted spawning and rearing habitat. Over-fishing and the introduction of non-native salmonids (brown, rainbow, lake, and brook trout) were also major factors in the extirpation of the species from the region. Lahontan cutthroat trout evolved in the absence of other trout species and consequently do not compete effectively with other salmonids.

Focused surveys for Lahontan cutthroat trout were not conducted at the project area. A brook trout (*Salvelinus fontinalis*) was observed in Indian Creek during field surveys. Although the Lahontan cutthroat trout was stocked in ICR at one time, given the absence of continuous stocking of the reservoir and the inability to compete with other salmonids that are known to occur within the reservoir and creek, Lahontan cutthroat trout will not expected to occur in either ICR or Indian Creek. It is likely that the Carson River, which occurs within the project area, and is historically known to support populations of the Lahontan cutthroat trout, continues to be inhabited by the species.

11.2.3.4 Amphibians

Mountain yellow-legged frog

The mountain yellow-legged frog (*Rana muscosa*) is listed both as a federal and state Species of Special Concern. The mountain yellow-legged frog is a true frog in the family Ranidae. Mountain yellow-legged frogs are moderately sized, about 40 to 80 millimeters from snout to urostyle (the pointed bone at the base of the backbone) (Jennings and Hayes 1994, Zweifel 1955). The pattern is variable, ranging from discrete dark spots that can be few and large, to smaller and more numerous spots with a mixture of sizes and shapes, to irregular lichen-like patches or a poorly defined network (Zweifel 1955). Some individuals may be dark brown with little pattern (Jennings and Hayes 1994). Folds are present on each side of the back, but usually they are not prominent (Stebbins 1985). The throat is white or yellow, sometimes with mottling of dark pigment (Zweifel 1955). The belly and undersurface of the high limbs are yellow, which ranges in hue from pale lemon yellow to an intense sun yellow. The iris is gold with a horizontal, black counter-shading stripe (Jennings and Hayes 1994). In the Sierra Nevada Mountains of California, the mountain yellow-legged frog ranges from southern Plumas County to southern Tulare County (Jennings and Hayes 1994), at elevations mostly above 1,820 meters (m) (6,000 feet (ft)).

The mountain yellow-legged frog inhabits riverbanks, meadow streams, isolated pools, and lake-borders in the high Sierra Nevada. The species prefers sloping banks with rocks or vegetation to the water's edge. Within the project area, there is potential for the species to inhabit portions of the West Fork of the Carson River, Indian Creek, and their tributaries.

11.2.3.5 Reptiles

Northwestern pond turtle

The western pond turtle is currently divided into two subspecies: the northwestern pond turtle (*Clemmys marmorata marmorata*) and the southwestern pond turtle (*Clemmys marmorata pallida*). Within California, the northwestern subspecies occurs throughout northern California extending northward from the vicinity of the American River, while the southwestern subspecies occurs in coastal drainages from the vicinity of Monterey County south (USFWS 2000). Individuals of both subspecies may occupy the zone between these two ranges. The northwestern and southwestern pond turtles are both designated as a federal and state Species of Special Concern. The northwestern subspecies is most likely to be present at the project site. Pond turtles are associated with permanent water or nearly permanent water including ponds, lakes, streams and irrigation ditches or permanent pools along intermittent streams in a variety of environments. Pond turtles are often observed basking on exposed sites, such as logs and mudbanks (Stebbins 1985). An omnivorous species, pond turtles feed on a variety of items including aquatic plant material, small insects, aquatic invertebrates, fish, and frogs. Threats to the species include habitat loss, degradation, and fragmentation.

This species has not previously been recorded within the CNDDB for the project vicinity.

Northern sagebrush lizard

The northern sagebrush lizard (*Sceloporus graciosus graciosus*) is a federal Species of Special Concern. It is most often associated with Great Basin sagebrush and bitterbrush over most of its range but also occurs in chaparral, piñon juniper woodland, oak, pine, and fir forest communities. Breeding populations are found throughout most of the intermountain west south into New Mexico and Texas. The species dwells among rocks, in brush, or downed logs and produces clutches of up to eight eggs. Changes in forms of land-use from shrublands to irrigated pasture have reduced the area of rangeland where the species once occurred.

This species has not previously been recorded within the CNDDB for the project vicinity.

11.2.3.6 Birds

Sage grouse

Sage grouse are uncommon permanent residents in the northern Great Basin east to the western Great Plains. It is a federal Species of Special Concern. Sage grouse often prefer mature stands of Great Basin sagebrush but with open areas for courtship displays. These birds are highly dependent on meadows or watercourse in sagebrush areas where they feed on forbs and insects.

White-faced ibis

The white-faced ibis (*Plegadis chihi*) is a federal Species of Special Concern. It is an uncommon summer resident in sections of the Great Central Valley and southern California. It prefers to feed in fresh emergent wetland, shallow lakes, wet meadows, and irrigated pasture. During periods of migration, the species is more widespread with known sightings at Honey Lake, in the Klamath Basin, on the northeastern plateau, and at Los Banos in the Great Central Valley. It no longer nests in California. It is more common east of the Sierra Nevada in the Great Basin, along the Snake River, and eastward to the Great Plains.

This species has not previously been recorded within the CNDDB for the project vicinity.

Northern goshawk

The northern goshawk (*Accipiter gentilis*) nesting habitat is generally characterized by older-aged mixed coniferous forest and deciduous woodland dominated by red fir, Jeffrey pine, and ponderosa pine. Nesting habitat is typically restricted to areas comprised of larger seral stage trees, a closed canopy for protection and thermal cover, and open spaces that allow maneuverability below the canopy (Fowler 1988). Deciduous riparian habitat is suitable when present with adjacent conifer stands. Isolated deciduous riparian stands provide only marginal habitat. Where more suitable habitat is absent, pure stands of mature lodgepole pine or stands dominated by mature lodgepole pine can provide habitat for nesting northern goshawks (Fowler 1988).

A model of goshawk nest stands developed by Fowler (1988) for application on the west slope of the Sierra Nevada with consideration for east side habitat conditions indicates that canopy closure of 60 to 100 percent from dominant and co-dominant trees is optimal for goshawk nest stands. Canopy closure of 50 to 59 percent is suitable, and canopy closure of 30 to 40 percent is marginal. Nest stands with a low canopy cover have been documented primarily from lodgepole pine forest habitats in eastern Oregon and from eastern Sierra Nevada forest habitats in the Inyo National Forest. According to Fowler, a stand size of 50 hectares (124 acres) or greater is characteristic of northern goshawk nesting territories within the Sierra Nevada. A disturbance-free zone within this 124-acre nest stand is considered necessary to increase the possibility of nest activity and reduce the potential for nest abandonment. In Fowler's model, slopes of 0 to 25 percent are identified as optimal. Slopes of 26 to 50 percent are considered suitable, while slopes greater than 50 percent are unsuitable. Aspect is also identified as an important component in nest stand selection, with a north to east aspect considered optimal. North to northwest and east to southeast slopes are considered suitable, while all other aspects are identified as marginal (Fowler 1988).

Foraging areas around nest sites generally encompass approximately 2,500 acres of forested habitat (Austin 1991 and Hargis et al. 1991). Snags and logs are considered important components of northern goshawk foraging areas, as they provide habitat for prey populations (USDA 1988). A minimum of three snags per acre greater than or equal to 18 inches diameter at breast height (dbh) and a minimum of five logs per acre greater than 12 inches dbh and eight feet long are cited as the habitat standard.

Habitat within the project area will be considered marginal according to Fowler’s model. The species most likely does not occur within the project area. This species has not previously been recorded within the CNDDB for the project vicinity.

Bald eagle

The bald eagle (*Haliaeetus leucocephalus*), which is proposed for delisting, was listed as federally threatened on August 11, 1995, and state listed as endangered on June 27, 1971. Breeding habitat generally consists of large remote lakes, reservoirs, and marshes with tall, sturdy trees located within a mile of open water. Winter over-night roosting sites consist of large, tall trees, with open crowns that are sheltered from winds.

Local sightings confirm bald eagle presence near ICR.

Ferruginous hawk

The USFWS and the CDFG designate the ferruginous hawk (*Buteo regalis*) as a Species of Special Concern. Ferruginous hawks are uncommon to fairly common winter residents of the Modoc Plateau, Central Valley, and Coast Ranges. Ferruginous hawks typically inhabit arid to semi-arid open terrain, such as valley and foothill grasslands, desert scrub, and sagebrush flats.

This species has not previously been recorded within the CNDDB for the project vicinity.

American peregrine falcon

The American peregrine falcon (*Falco peregrinus anatum*) was federally listed as endangered on October 13, 1970 and state endangered on June 27, 1971. On August 25, 1999, the American peregrine falcon was officially delisted in accordance with the Endangered Species Act. Delisting of a species indicates that the current population is stabilized so that the species is no longer in danger of becoming extinct.

Although the peregrine falcon is a recovering nesting species in California (especially along the central coast), the state population increases significantly during September to early May when northern migrants arrive to winter. These individuals typically winter in areas containing large numbers of shorebirds or waterfowl.

Peregrine falcons traditionally nest on open ledges of vertical cliffs overlooking rivers, lakes or the ocean where waterfowl, shorebird and other bird prey are readily available. City buildings and bridges may also provide nesting sites (BioSystems Analysis, Inc. 1994). Inland marshes, riparian corridors, and coastal wetlands are important foraging areas for breeding, migrating and wintering peregrines (Zeiner et al. 1990a).

The American peregrine falcon was once common throughout most of California. Eggshell thinning associated with high DDT concentrations in prey species led to a drastic decline in population numbers beginning in the 1940s. By the mid-1970s, the California population of American peregrine falcon was reduced to approximately 10 breeding pairs (CDFG 1992).

Suitable habitat for the species occur within the project area: the species has not previously been recorded within the CNDDB for the project vicinity.

California spotted owl

The range of the California spotted owl is considered to include the southern Cascades, the entire Sierra Nevada province of California, all mountainous regions of the southern California province and the central Coast Ranges at least as far north as Monterey County (Verner et al., 1992). In the Sierra Nevada, the major forest types comprising known and potential habitat include mixed conifer, red fir, ponderosa pine/hardwood, eastside pine, and foothill riparian/hardwood forests (nomenclature follows Verner et al., 1992). Mixed conifer forest is the most abundant forest type and contains most of the known owl sites. Habitats used for nesting typically have greater than 70 percent total canopy cover, except at very high elevations where canopy cover as low as 30 to 40 percent may occur (as in some red fir stands of the Sierra Nevada). Nest stands typically include a mixture of tree sizes with a number of very large, old trees and usually at least two canopy layers. Large snags and an accumulation of downed woody debris are usually present. Foraging habitat is similar in structure and composition but also comprises more open stands with canopy covers down to 40 percent.

Home range sizes of California spotted owl tend to be smallest in lower elevation hardwood forests, intermediate in size in conifer forests of the central Sierra Nevada, and largest in true fir forests in the northern Sierra Nevada (Verner et al., 1992). Neal et al., (1990) reported that California spotted owl home ranges in Sierra Nevada mixed conifer forest average 3,400 acres, including about 460 acres in stands with 70 percent or greater canopy cover and about 1,990 acres in stands with 40 to 69 percent canopy cover. Verner et al. (1992) generally concur with these data, indicating that Sierra National Forest owls were found to have a median home range for pairs of approximately 3,000 to 5,000 acres. Verner et al. (1992) cite an overall mean home range size of owl pairs during the breeding period in Sierran conifer forests of about 4,200 acres.

Habitat within the project area will be considered marginal according to Fowler's model. The species most likely does not occur within the project area. This species has not previously been recorded within the CNDDB for the project vicinity.

Great gray owl

Historic records of the great gray owl (*Strix nebulosa*) indicate that the species once ranged through 15 counties in the Sierra Nevada and north coast regions of California. In 1989 only ten pairs of great gray owls were thought to be nesting in California (CDFG 1992). These ten pairs were all documented from the vicinity of Yosemite National Park and adjacent National Forest lands. Studies conducted since 1989 now suggest that a larger population of great gray owls exist in the central Sierra Nevada. Although the CDFG currently estimates this population at approximately 100 great gray owls; it is not known how many occur as active nesting pairs.

In the Sierra Nevada, great gray owls inhabit mixed coniferous forests between 2,500 and 8,000 feet in elevation. Important characteristics of the forest habitat include high canopy closure, a high density of snags, and proximity to meadows, or other open vegetation types. Nesting usually occurs within 600 feet of the forest edge and adjacent to open foraging habitat. Most nests are made in broken-top snags, but platforms such as old hawk nests are also used. Nest trees or snags are generally greater than 21 inches dbh and at least 20 feet tall (USDA 1992). The reduced range of great gray owls in California is thought to be a result of habitat loss due to logging of mature forests and overgrazing of montane meadows (CDFG 1992).

The CNDDB cites one occurrence of the great gray owl in 1984. This occurrence was recorded approximately two miles west of Markleeville in the Grover Hot Springs State Park. No recent sightings of species were found in the database for the Carter's Station, Minden, or Woodfords USGS 7.5" topographic quadrangles.

Rufous hummingbird

The Rufous Hummingbird (*Selasphorus rufus*) is a federal species of concern. It is a common migrant and uncommon, summer resident of California but is found north into northern Nevada, Oregon, Washington, Idaho, and western Canada. While a common breeder in the Pacific Northwest, it has been observed breeding in the Klamath Region in recent years. Most post-breeders migrate south through the Cascades and Sierra Nevada in summer. The species is found in a variety of habitats that support the nectar producing flowers upon which it feeds. It is known from montane meadows and aspen thickets into coniferous, hardwood, and chaparral plant communities.

Lewis' woodpecker

The Lewis' woodpecker (*Melanerpes lewis*) is a federal Species of Special Concern. It is an uncommon, local winter resident occurring in open oak savannas, broken deciduous and coniferous habitats. Found along the eastern slopes of the California Coast Ranges and also the Modoc Plateau, Sierra Nevada, and Transverse ranges. Lewis' woodpecker breeds locally along the eastern slopes of the Coast Ranges of California and in the Sierra Nevada, Warner Mountains, Klamath Mountains, and Cascade Range. The species tends to wander as nomadic flocks that travel to the mountains in the summer and to the lowlands in winter.

This species has not previously been recorded within the CNDDB for the project vicinity.

Little willow flycatcher

The Little willow flycatcher (*Empidonax traillii brewsteri*) is a federal Species of Special Concern. It is a rare to locally uncommon, summer resident in wet meadow and montane riparian habitats above 2000 feet in the Sierra Nevada and Cascade Range. The birds are most often found in broad, open river valleys or in large meadows. Great Basin races are known as E. t. adastus. To the north and west, Pacific Northwest races are regarded as a separate subspecies E. t. brewsteri. The species is often found nesting in ungrazed willow thickets of mountain meadows, seeps and streams where it feeds on flying insects.

This species has not previously been recorded within the CNDDB for the project vicinity.

Brewer's sparrow

The Brewer's sparrow (*Spizella breweri*) is a federal Species of Special Concern. It is most often associated with Great Basin sagebrush and bitterbrush over most of its range but also occurs in related steppe and desert environments. Breeding populations are found throughout most of the intermountain west, but also occur east of the Rocky Mountains in the Great Plains. Birds tend to prefer cover with shrubs and not grass. Its tendency to prefer shrublands to grasslands is one factor in the decline of breeding populations. Fragmentation of habitat occurs as a result of overgrazing of shrublands, clearing of shrubs to plant cheatgrass and other range grasses, or habitat loss to urbanization, power line corridor construction, and highway construction. Changes in forms of land-use from shrublands to irrigated pasture have reduced the area of rangeland where the species once occurred.

This species has not previously been recorded within the CNDDB for the project vicinity.

11.2.3.7 Mammals

Bats

Nine species of special-status bats have suitable habitat within the project area. The pale Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) and Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*) are federal Species of Special Concern. These bats inhabit coniferous forests, woodlands, grasslands and deserts. The spotted bat (*Euderma maculatum*) is both a federal and California Species of Special Concern. This bat inhabits desert scrub and open forested areas. It roosts in cliff faces and rock crevices. The small-footed myotis bat (*Myotis ciliolabrum*), a federal Species of Special Concern inhabits relatively arid and brushy uplands in close proximity to water. The long-eared myotis bat (*Myotis evotis*) is another federal Species of Special Concern that may be found in a variety of brush, woodland, and forest communities that occur within the project area. The fringed myotis bat (*Myotis thysanodes*), the long-legged myotis bat (*Myotis volans*), the Yuma myotis bat (*Myotis yumanensis*) and the Greater western mastiff bat (*Eumops perotis californicus*) are all federally listed as Species of Special Concern. These bats inhabit a variety of vegetation communities including valley and foothill hardwood forests, hardwood coniferous forests, piñon-juniper pine woodlands, open semi-arid to arid chaparral, and scrub. Although focused surveys for bat species were not conducted suitable habitat for the seven species described above exists within the project area. Threats to the species include roosting habitat loss, destruction, and fragmentation.

Pygmy rabbit

The Pygmy rabbit (*Brachylagus idahoensis*) is a federal Species of Special Concern. Populations of this species are uncommon in sagebrush, bitterbrush, and piñon-juniper woodlands of the Great Basin of California, Idaho, Oregon, and Nevada. It is the smallest of the lagomorphs in western North America. Within its range this species prefers large sagebrush bitterbrush, and rabbitbrush clumps where it burrows and forages. Pygmy rabbits produce one litter of six young per year. The diet of the pygmy rabbits consists largely of foliage from sagebrush.

This species has not previously been recorded within the CNDDB for the project vicinity.

Sierra Nevada red fox

The Sierra Nevada red fox (*Vulpes vulpes necator*) inhabits forested areas interspersed with riparian and meadow habitats and brush fields. The range of this species is described as the northern California Cascades eastward to the northern Sierra Nevada, then south along the Sierra Nevada crest to Tulare County. In the Sierra Nevada, preferred forest types include red fir, lodgepole pine, and subalpine fir. The species occurs mainly at elevations greater than 7,000 feet and seldom is observed below 5,000 feet.

As of 1977, Sierra Nevada red fox populations were thought to be either maintaining themselves at a reduced level or slowly declining. There is little current information available to either justify or counter this assumption (USDA 1992).

The Sierra Nevada red fox moves seasonally from higher elevations in winter to mid-elevation forests during the summer. Predator avoidance in the open may not be a problem for this native fox, as they are known to hunt in open areas (Duncan Furbearer Interagency Workgroup 1989). Although little is known about this species and no specific criteria for analyzing its habitat have been developed, it has been assumed that the Sierra Nevada red fox, like other subspecies of red fox, may be more adaptable and opportunistic than other forest carnivores. Further, it has been hypothesized that if the more restrictive habitat requirements of Pacific fisher, pine marten, willow flycatcher, and California spotted owl are provided, the habitat requirements of Sierra Nevada red fox will also be met (Freel 1991).

This species has not previously been recorded within the CNDDB for the project vicinity.

American marten

The American (pine) marten (*Martes americana*) occurs throughout the Sierra Nevada Province where suitable habitat is present. Based on an extensive review of scientific literature and expert opinion, Freel (1991) described preferred habitat as dense (60 to 100 percent canopy closure), multi-storied, multi-species late seral stage coniferous forest of red fir, red fir/white fir mixtures, lodgepole pine, and mixed conifer. A high number of large snags and downed logs are associated with preferred habitat. Habitat areas are generally located in close proximity to dense riparian corridors that are used as travelways. An interspersion of small (<1 acre) openings with good ground cover is required for foraging. For the northern Sierra Nevada, Freel cites elevational records of 3,400 to 10,400 feet, with an average elevation of 6,000 feet for preferred habitat.

According to Freel (1991), numerous and heavily traveled roads are not desirable within pine marten habitat areas as they are associated with habitat disruption and animal mortality. Roads may also reduce food availability for pine marten by increasing road kills in prey populations and creating behavioral barriers to foraging movements (Allen 1987). Occasional one and two lane forest roads with moderate levels of traffic are not believed to limit pine marten movements (Freel 1991).

This species has not previously been recorded within the CNDDB for the project vicinity.

Pacific fisher

In California, Pacific fisher (*Martes pennanti pacifica*) most often occur at somewhat lower elevations than pine marten. These elevations are typically between 2,000 and 5,000 feet in the North Coast region and between 4,000 and 8,000 feet in the southern Sierra Nevada. Based on Freel's (1991) literature review, preferred habitat for the fisher is characterized by dense (60 to 100 percent canopy), multi-storied, multi-species late seral stage coniferous forest with a high number of large snags and downed logs. Preferred habitat types in the Sierra Nevada include montane hardwood-conifer, mixed conifer, montane riparian, Jeffrey pine, ponderosa pine, lodgepole pine, subalpine conifer, aspen, eastside pine, and possibly red fir. Habitat areas also include close proximity to dense riparian corridors, saddles between major drainages, or other landscape linkage patterns that are used as dispersal corridors. An interspersion of small (< 2 acres) openings with good ground cover is required for foraging.

Although studies have indicated that fishers apparently use greater percentages of early to mid-seral stage forest stands for foraging in summer months, they still appear to need and utilize the mature, old growth stands for denning, especially in areas with high snowfall (Freel 1991). Numerous and heavily traveled roads are not desirable, as they are associated with habitat disruption and animal mortality. Occasional one- and two-lane forest roads with moderate levels of traffic are not believed to limit fisher movements.

The CNDDB cites one occurrence of fisher in 1967. This occurrence was recorded approximately four miles south of Meyers in the El Dorado National Forest. No recent sightings of fisher were found in the database for the Carter's Station, Markleeville, Minden, or Woodfords USGS 7.5" topographic quadrangles. Available data suggest that the pacific fisher have been extirpated from the central and northern Sierra Nevada.

11.3 Regulatory Setting

The Project will comply with federal, state, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Biological Resources Chapter the following subsections provide descriptions of applicable requirements.

11.3.1 Federal Endangered Species Act

The FESA recognized that many species of fish, wildlife, and plants are in danger of or threatened with extinction and established a national policy that all federal agencies work toward conservation of these species. The FESA designates the Secretary of the Interior and the Secretary of Commerce as responsible for identifying endangered and threatened species and their critical habitats, carrying out programs for the conservation of these species, and rendering opinions regarding the impact of proposed federal actions on endangered species. The FESA also outlines what constitutes unlawful taking, importation, sale, and possession of endangered species and specifies civil and criminal penalties for unlawful activities.

Biological assessments are required under Section 7(c) of the FESA if listed species or critical habitat may be present in the area and affected by any major construction activity conducted by, or subject to issuance of a permit from, a federal agency as defined in Part 404.02. Under Section 7(a)(3) of the FESA, every federal agency is required to consult with the USFWS or National Marine Fisheries Service on a proposed action if the agency determines that its proposed action may affect an endangered or threatened species.

Section 9 of FESA prohibits acts of disturbance, which result in the "take" of threatened or endangered species. "Take" is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." Violation of this section can result in penalties of up to $250,000 and up to one-year imprisonment. Sections 7 and 10(a) of FESA provide a method for permitting an action that may result in an "incidental take" of a federally listed species. Incidental take refers to take of a listed species that is incidental to, but not the primary purpose of, an otherwise lawful activity. Incidental take is permitted under Section 7 for projects on federal land or involving a federal action, while Section 10(a) provides a method for permitting an incidental take resulting from a state or private action.

11.3.2 Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (MBTA) of 1918 (16 USC 703-711) makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 CFR Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations (50 CFR 21).

11.3.3 Bureau of Land Management

BLM manages most of the land where the District proposes to improve existing ditches. BLM is responsible for reviewing proposed projects that involve federal land. The BLM may be the “Lead Agency” for any of the anticipated NEPA documents, such as an environmental assessment (EA) that may be needed to improve or construct water conveyance ditches and pipelines on federal land, or to exchange BLM land.

11.3.4 Forest Service

Forest Service, Toiyabe National Forest (U.S. Forest Service), manages many of the federal lands not under BLM or Washoe control within the project area, east of the crest of the Carson Range, such as lands traversed by the District "C"-Line over Luther Pass. The Toiyabe National Forest Supervisor will review the EIR to ensure conformity with the Toiyabe Forest Plan.

11.3.5 Environmental Protection Agency/Fish & Wildlife Service Memorandum of Agreement

USEPA and USFWS have a Memorandum of Agreement (MOA) that covers endangered and threatened species within the project area. If, for example, the endangered Lahontan cutthroat trout is reintroduced into Indian Creek as part of the overall Carson River recovery plan for this species, then Indian Creek becomes critical habitat.

11.3.6 Wetlands and Other Jurisdictional Waters of the United States

The CEQA Guidelines (1994) state that affects on the environment that conflict with adopted environmental plans or goals are normally regarded as significant. A "no net loss of wetland acreage or value" policy is established within both the state and federal executive branches (California Wetlands Conservation Policy 1993). Ditching, draining, or other activities that could alter the characteristic physical, chemical, biological or public interest values (as defined by 40 CFR 230 Subparts C-F) associated with wetlands and other waters of the U.S. are considered impacts under the United States Army Corps of Engineers (USACE) authority. For the purposes of this document, any destruction of wetlands or other waters of the U.S. (either in fill or other disturbance) is considered significant.

Placement of fill material in waters of the United States is regulated through Section 404 of the Clean Water Act of 1972 (CWA), under jurisdiction of the USACE. Waters defined under Section 404 include, but are not limited to, areas subject to the ebb and flow of the tide, streams, and wetlands (33 CFR §328.23[3]). The extent of the waters in streams is defined by elevations along the stream bank above which water normally does not rise (ordinary high water). Wetlands are defined as areas that are saturated or inundated by surface or ground water for a frequency and duration sufficient to support the prevalence of plants adapted for life in saturated soil conditions (33 CFR §328 [(b)b]).

The goal of the CWA is to maintain, restore, and enhance the physical, chemical, and biological integrity of the Nation's waters. In reviewing proposed projects involving impacts to wetlands, the USACE requires no net loss of wetland functions and values. Compensatory mitigation for unavoidable impacts to wetlands permitted by the USACE requires replacement acreage, preferably in-kind and in the same watershed, sufficient to achieve the goal of no net loss. The USACE determines replacement acreage is based on the functions and values of the area being filled, the functions and values of the proposed mitigation site, and the likelihood of success of the proposed mitigation. Wetland mitigation includes restoration, creation, and/or preservation. The mitigation is based on the functions and values of wetlands that are affected and the local opportunities to utilize these three approaches. Compensation is completed before or concurrent with the impact, as near to the site of impact as practicable, and the mitigation site must be protected from subsequent loss or degradation.

Since 1984, with the implementation of its settlement agreement final regulations, the USACE began to regulate the discharge of fill into isolated waters. The 1984 draft regulations also included the now expired Nationwide permit (NWP) 26 for discharges into isolated waters and other waters above the headwaters. NWP 26 has been replaced, in large part, by NWP 39, and other NWPs, effective June 1, 2000. Lacking information about migratory bird use, the USACE assumed jurisdiction over seasonal wetlands, including seasonal pools and ponds, that are isolated or above the headwaters hinging its regulatory authority on the Migratory Bird Species Act. The USACE operated under the assumption until the January 2001 United States Supreme Court decision Solid Waste Agency of Northwestern Cook County versus United States Army Corps of Engineers et al. (SWANCC decision). The Court apparently removed the jurisdictional status of isolated intrastate waters including vernal pools, abandoned, water-filled quarry pits, some ponds and lakes without outlets, isolated wetlands, seeps and seasonally wet depressions. The State RWQCB exercises jurisdiction and control over waters of the State under applicable Basin Plan wetland protection and water quality control policies.

Current policy statements issued by USACE General Counsel assert that, "the Corps' ecological judgment about the relationship between waters and their adjacent wetlands provides an adequate basis for legal judgment that adjacent wetlands may be defined as waters under the CWA. In sum, the holding, the facts, and the reasoning of United States versus Riverside Bayview Homes continues to provide authority for the USEPA and the USACE to assert CWA jurisdiction over all of the traditional navigable waters, all interstate waters, and all tributaries to navigable or interstate waters, upstream to the highest reaches of the tributary systems, and over all wetlands adjacent to any and all of these waters."

11.3.7 California Endangered Species Act

The CESA (Fish and Game Code Sections 2050-2098) establishes state policy to conserve, protect, restore and enhance any endangered species or any threatened species and its habitat. The CDFG is charged with establishing a list of endangered and threatened species. State agencies must consult with the CDFG to determine if a proposed project is likely to jeopardize the continued existence of any endangered or threatened species.

The California Fish and Game Code defines "take" (Section 86) and prohibits "taking" of a species listed as endangered or threatened under the CESA (California Fish and Game Code Section 2080) or as fully protected (as defined in California Fish and Game Code Sections 3511, 4700, and 5050). Impacts on individuals of those species are considered significant if they result in the following effects: a) direct mortality; b) permanent or temporary loss of occupied habitat that result in mortality to or reduced productivity of at least one individual of the species; c) avoidance of biologically important habitat for substantial periods resulting in mortality to or reduced productivity of at least one individual of the species.

Section 2081 of the Fish and Game Code allows the "take" of a species listed as threatened or endangered by the CESA. "Take" is defined as any act that involves direct mortality or other actions that may result in adverse impacts when attempting to take individuals of a listed species. Under Section 2081, the CDFG may issue a permit to authorize take for scientific, educational or management purposes, or take that is incidental to otherwise lawful activities.

11.3.8 California Environmental Quality Act

11.3.8.1 CEQA Guidelines - Article 5, Section 15065

Article 5, Section 15065 of the CEQA Guidelines requires that a lead agency make mandatory findings of significance in an EIR if:

"The Project has the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory."

11.3.8.2 CEQA Guidelines - Section 15380

Rare or endangered species are defined in the CEQA Guidelines (Section 15380) as follows:

(a) "Species" as used in this section means a species or subspecies of animal or plant or variety of plant;

(b) A species of animal or plant is:

(1) "Endangered" when its survival and reproduction in the wild are in immediate jeopardy from one or more causes, including loss of habitat, change in habitat, over exploitation, predation, competition, disease, or other factors; or

(2) "Rare" when either:

(A) Although not presently threatened with extinction, the species is existing in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens; or

(B) The species is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered "threatened" as that term is used in the Federal Endangered Species Act;

(c) A species of animal or plant shall be presumed to be rare or endangered as it is listed in:

(1) Sections 670.2 or 670.5, Title 14, California Administrative Code; or

(2) Title 50, Code of Federal Regulations Sections 17.11 or 17.12 pursuant to the Federal Endangered Species Act as rare, threatened, or endangered; or

A species not included in any listing identified in subsection (c) shall nevertheless be considered to be rare or endangered if the species can be shown to meet the criteria in subsection (b).

11.3.8.3 CEQA Guidelines - Appendix G

Appendix G of the State CEQA Guidelines lists several impacts that are "normally" considered significant. The three impacts relating to biological resources are listed below:

- Substantially affect a rare or endangered species of animal or plant or the habitat of the species;
- Interfere substantially with the movement of any resident or migratory fish or wildlife species; and
- Substantially diminish habitat for fish, wildlife, or plants.

11.3.9 California Fish and Game Code

The CDFG Code defines "take" (Section 86) and prohibits "taking" of a species listed as threatened or endangered under the CESA (California Fish and Game Code Section 2080) or as fully protected (as defined in California Fish and Game Code Sections 3511, 4700, and 5050). Impacts on individuals of those species are considered significant if they result in the following effects: a) direct mortality; b) permanent or temporary loss of occupied habitat that will result in mortality to or reduced productivity of at least one individual of the species; c) avoidance of biologically important habitat for substantial periods resulting in mortality to or reduced productivity of at least one individual of the species.

The CDFG regulates activities that may affect stream beds through its 1600 process. Division 2, Chapter 6, Section 1601 of the CDFG states that "...general plans sufficient to indicate the nature of a project for construction by, or on the behalf of, any governmental agency, state or local, and any public utility, of any project which will divert, obstruct or change the natural flow or bed, channel, or bank of any river, stream, or lake designated by the Department in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit, or will use material from the stream beds designated by the Department, shall be submitted to the Department." The CDFG states that their jurisdiction is any area that is within the 100-year floodplain. Impacts within this jurisdiction are considered significant.

11.3.10 California Fish and Game Code Native Plant Protection Policy

The goals of the Chapter 10 of the California Native Plant Protection Policy are as follows:

The intent of the Legislature and the purpose of this chapter is to preserve, protect, and enhance endangered or rare plants of this state (Section 1900). For purposes of this Chapter, a 'native plant' means a plant that grows in a wild uncultivated state, which is normally found native to the plant life of this state (Section 1901).

The commission may adopt regulations governing the taking, possession, propagation, transportation, exportation, importation, or sale of any endangered or rare native plants. Such regulations may include, but shall not be limited to, requirements for persons who perform any of the foregoing activities to maintain written records and to obtain permits, which may be issued by the department (Section 1907).

No person shall import into this state, or take, possess, or sell within this state, except as incident to the possession or sale of the real property on which the plant is growing, any native plant, or any part or product thereof, that the commission determines to be an endangered native plant or a rare native plant, except as otherwise provided in this chapter (Section 1908).

All state departments and agencies shall, in consultation with the department, utilize their authority in furtherance of the purposes of this chapter by carrying out programs for the conservation of endangered or rare native plants. Such programs include, but are not limited to, the identification, delineation, and protection of habitat critical to the continued survival of endangered or rare native plants (Section 1911).

11.3.11 Nevada Division of Forestry

The State of Nevada Revised Statutes (NRS) are applicable to the protection, management, and use of natural resources and the environment in the State. The NDF is a subsidiary agency of State of Nevada Department of Conservation and Wildlife. The NDF's regulatory authority is vested in the office of the Nevada State Forester Fire Warden. The regulations in NRS Chapter 527 include: tree or flora removal; Christmas tree, cactus and yucca removal; fire regulations; forest insects and pests; piñon pine protection; and native flora threatened with extinction policy. The chapter also provides a program for the conservation, protection, restoration, and propagation of selected species of plants and for the perpetuation of these species.

11.3.12 Nevada Division of Fish & Wildlife

The NRS are applicable to the protection, management, and use of natural resources and the environment in the State. The Nevada Division of Fish & Wildlife (Division) is a subsidiary agency of State of Nevada Department of Conservation and Wildlife. The Division's regulatory authority is vested in the Nevada State Board of Wildlife Commissioners. The regulations include: NRS Chapter 488 (boat safety); 501 (wildlife policy); 502-503 (hunting, fishing, trapping, County Advisory Board, enforcement, fauna threatened with extinction policy); and 504 (wildlife management, federal agency coordination, and wild horse protection). Chapter 503 of the NRS also regulates the erection of dams and weirs or other obstructions to the free passage of fish in waters of the State of Nevada including canals, ditches, or any other artificial watercourse. The chapter also provides a program for the conservation, protection, restoration, and propagation of selected species of wildlife (including native fish and migratory birds), and for the perpetuation of these species.

11.4 Biological Resource Goals, Objectives and Policies

Table 11-3 identifies goals, objectives, and policies that provide guidance for development in relation to biological resources within the project area. The table also indicates which criteria are responsive to each set of policies.

Table 11-3

General Plan Goals, Objectives, and Polices – Biological Resources

Adopted Plan Document	Document Section	Numeric Reference	Policy	Relevant Evaluation Criteria
Alpine County General Plan	Conservation Element Wetlands	Goal 8 Policy 8	Preserve and protect wetland areas. Minimize development in or conversion of wetlands.	6, 7
Douglas County Master Plan	Conservation Element Potential Wetlands	Goal 4.07 Policy 4.07.01 Policy 4.07.02 Policy 4.07.03 Policy 4.07.04	To protect wetlands or their values for groundwater recharge, flood protection, sediment and pollution control, wildlife habitat, and open space. Development proposals within Douglas County shall be referred to USACE for review and comment. Any development within the USACE designated wetland areas must meet the requirements specified by USACE and USFWS or other jurisdiction and agencies. A copy of the 404 Permit, along with conditions, must be provided to Douglas County for incorporation into their files. Douglas County may review the potential for wetland mitigation banking to allow for replacement of wetlands.	6, 7
Alpine County General Plan	Conservation Element Plant Life: Threatened, Rare, or Endangered Plants	Goal 9 Policy 9	Protect and increase the populations of threatened, rare, or endangered plant species. Areas containing or suspected of containing rare, endangered, or threatened plants should not be disturbed without providing the CDFG a reasonable period of time within which to investigate, remove, or otherwise protect them.	1, 2, 5, 6
Alpine County General Plan	Conservation Element Animal Life: Sensitive, Threatened, Rare, or Endangered Wildlife	Goal 13 Policy 13	Protect the critical habitat of all Federal or State listed sensitive, threatened, rare, or endangered wildlife. Provide the CDFG notice of all development that may encroach upon the critical habitat of sensitive, threatened, rare, or endangered species with reasonable time for CDFG to respond with recommendations for project alternatives and mitigation measures.	1, 3, 5, 6

Table 11-3

General Plan Goals, Objectives, and Polices – Biological Resources

Adopted Plan Document	Document Section	Numeric Reference	Policy	Relevant Evaluation Criteria
Alpine County General Plan	Conservation Element Animal Life: Deer	Goal 14 Policy 14a Policy 14b	Protect important deer habitats and migration routes to the greatest extent feasible. Provide CDFG with notice of all development projects located within known or suspected critical summer or winter range or deer migration corridors with reasonable time for CDFG to respond with recommendations for project alternatives and mitigation measures. Encourage cluster development to protect wildlife habitats and migration routes by placing them in permanent open space in conjunction with approved cluster development.	3, 4, 5, 6
Alpine County General Plan	Conservation Element Animal Life: Fisheries	Goal 15 Policy 15a Policy 15b Policy 15c Policy 15d Policy 15e	Protect and enhance fisheries including the existing and proposed habitats for threatened Paiute and Lahontan cutthroat trout. Protect the aquatic habitat along the East Fork of the Carson River to maintain the fishery in the designated Wild Trout Management Area upstream of Wolf Creek. Cooperate with CDFG in implementing their East Fork of the Carson River Wild Trout Management Plan. Acquire easements to and along rivers, streams, and lakes that provide viable fish habitats wherever feasible and appropriate to maintain fishing access. Cooperate with other agencies in the development of an overall drainage management plan for the East and West Forks of the Carson River and their tributaries. Support acquisition of water rights at Heenan Lake, Red Lake, Caples Lake, Twin Lake, and Meadow Lake Hydro System. Oppose the transfer of water rights or diversion of water within Alpine County that would adversely impact fisheries and recreational uses.	1, 5, 6, 7

Table 11-3

General Plan Goals, Objectives, and Polices – Biological Resources

Adopted Plan Document	Document Section	Numeric Reference	Policy	Relevant Evaluation Criteria
Douglas County Master Plan	Conservation Element Wildlife/ Vegetation	Goal 4.19 Policy 4.19.01 Policy 4.19.02 Policy 4.19.03 Policy 4.19.04	To protect Douglas County's sensitive wildlife and vegetation in recognition of their importance as components of the County's quality of life. Protect environmentally sensitive and habitat areas that serve valuable ecological functions by limiting their development or by requiring mitigation of adverse impacts resulting from development. Establish development regulations and design guidelines to minimize impacts of new development on sensitive habitats and migration routes. Work with the USFS and BLM to retain and enhance the viability of deer migration corridors through the County. Support efforts to manage the County's rivers and streams to maintain or enhance the existing riparian ecosystems.	1, 2, 3, 4, 5, 6, 7

Source: Hauge Brueck Assoc. 2008

1 The biological resources evaluation criteria are provided in Table 11-4.

11.5 Evaluation Criteria With Points of Significance

Justification to accompany the points of significance of impacts to the natural environment is from the major regulatory policies, ordinances and rules that govern Alpine and Douglas counties. These include the primary federal and state environmental protection laws, BLM policies, Forest Service plans, Alpine County General Plan, and Douglas County Master Plan. The CDFG Code, NEPA, CEQA, the FESA, and the CESA are used as supporting documentation in developing the evaluation criteria and points of significance outlined in Table 11-4.

For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A Biological Resource impact is considered significant if implementation of the Project exceeds the point of significance show in Table 11-4.

Table 11-4

Evaluation Criteria and Points of Significance - Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
1. Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	a. Number of individuals of a plant or wildlife species that will be lost b. Acres of occupied or designated critical habitat	a. Greater than 0 individuals b. Greater than 0 acres	FESA CESA (Sections 2062 and 2067) CEQA Checklist IV-a CEQA (Article 5, Section 15065) California Native Plant Protection Act (CDFG Code Sections 1900-1913) Alpine County General Plan 2005 Douglas County Master Plan 1996
2. Will the Project cause loss of individuals of CNPS List 2, 3, or 4 plant species?	Number of plant species or populations that will experience a loss of individuals	Greater than 15 percent of known occurrences or populations in either Alpine or Douglas County	CEQA Checklist IV-a California Native Plant Protection Act (CDFG Code Sections 1900-1913) CEQA (Article 5, Section 15065)
3. Will the Project cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	Number of active nesting sites or wildlife nursery sites	Greater than 0 active nest sites or wildlife nursery sites	CEQA Checklist IV-a CEQA (Article 5, Section 15065) CDFG Wildlife Habitat Relationships model - (Version 5.2) Fish and Game Code - (Section 3503.5)
4. Will the Project substantially block or disrupt major fish or wildlife migration or travel corridors?	Number of corridors substantially blocked or disrupted	Greater than 0 corridors	CEQA Checklist IV-d Alpine County General Plan 2005 Douglas County Master Plan 1996

Table 11-4

Evaluation Criteria and Points of Significance - Biological Resources

Evaluation Criteria	As Measured By	Point of Significance	Justification
5. Will the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	Acres of sensitive wildlife habitat	Greater than 10 percent of each habitat type in Alpine or Douglas County	CEQA Checklist IV-b CEQA (Article 5, Section 15065) CDFG Wildlife Habitat Relationships model - (Version 5.2) Alpine County General Plan 2005 Douglas County Master Plan 1996
6. Will the Project conflict with any local, regional, or state policies or ordinances protecting biological resources, habitat conservation plans or other approved plan?	Compliance with policies, ordinances, and habitat conservation plans	Conflict with said policies, ordinances, or conservation plans	CEQA Checklist IV-e,f- Alpine County General Plan 2005 Douglas County Master Plan 1996
7. Will the project have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	Acres of disturbance to wetlands.	Greater than 0 acres	CEQA Checklist IV-c Clean Water Act, 404 CFR 230 Section 404 (b)(1) BLM, USACE, USEPA, USFWS, Lahontan, CDFG, Section 1600 et seq., CEQA Appendix G Checklist, Alpine County General Plan 2005, Douglas County Master Plan 1996

Source: Hauge Brueck Assoc. 2008

Notes:

CDFG California Department of Fish and Game CEQA California Environmental Quality Act CESA California Endangered Species Act CNDDB California Natural Diversity Data Base CNPS California Native Plant Society FESA Federal Endangered Species Act USFWS United States Fish and Wildlife Service	1. Endangered, threatened, or rare is defined here as: federally listed endangered, threatened, or proposed plant or wildlife species state listed endangered, threatened, or proposed plant or wildlife species or rare plant species federal candidates for listing CNPS List 1B plant species 2. Sensitive wildlife are defined here as: wildlife designated as “species of special concern” by the California Department of Fish and Game wildlife listed as “fully protected” in California 3. In terms of habitats, a “major corridor”, for purposes of the EIR/EIS, is defined as any habitat that serves as a movement corridor for entire populations of a given species, essential to completion of their life cycle.

11.6 Environmental Consequences (Impacts) and Recommended Mitigation

11.6.1 No Project Alternative

Table 11-5 presents potential impacts to Biological Resources, outlines points of significance, and ranks the level of significance for the No Project Alternative.

Table 11-5

Biological Resource Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
BIO-1. Will the No Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	a. Greater than 0 individuals b. Greater than 0 acres	NP-1, NP-2			
BIO-2. Will the No Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?	Greater than 15 percent of known occurrences or populations in Alpine County	NP-1, NP-2			
BIO-3. Will the No Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	Greater than 0 active nest sites or wildlife nursery sites	NP-1, NP-2			
BIO-4. Will the No Project Components substantially block or disrupt major fish or wildlife migration or travel corridors?	Greater than 0 corridors				NP-1, NP-2
BIO-5. Will the No Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	Greater than 10 percent of each habitat type in Alpine or Douglas County	NP-1, NP-2			

Table 11-5					
Biological Resource Impacts – No Project Components					
		Level of Significance by Component			
Impact	Point of Significance	Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
BIO-6. Will the No Project Components conflict with any local, regional, or state policies or ordinances protecting biological resources, habitat conservation plans or other approved plan?	Conflict with said policies, ordinances, or conservation plans				NP-1, NP-2
BIO-7. Will the No Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	Greater than 0 acres	NP-1, NP-2			

Source: Hauge Brueck Assoc., 2008

Impact: **BIO-1. Will the No Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?**

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components (NP-1 and NP-2) will result in continued operation of the District's existing freshwater and recycled water components as currently occurs. Under current operation of the District facilities, the potential exists for overtopping of the HPR Dam with recycled water and impact the water quality of Indian Creek and impact surrounding native rangeland. The resultant flooding of Indian Creek and associated lands has the potential to impact native rangeland that may contain sensitive species. The No Project Alternative will involve no construction or new facilities, and will not be able to alleviate impacts associated with flood events.

Mitigation: *No mitigation is possible. NP-1, NP-2*

Impact: **BIO-2. Will the No Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?**

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components (NP-1 and NP-2) will result in continued operation of the District's existing freshwater and recycled water components as currently occurs. Under current operation of the District facilities, the potential exists for overtopping of the HPR Dam with recycled water and impact the water quality of Indian Creek and impact surrounding native rangeland. The resultant flooding of Indian Creek and associated lands has the potential to impact native rangeland that may contain sensitive CNPS plant species. The No Project Alternative will involve no construction or new facilities, and will not be able to alleviate impacts associated with flood events.

Mitigation: *No mitigation is possible. NP-1, NP-2*

Impact: BIO-3. Will the No Project Components cause loss of active raptor nests, migratory bird nests, or wildlife nursery sites?

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components (NP-1 and NP-2) will result in continued operation of the District's existing freshwater and recycled water components as currently occurs. Under current operation of the District facilities, the potential exists for overtopping of the HPR Dam with recycled water. The resultant flooding of Indian Creek and associated lands has the potential to impact native rangeland that may contain active migratory bird nests or wildlife nursery sites. The No Project Alternative will involve no construction or new facilities, and will not be able to alleviate impacts associated with flood events and the no project has the potential to significantly impact migratory bird nests and wildlife nursery sites.

Mitigation: *No mitigation is possible. NP-1, NP-2*

Impact: BIO-4. Will the No Project Components substantially block or disrupt major fish or wildlife migration or travel corridors?

Analysis: *No Impact; NP-1, NP-2*

The No Project Alternative will involve no construction or new facilities, and will have no impacts to fish or wildlife migration or travel corridors. No existing blockages or disruptions are currently present and will not be exasperated as a result of continued operation of the freshwater and recycled water facilities.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: BIO-5. Will the No Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS?

Analysis: *Significant Impact; NP-1 and NP-2*

The No Project Components (NP-1 and NP-2) will result in continued operation of the District's existing freshwater and recycled water components as currently occurs. Under current operation of the District facilities, the potential exists for overtopping of the HPR Dam with recycled water and impact the riparian habitat located below the dam along Indian Creek. A large flood event may result in impacts to riparian vegetation and cause hydrologic changes to the creek that will have the potential to result in damage to the riparian habitat system currently in place. The No Project Alternative will involve no construction or new facilities that will allow for water management during flood events, and will not be able to alleviate impacts associated with flood events.

Mitigation: *No mitigation is possible. NP-1, NP-2*

Impact: BIO-6. Will the No Project Components conflict with any local, regional, or state policies or ordinances protecting biological resources, habitat conservation plans or other approved plan?

Analysis: *No Impact; NP-1, NP-2*

The No Project Components do not currently conflict with any local, regional or state policies or ordinances that protect biological resources or habitat conservation plans. The No Project Components will not result in any new construction or new facilities, and will have no impacts.

Mitigation: *No mitigation is needed. NP-1, NP-2*

Impact: BIO-7. Will the No Project Components have an effect on federally protected wetlands as defined by Section 404 of the CWA or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?

Analysis: *Significant Impact; NP-1, NP-2*

The No Project Components (NP-1 and NP-2) will result in continued operation of the District's existing freshwater and recycled water components as currently occurs. Under current operation of the District facilities, the potential exists for overtopping of the HPR Dam with recycled water and impact the riparian habitat located below the dam along Indian Creek which is likely protected wetlands as defined by Section 404 of the Clean Water Act. A wetland delineation has not been performed. Assuming a worse case scenario, it can be anticipated that Indian Creek will be considered Waters of the U.S. and a large flood event may result in impacts to riparian vegetation and cause hydrologic changes to the creek that will have the potential to result in damage to the riparian habitat system currently in place. The No Project Alternative will involve no construction or new facilities that will allow for water management during flood events, and will not be able to alleviate impacts associated with flood events.

Mitigation: *No mitigation is possible. NP-1, NP-2*

11.6.2 Project Components

Table 11-6 presents potential impacts to Biological Resources, outlines points of significance, level of impact and type of impact, and also ranks the level of significance for the 28 Project Components.

Table 11-6

Biological Resource Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component: Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	a. Greater than 0 individuals b. Greater than 0 acres	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32		18	8, 20
BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?	Greater than 15 percent of known occurrences or populations in either Alpine or Douglas County	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32		18	8, 20
BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	Greater than 0 active nest sites or wildlife nursery sites	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32			8, 18, 20, 23, 24
BIO-4. Will the Project Components substantially block or disrupt major fish or wildlife migration or travel corridors?	Greater than 0 corridors		2, 3, 4, 5, 6, 11, 14, 17, 22	11, 23, 30	1, 7, 8, 9, 10, 12, 13, 15, 16, 18, 19, 20, 21, 24, 29, 31, 32
BIO-5. Will the Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	Greater than 10 percent of each habitat type in Alpine or Douglas County		1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22		2, 7, 10, 12, 13, 15, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Table 11-6

Biological Resource Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
BIO-6. Will the Project Components conflict with any local, regional, or state policies or ordinances protecting biological resources, habitat conservation plans or other approved plan?	Conflict with said policies, ordinances, or conservation plans				1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	Greater than 0 acres	1, 2, 3, 4, 5, 6, 7, 9, 10, 11 (HPR Bypass Pipeline, A, B, C), 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32		11 (Irrigation Fields)	8, 15, 18, 20, 21

Source: Hauge Brueck Assoc., 2008

Impact: **BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?**

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32*

Construction of facilities in native rangeland could affect species of concern, including pygmy rabbit, northern sagebrush lizard, Carson Valley wood nymph, Carson Valley sandhill skipper, Webber's ivesia, and three-bracted onion. The following components have the potential for significant effects on species of concern:

Component 1 - Provide Recycled Water to New Non-Irrigated, Permitted Land, ~~will~~ may result in minor conversion of rangeland to irrigated pasture, which may cause loss of individuals or occupied habitat of sensitive species.

Component 2 - Make Recycled Water Available to Irrigators in Nevada, ~~will~~ may involve the construction of conveyance infrastructure across native rangeland, which may contain occupied wildlife habitat. Most tributary streams in the area contain Lahontan cutthroat trout, a federally threatened species which may be impacted as a result of project implementation.

Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, will involve the replacement of in-stream control structures and will not have an impact on Lahontan cutthroat trout as the Diamond Ditch is not connected to any tributary streams in the area. ~~The Diamond Ditch system may contain strays of Lahontan cutthroat trout, a federally threatened species which may be impacted as a result of project implementation.~~

Component 4 - Provide Pressurized Recycled Water to the Fredericksburg System, will involve the construction of conveyance infrastructure across native rangeland, which may contain occupied wildlife habitat. Most tributary streams in the area contain Lahontan cutthroat trout, a federally threatened species which may be impacted as a result of project implementation.

Component 5 - Provide Pressurized Recycled Water Through Wade Valley, will entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. There is potential habitat for several special-status fish and wildlife species (Table 11.2) along the proposed new Wade Valley pipeline alignments that may be impacted as a result of project implementation. As the exact alignments of the pipeline have yet to be determined, it is assumed that the impact to these species is significant until future surveys are performed.

Component 6 - Provide Pressurized Recycled Water to the Ranchettes, will entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. There is potential habitat for several special-status fish and wildlife species (Table 11.2) along the proposed new pipeline alignments that may be impacted as a result of project implementation. As the exact alignments of the pipeline have yet to be determined, it is assumed that the impact to these species is significant until future surveys are performed.

Component 7 - Non-Flood Irrigation Application System, ~~will~~ may involve the construction of subsurface application infrastructure in previously undisturbed areas and native rangeland, which may contain occupied wildlife habitat.

Component 9 - Groundwater Recharge Using Infiltration Basins, ~~will~~ may result in conversion of rangeland to infiltration basins, which may cause loss of individuals or occupied habitat of sensitive species. Construction of these basins may also create new habitat for sensitive species.

Component 10 - Construct Zero-Discharge Basins, will create wetlands in what is currently upland vegetation with range forbs, shrubs, and possibly trees. Federal and state regulations do not allow creation of mitigation sites in sensitive or occupied habitat. It is unknown whether the proposed site is currently occupied habitat as the area has not been surveyed for project specific locations and details. Creation of wetland areas often leads to the establishment of migratory waterfowl populations including sensitive species.

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will result in conversion of rangeland and installation of two temporary containment basins on the Diamond Valley Ranch. Suitable habitat for pygmy rabbits exists in the area of the irrigation fields as well as the alternative HPR bypass pipelines. These areas were surveyed to protocol in January of 2009. No evidence of pygmy rabbits was located during the survey. The area was subsequently surveyed on May 29 for the presence of migratory bird nests and raptor nests. No nesting birds were located within the project area. No other suitable habitat for sensitive species exists in the proposed location of the irrigation fields, temporary containment basins or alternative bypass pipeline alignments.

Component 12 - Growing Biomass Crops for Pulp Production Using Recycled Water, will result in conversion of ~~rangeland~~ existing grazed pastureland to biomass agricultural cropland, which may cause loss of individuals or occupied habitat of sensitive species.

Component 13 - Basin Sod and Seed Production, ~~will result in conversion of native rangeland~~ may result in conversion of existing grazed pastureland to agricultural land, which may cause loss of individuals or occupied habitat of sensitive species.

Component 14 - Pipe Recycled Water Systems to Minimize Setbacks and Human Contact, will involve the construction of pipelines adjacent to open channel flow and ditch systems. Construction ~~will~~ may occur in previously undisturbed areas and native rangeland, which may contain occupied wildlife habitat.

Component 15 - Mitigation Wetland Creation Using Freshwater will involve the construction of wetlands in areas where they currently do not exist. The locations for the mitigation wetlands may be located in ~~previously un~~disturbed riparian areas and ~~native rangeland~~ pastureland, which may contain occupied wildlife habitat.

Component 16 - Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas, will involve the construction of subsurface application infrastructure in previously ~~undisturbed areas and native rangeland~~ grazed pastureland, which may contain occupied wildlife habitat.

Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity, will entail replacement of the open ditch (which is Waters of the State, according to Lahontan) with a pipeline, or will include improvements to the existing channel. The ditch may contain strays of Lahontan cutthroat trout from the Carson River. As stated in a letter to the District, Caltrans will require an encroachment permit application to include the full suite of biological and environmental surveys, including fisheries surveys, before allowing the project to be located within the State Route 89 right-of-way.

Component 19 - Pursue Permitting of More Land in Alpine County, ~~will~~ may result in conversion of existing grazed pastureland or native rangeland to irrigated pasture which may cause loss of individuals or occupied habitat of sensitive species. Construction of irrigated pasture may create new habitat for sensitive species.

Component 21 - Develop Tailwater Control System, will involve construction of detention ponds and pumping facilities on permitted land for the re-use of tailwater. These facilities may result in the disturbance of native rangeland which may cause the loss of individuals or occupied habitat of sensitive species.

Component 22 – Parallel Recycled Water Pipeline Along Existing Diamond Ditch, ~~will~~ may entail construction of new water conveyance infrastructure across native rangeland, which may contain occupied wildlife habitat. ~~The Diamond Ditch system may contain strays of Lahontan cutthroat trout, a federally threatened species which may be impacted as a result of project implementation.~~

Components 23 (Route Mud Lake Winter Flows Through Indian Creek Reservoir) and 24 (Transfer Additional Water Rights to Storage in Indian Creek Reservoir) are fisheries enhancing components. These components include physical facilities that could affect sensitive species in native rangeland, including pygmy rabbit, northern sagebrush lizard, Carson Valley wood nymph, Carson Valley sandhill skipper, Webber's ivesia, and three-bracted onion.

Component 29 – Irrigate the District Pasture, will include irrigation of the District Pasture with recycled water. Currently the District Pasture is not irrigated and is beginning to revert from grass pastureland to a more xeric state as noted by increased sagebrush encroachment. Currently there are no known TES species present within the District Pasture and implementation of this component will not result in impacts to special status species.

Component 30 - Irrigate the Jungle with Recycled Water, will include irrigation of the Jungle with recycled water. The Jungle is a mixture of Jeffrey Pine Forest and Great Basin Mixed Scrub habitats. Introduction of irrigation to this area may modify the habitat to promote more grasses and riparian vegetation to occupy the Jungle area. Snowshoe Thompson Ditch #2 flows on the top of the hillside adjacent to the Jungle on the southeast side. As a result of seepage from the ditch (transmissive losses), hydrophilic vegetation occurs below the ditch. Additional irrigation will likely result in an increased amount of riparian vegetation in the lower portion of the Jungle area. While no known TES species are present within the Jungle Area, the potential exists for them to occur, and with the minor shifts in habitat composition, modifications may result to habitat suitability.

Component 31 – Divert Stormwater Flow Away from Harvey Place Reservoir and to Indian Creek Reservoir, will entail construction of a new stormwater diversion trench across undisturbed lands adjacent to HPR and ICR and will involve the construction of conveyance infrastructure across native rangeland, which may contain occupied wildlife habitat.

Component 32 – ICR Spillway Channel, will entail construction of a new channel between ICR and Indian Creek. This channel will be located adjacent to HPR along native rangeland and may contain occupied wildlife habitat.

Mitigation: **BIO-1. Conduct Biological Resource Assessments**

SP-25. Sensitive Resource Program

After Mitigation: *Less Than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32*

The proposed mitigation will allow the District to avoid or protect biological resources, it cannot be anticipated that the Sensitive Resource Program will allow for full mitigation of impacts that have yet to be determined as the details of the components have not been finalized. The District will compensate, in kind, for disturbance or alteration of habitat that may occur as a result of project implementation. Following implementation of the Standard Practices and recommended mitigation measure BIO-1, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered significant after mitigation.

Analysis: *Less than Significant Impact; Component 18*

Component 18 - Optimize Application Rate on Existing Irrigated Lands, will result in specific management measures to decrease the amount of tailwater generated on irrigated lands and also minimize groundwater impacts. Modifying the application rates on these existing irrigated lands in order to maximize water usage will not result in changes to native rangeland that may contain occupied habitat or sensitive species. This impact level is considered less than significant.

Mitigation: *No mitigation is needed. Component 18*

Analysis: *No Impact; Components 8, 20*

Component 8 - Improve Recycled Water Quality, will involve measures taken at the District Treatment Plan in South Lake Tahoe to upgrade the plant and improve the quality of the recycled water. No known sensitive species will be impacted as a result of the upgrades and no impact will occur.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, involves modifications to the ownership of the Diamond Ditch and will not have an impact on sensitive species or habitat.

Mitigation: *No mitigation is needed.*

Impact: BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32*

A search of the CNDDB and the CNPS databases found no records for CNPS List 2, 3, or 4 plant species within the project area. Aerial photographs of the project vicinity indicate the presence of native rangeland that could contain CNPS List 2, 3, or 4 plant species, including rocky or clayey openings in shrub land and woodland, where CNPS List 2, 3, or 4 plant species may occur. Floristic surveys have not been performed for the entirety of the project area and it is necessary to develop a Sensitive Plant Protection Program for potentially significant impacts to BLM Sensitive, CNPS and Nevada Natural Heritage Program Special Status Plant Species.

Mitigation: **SP-26. Sensitive Plant Protection Program**

After Mitigation: *Less Than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32*

The standard practice will require the avoidance or protection of listed native plant species. When needed, mitigation will allow the Project to compensate, in kind, for loss of individuals of listed species. Many of the projects outlined in the Master Plan may be implemented in the future. Following implementation of the Sensitive Plant Protection Program, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered significant after mitigation.

Analysis: *Less than Significant Impact; Component 18*

Component 18 - Optimize Application Rate on Existing Irrigated Lands, will result in specific management measures to decrease the amount of tailwater generated on irrigated lands and also minimize groundwater impacts. Modifying the application rates on these existing irrigated lands in order to maximize water usage will not result in changes to native rangeland that may contain CNPS species. This impact level is considered less than significant.

Mitigation: *No mitigation is needed, Component 18*

Analysis: *No Impact; Components 8, 20*

Component 8 - Improve Recycled Water Quality, will involve measures taken at the District Treatment Plant in South Lake Tahoe to upgrade the plant and improve the quality of the recycled water. No known CNPS species will be impacted as a result of the upgrades to the District Treatment Plant; no impact will occur.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, involves modifications to the ownership of the Diamond Ditch and will not have an impact on sensitive plant species or habitat.

Mitigation: *No mitigation is needed.*

Impact: BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests, or wildlife nursery sites?

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 29, 30, 31, 32*

The following project components could have adverse effects on nests or nursery sites.

Component 1 - Provide Recycled Water to New Non-Irrigated, Permitted Land, ~~will~~ may result in conversion of rangeland to irrigated pasture, which may contain occupied wildlife habitat including nests and nurseries.

Component 2 - Make Recycled Water Available to Irrigators in Nevada, ~~will~~ may involve the construction of conveyance infrastructure across native rangeland that may contain occupied wildlife habitat including nests and nurseries.

Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, may involve the replacement of in-stream control structures. These improvements may have impacts to adjacent habitats that may contain occupied wildlife habitat including nests and nurseries.

Component 4 - Provide Pressurized Recycled Water to the Fredericksburg System, ~~will~~ may involve the construction of conveyance infrastructure across native rangeland that may contain occupied wildlife habitat including nests and nurseries.

Component 5 - Provide Pressurized Recycled Water Through Wade Valley, ~~will~~ may entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. There is potential habitat for raptors including the northern goshawk, bald eagle, ferruginous hawk, American peregrine falcon, California spotted owl, and the great gray owl. Noise and visual disturbance associated with construction activities occurring during the nesting season may disrupt nesting raptors leading to nest abandonment and nest failure. Construction activities may destroy active nest sites and nurseries.

Component 6 - Provide Pressurized Recycled Water to the Ranchettes, ~~will~~ may entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. There is potential habitat for raptors including the northern goshawk, bald eagle, ferruginous hawk, American peregrine falcon, California spotted owl, and the great gray owl. Noise and visual disturbance associated with construction activities occurring during the nesting season may disrupt nesting raptors leading to nest abandonment and nest failure. Construction activities may destroy active nest sites and nurseries.

Component 7 - Non-Flood Irrigation Application System, may involve the construction of subsurface application infrastructure in previously undisturbed areas and native rangeland, which may contain occupied wildlife habitat including nests and nurseries.

Component 9 - Groundwater Recharge Using Infiltration Basins, ~~will~~ may result in conversion of rangeland to infiltration basins, which may cause loss of individuals or occupied habitat of sensitive species including nests and nurseries.

Component 10 - Construct Zero-Discharge Basins, ~~will~~ may create wetlands in what is currently upland vegetation with range forbs, shrubs, and possibly trees. Specific areas have not been surveyed and these areas may convert rangeland which may cause the loss of individuals or occupied habitat of sensitive species including nests and nurseries.

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will result in conversion of ~~rangeland~~ pastureland, the installation of two temporary containment basins and installation of the bypass pipeline from the C-line to the basins. Suitable habitat for pygmy rabbits exists in the area, which was surveyed to protocol in January of 2009. No evidence of pygmy rabbits was located during the survey (HBA 2009). The area was subsequently surveyed on May 29 for the presence of migratory bird nests and raptor nests. No nesting birds were located within the project area. As the last field visit was performed in the winter and spring of 2009, it cannot be determined if ~~there were~~ new nests or nursery sites ~~that~~ will be impacted as a result of implementation of the project, therefore SP-30 shall be implemented again to ensure no new nests are established prior to commencement of project construction.

Component 12 - Growing Biomass Crops for Pulp Production Using Recycled Water, ~~will~~ may result in conversion of ~~rangeland~~ existing grazed pastureland to biomass agricultural cropland, which may cause loss of individuals or occupied habitat of sensitive species including nests and nurseries.

Component 13 - Basin Sod and Seed Production, ~~will result in conversion of native rangeland~~ may result in conversion of existing grazed pastureland to agricultural land, which may cause loss of individuals or occupied habitat of sensitive species including nests and nurseries.

Component 14 - Pipe Recycled Water Systems to Minimize Setbacks and Human Contact, will involve the construction of pipelines adjacent to open channel flow and ditch systems. Construction ~~will~~ may occur in previously undisturbed areas and ~~native range~~ pastureland, which may contain occupied wildlife habitat including nests and nurseries.

Component 15 - Mitigation Wetland Creation Using Freshwater will involve the construction of wetlands in areas where they currently do not exist. The locations for the mitigation wetlands may be located in previously ~~un~~disturbed riparian areas and ~~native range~~ pastureland, which may contain occupied wildlife habitat including nests and nurseries.

Component 16 - Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas, ~~will~~ may involve the construction of subsurface application infrastructure in previously ~~undisturbed areas and native range~~ grazed pastureland, which may contain occupied wildlife habitat including nests and nurseries.

Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity, will entail replacement of the open ditch with a pipeline, or by making improvements to the existing channel. The existing channel may be lined with small trees and shrubs that will be destroyed by excavation that may contain nests. The portion of the ditch that is within the SR 89 right-of-way also contains trees and shrubs that could contain nests or nursery sites. As stated in a letter to the District, Caltrans will require an encroachment permit application to include the full suite of biological and environmental surveys, including surveys for nesting raptors and wildlife nursery sites, before allowing the project to take place along the State Route 89 right-of-way.

Component 19 - Pursue Permitting of More Land in Alpine County, ~~will~~ <u>may</u> result in conversion of <u>existing pastureland or</u> native rangeland to irrigated pasture which may cause loss of individuals or occupied habitat including nests and nurseries. <u>See component 11 above for results of surveys.</u>

Component 21 - Develop Tailwater Control System, will involve construction of detention ponds and pumping facilities on permitted land for the re-use of tailwater. These facilities may result in the disturbance of native rangeland which may cause the loss of individuals or occupied habitat including nests and nurseries.

Component 22 – Parallel Recycled Water Pipeline Along Existing Diamond Ditch, may impact wildlife nursery sites, migratory bird nests and raptor sites in areas along the pipeline adjacent to the Diamond Ditch.

Component 29 – Irrigate the District Pasture, will include irrigation of the District Pasture with recycled water. The District Pasture may contain active migratory bird nests and nurseries sites.

Component 30 - Irrigate the Jungle with Recycled Water, will include irrigation of the Jungle with recycled water. The Jungle is a mixture of Jeffrey Pine Forest and Great Basin Mixed Scrub habitats. These habitats are suitable for raptor nests locations as well as nursery sites. The introduction of irrigation to the Jungle may have impacts to active nests and to nursery sites.

Component 31 – Divert Stormwater Flow Away from HPR and to ICR, ~~will~~ <u>may</u> entail construction of a new stormwater diversion trench across undisturbed lands adjacent to HPR and ICR. This land may contain occupied raptor bird nests as well as nursery sites for pygmy rabbits.

Component 32 – ICR Spillway Channel, will entail construction of a new channel between ICR and Indian Creek. This channel will be located adjacent to HPR along native rangeland and may contain occupied raptor bird nests as well as nursery sites for pygmy rabbits.

Mitigation: **SP-30. Pre-construction Surveys for <u>Migratory Birds</u>, Nesting Raptors and Wildlife Nurseries**

After Mitigation: *<u>Less Than</u> Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 29, 30, 31, 32*

The standard practice will allow the District to avoid and protect active raptor nests, migratory bird nests as well as nursery sites. Following implementation of the pre-construction surveys, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered significant after mitigation.

Analysis: *No impact; Components 8, 18, 20, 23, 24*

Component 8 - Improve Recycled Water Quality, will involve measures taken at the District WWTP to upgrade the plant and improve the quality of the recycled water. No nests or nursery sites will be impacted as a result of the upgrades; no impact will occur.

Component 18 - Optimize Application Rate on Existing Irrigated Lands, will result in specific management measures to decrease the amount of tailwater generated on irrigated lands and also minimize groundwater impacts. Modifying the application rates on these existing irrigated lands in order to maximize water usage will not result in changes to native rangeland that may contain nests or nursery sites.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, involves modifications to the ownership of the Diamond Ditch and will not have an impact on nests or nursery sites.

Components 23 and 24 are fisheries enhancing components that have the potential to enhance fish spawning and rearing. These components do not have physical facilities that will affect nursery sites or nests.

Mitigation: *No mitigation is needed.*

Impact: BIO-4. Will the Project components substantially block or disrupt major fish or wildlife migration or travel corridors?

Analysis: *Significant Impact; Components 2, ~~3~~, 4, 5, 6, 11, 14, 17, ~~22~~*

The following components could affect migration or travel corridors and will result in significant impacts

Component 2 - Make Recycled Water Available to Irrigators in Nevada, ~~will~~ may involve the construction of conveyance infrastructure across native rangeland that may contain streams occupied by Lahontan cutthroat trout, a federally Threatened species.

~~Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, will involve the replacement of instream control structures. The Diamond Ditch system may contain strays of Lahontan cutthroat trout, a federally Threatened species.~~

Component 4 - Provide Pressurized Recycled Water to the Fredericksburg System, ~~will~~ may involve the construction of conveyance infrastructure across native rangeland that may contain occupied wildlife habitat. Most tributary streams in the area contain Lahontan cutthroat trout, a federally Threatened species.

Component 5 - Provide Pressurized Recycled Water Through Wade Valley, may entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. These activities could cause temporary and permanent blockage or disruption of major fish and/or wildlife migration and travel corridors.

Component 6 - Provide Pressurized Recycled Water to the Ranchettes, ~~will~~ may entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities adjacent to~~t~~ the Upper and Lower Fredericksburg and

Diamond Ditch systems. These activities could cause temporary and permanent blockage or disruption of major fish and/or wildlife migration and travel corridors as the Diamond Ditch system may contain strays of Lahontan cutthroat trout, a federally Threatened species. The Diamond Ditch system may result in blockage of deer migration corridors due to the inability of deer to escape and become trapped in the ditch system.

Component 11 - The Alternative B alignment for the HPR bypass pipeline will cross the Millich Ditch in three locations, which may block the movement of strays of Lahontan cutthroat trout. The Alternative A alignment will not have any interruptions of the Millich Ditch and will not cause any interruptions to wildlife migration. The Alternative C pipeline alignment will cross the Millich Ditch in one location. These construction activities may result in blockage of movement of strays of Lahontan cutthroat trout that may occupy the Millich Ditch. This impact is considered significant for Alternative B and C HPR bypass pipeline alignments.

Component 14 - Pipe Recycled Water Systems to Minimize Setbacks and Human Contact, will entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. These activities could cause temporary and permanent blockage or disruption of major fish and/or wildlife migration and travel corridors.

Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity, will result in the replacement of the existing ditch with a pipeline. The ditch may contain strays of Lahontan cutthroat trout from the Carson River.

~~Component 22 – Parallel Recycled Water Pipeline Along Existing Diamond Ditch, will entail construction of new water conveyance infrastructure within fish and wildlife habitat, and in native plant communities. These activities could cause temporary and permanent blockage or disruption of major fish and/or wildlife migration and travel corridors as the Diamond Ditch system may contain strays of Lahontan cutthroat trout, a federally Threatened species.~~

Mitigation: **BIO-4A. Fish Passage Structures and Deer Migration Corridors**

BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife

After Mitigation: *Less than Significant Impact; Components 2, 3, 4, 5, 6, 11, 14, 17, 22*

The proposed mitigation will require design changes to the Project to facilitate fish and deer passage and limit construction timing to periods when fish are not spawning and when deer are not migrating. These mitigation measures will reduce the Project's potential adverse effects on wildlife movements and breeding to a level of less than significant.

Analysis: *Less than Significant Impact; Components 3, 11, 22, 23, 30*

Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, will involve the replacement of instream control structures. The Diamond Ditch system is a closed system and is not connected to any streams and therefore does not contain Lahontan cutthroat trout.

Component 11 - Construct Irrigation Fields with Pumping Back to HPRr, will result in the construction of temporary containment basins along with a pipeline from the C-line located at the junction of Diamond Valley Road and SR 89. These facilities will not result in any blockage of any stream that will contain migrating fish. The Carson River Deer Heard Management Plan (CDFG 1985) delineates migration corridors on the east side of the Carson River with some smaller corridors denoted through Wade Valley. The proposed location of the irrigation fields are outside the delineated critical winter range. When full, the irrigation fields may present a temporary interruption to the movements of the Carson River Deer Herd, but the duration of such an interruption will be short and the impact will be less than significant.

Construction of the alternative pipeline alignments for the HPR bypass pipeline will not have an impact on wildlife movements as no blockage will occur to deer migration corridors that have been mapped in the area.

Component 22 – Parallel Recycled Water Pipeline Along Existing Diamond Ditch, will not result in the blockage of any fish or wildlife corridor as the Diamond Ditch is a closed system and does not contain any Lahontan cutthroat trout.

Component 23 - Route Mud Lake Winter Flows through ICR, will divert flows from Indian Creek into Upper Dressler ~~Millich~~ Ditch through ICR. As the Upper Dressler ~~Millich~~ Ditch only operates during spring flows when Indian Creek is flowing, routing the flows through ICR will result in equal flow out of ICR and into the portion of Indian Creek below the reservoir. The impact to fish passage that will occur as a result of Component 23 will be less than significant due to the equal flows reaching Indian Creek below the HPR.

Component 30 - Irrigate the Jungle with Recycled Water, will involve surface irrigation to the area known as the Jungle. Pipelines will be constructed to provide water for irrigation. No existing streams will be crossed and construction activities in the area will not block migration corridors for deer and fish passage.

Mitigation: *No mitigation is needed. Components 11, 23, 30*

Analysis: *No Impact; Components 1, 7, 8, 9, 10, 12, 13, 15, 16, 18, 19, 20, 21, 24, 29, 31, 32*

Component 1 - Provide recycled water to new non-irrigated, permitted land, ~~will~~ may involve the conversion of rangeland to irrigated pasture. This conversion will not result in barriers to deer migration corridors or fish passage. No impact will occur.

Component 7 - Non-Flood Irrigation Application System, will result in the conversion of irrigation methods from flood irrigation to sprinkler or subsurface irrigation. No impact to deer migration corridors or fish passage will occur.

Component 8 - Improve Recycled Water Quality, will involve measures taken at the District WWTP to upgrade the plant and improve the quality of the recycled water. No impact to deer migration corridors or fish passage will occur.

Component 9 - Groundwater Recharge Using Infiltration Basins, ~~will~~ may result in conversion of rangeland to infiltration basins, which will not result in any impact to deer migration corridors or fish passages.

Component 10 - Construct Zero-Discharge Basins, ~~will~~ may create wetlands in what is currently upland vegetation with range forbs, shrubs, and possibly trees. No impact to deer migration corridors or fish passage will occur.

Component 12 - Growing Biomass Crops for Pulp Production Using Recycled Water, ~~will~~ may result in conversion of ~~rangeland~~ existing grazed pasture to biomass agricultural cropland, which ~~will~~ may not result in any impact to deer migration corridors or fish passages.

Component 13 - Basin Sod and Seed Production, ~~will result in conversion of native~~ may result in conversion of existing grazed pasture ~~rangeland~~ to agricultural land, which will not result in any impact to deer migration corridors or fish passages.

Component 15 - Mitigation Wetland Creation Using Freshwater may involve the construction of wetlands in areas where they currently do not exist. The locations for the mitigation wetlands may be located in previously grazed pastureland: they will not result in blockage of fish migration corridors or deer migration corridors.

Component 16 - Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas, ~~will~~ may involve the construction of subsurface application infrastructure in previously ~~undisturbed areas and native range~~ grazed pastureland, which will not result in the blockage of wildlife migration corridors or fish passage.

Component 18 - Optimize Application Rate on Existing Irrigated Lands, will result in specific management measures to decrease the amount of tailwater generated on irrigated lands and also minimize groundwater impacts. Modifying the application rates on these existing irrigated lands in order to maximize water usage will not result in blockage of wildlife corridors or fish passages.

Component 19 - Pursue Permitting of More Land in Alpine County, ~~will~~ may result in conversion of native rangeland to irrigated pasture which will not result in the blockage of wildlife migration corridors or fish passage.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, involves modifications to the ownership of the Diamond Ditch and will not have an impact on wildlife migration corridors or fish passage.

Component 21 - Develop Tailwater Control System, will involve construction of detention ponds and pumping facilities on permitted land for the re-use of tailwater. These facilities may result in the disturbance of native rangeland but will not have any impact on wildlife migration corridors or fish passage.

Component 24 - Transfer Additional Water Rights to Storage in ICR, will result in more water in ICR which will result in improved water quality and improved fish habitat. This component does not have any physical facilities and will not have an impact on wildlife migration corridors or fish passage.

Component 31 - Divert Stormwater Flow Away from HPR to ICR, ~~will~~ may increase the amount of freshwater in ICR as a result of project implementation. This diversion will not result in the blockage of wildlife or fish passages. No impact will occur.

Component 32 - ICR Spillway Channel, will result in decreased chances of spilling recycled water from HPR which protects the water quality of Indian Creek. The physical facilities associated with this component will not result in any blockage of wildlife migration corridors or fish passage.

Mitigation: *No mitigation is needed. Components 1, 7, 8, 9, 10, 12, 13, 15, 16, 18, 19, 20, 21, 24, 29, 31, 32*

Impact: **BIO-5. Will the Project Components have a substantial adverse effect on or result in the permanent loss of any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS?**

Analysis: *Significant Impact; Components 1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22*

Sensitive wildlife habitats are defined as habitats that provide high suitability for foraging and breeding for state and federal species of special concern and California fully protected species, and important nesting, foraging, and breeding habitat for migratory songbirds and other wildlife. Montane riparian scrub, Modoc/Great Basin riparian forest, and montane freshwater marsh are sensitive wildlife habitats identified within the project area. Section 401, Waters of the State and Section 404 Waters of the U.S. are addressed in BIO-7 below. Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity, and Component 22 - Parallel Recycled Water Pipeline Along Existing Diamond Ditch all involve the improvements to the conveyance capacity of existing ditches. These ditches all have evidence of high transmissive losses which results in seepage of both recycled (Diamond Ditch) and freshwater (Snowshoe Thompson No. 1, ~~and~~ Snowshoe Thompson No. 2, and Millich Ditch). This seepage over time has resulted in the establishment of riparian vegetation on the banks of the earthen portions of the ditches and downslope from the ditches. The proposed improvements to increase capacity and reduce the transmissive losses has the potential to decrease the water available to this established riparian vegetation. The existing vegetation that will be impacted will be minimal and project construction will not reduce the riparian vegetation by 10 percent or more in Alpine County, but will result in the permanent loss of riparian vegetation: this impact is considered significant. Implementation of SP-31 and SP-32 will allow the District to map, avoid and protect sensitive riparian habitat. The District will monitor the recovery and restoration of altered and/or created habitat.

Component 11 - Construct Storage Facility with Pumping Back to HPR will result in the minor removal of riparian vegetation. This vegetation is associated with the transmissive losses associated with ~~Snowshoe Thompson No. 1~~ Millich Ditch. Due to the size of the area involved with the pipeline alignments, it is not possible for project construction to permanently reduce sensitive habitat by 10 percent or more in Alpine County but will result in the permanent loss of riparian vegetation due to construction activities. Alternative bypass pipeline alignment A crosses Millich Ditch in three locations and would likely result in minor removal of individual Salix bushes. Alternative bypass pipeline alignment C would follow the dirt roadway and would cross the ditch in one location, and would not result in the removal of riparian vegetation. Alternative bypass pipeline alignment B crosses the Millich ditch (which is contained to the culvert under the roadway) and would not result in the removal of riparian vegetation. A Lake or Streambed Alteration agreement would be required to be issued by California Department of Fish and Game for Alternatives A and C due to disturbance to the Millich Ditch and associated minor removal of riparian vegetation.

Components 1, 4, 5, 6, 14, 16 are all conveyance components that will cross native rangeland which may contain sensitive natural communities. Due to the limited area of linear disturbance of these components, it is not possible for project construction to permanently reduce sensitive habitat by 10 percent or more in Alpine County but may result in the permanent loss of riparian vegetation: this impact is considered significant.

Mitigation: **SP-31. Pre-construction Marking and Fencing of Sensitive Native Plant Communities**

SP-32. Pre-construction Marking and Fencing of Wetlands and Riparian Habitat

BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan

BIO-5B. Monitor Habitat Restoration and Revegetation Sites

After Mitigation: *Less than Significant Impact; Components 1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22*

The standard practices and proposed mitigation will allow the District to map and protect sensitive native plant communities and riparian habitat. Monitoring of habitat restoration and revegetation sites is also included to ensure the success of restoration activities. After implementation of these mitigation measures, the impact to sensitive plant communities will be less than significant.

Analysis: *No Impact; Components 2, 7*, 10, 12, 13, 15, *18, 19, 20, 21, 23, 24,* 29, 30 *31, 32*

Components 2 - Make Recycled Water Available to Irrigators in Nevada, will not have any impact to riparian vegetation or sensitive natural community as the component pursues the permitting of land in Nevada by the NDEP.

Component 18 - Optimize Application Rate on Existing Irrigated Lands, will not have any impact on riparian vegetation or sensitive natural communities as the component only impacts existing irrigated land.

Component 19 - Pursue the Permitting of More Land in Alpine County, will not involve the removal of or impact of sensitive natural communities as the component does not involve any physical facilities.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, involves evaluation of the ownership of the Diamond Ditch and does not involve any physical impacts to existing facilities: no impacts to sensitive natural communities will occur.

Component 21 - Develop Tailwater Control System, involves management of tailwater on existing irrigated lands and will not result in removal of riparian vegetation: no impacts to sensitive natural communities will occur.

Component 23 - Route Mud Lake Winter Flows through ICR, will not involve the removal of riparian vegetation or any impacts to sensitive natural communities as there will not be any decrease in flows through Indian Creek which contains riparian vegetation.

Component 24 - Transfer Additional Water Rights to Storage in ICR will result in increased flows to ICR and will not impact sensitive natural communities.

Component 31 – Divert Stormwater Flow Away from HPR and to ICR, will involve the construction of conveyance infrastructure across rangeland that does not contain sensitive native plant communities: no impact will occur.

Component 32 – ICR Spillway Channel, will involve the construction of conveyance infrastructure across rangeland that does not contain sensitive native plant communities: no impact will occur.

Components 7, 10, 12, 13, 15, 29 and 30 all have the potential to increase riparian vegetation and thereby improve the amount of riparian habitat and sensitive communities within the project area.

Mitigation: *No mitigation is needed. Components 2, 7, 10, 12, 13, 15, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32*

Impact: BIO-6. Will the Project Components conflict with any local, regional, or state policies or ordinances protecting biological resources, habitat conservation plans or other approved plan?

Analysis: *No Impact; Components 1, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 22, 29, 30*

Components 1, 3, 4, 5, 6, 7, 10, 11, 12, 13, 14, 15, 16, 17, 22, 29 and 30 have the potential to result in conversion of native rangeland to agricultural land and to disturb native rangeland for the installation of facilities. The native rangeland may contain sensitive or rare plant species or wetlands. Surveys for sensitive plant species have not been performed for the locations of these components and it cannot be determined that rare plant species do not occupy the area or if wetlands are present within the area to be disturbed. The potential existence of rare plants in the area, the conversion of lands to agricultural use, and the potential to impact wetlands will conflict with Alpine County General Plan Goals No. 8 and 9. Standard Practice 24 - Sensitive Resource Program, as outlined in Appendix D, requires the District comply with Alpine County General Plan Goals and Policies that protect biological resources. The District is required to minimize development in or conversion of wetlands and to protect rare, endangered or threatened plants. Based on the conformance with all goals and policies protecting biological resources, no impact will occur.

Mitigation: *No mitigation is required. Components 1, 3, 4, 5, 6, 7, 10, 12, 13, 14, 15, 16, 17, 22, 29, 30*

Analysis: *No Impact; Components 2, 18, 19, 20, 21, 23, 24, 31, 32*

Components 2, 18, 19, 20, 21, 23, 24, 31 and 32 do not involve conversion of native rangeland to irrigated pasture or result in the construction of new infrastructure on rangeland, which could affect native plant communities. These activities will not conflict with regional and State polices that regulate development in these areas and no impact will occur.

Mitigation: *No mitigation is required. Components 2, 18, 19, 20, 21, 23, 24, 31, 32*

Impact: BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the CWA or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Wetland delineations have not been performed on District, private or public lands in the locations of the projects and components listed in the Master Plan. Standard Practice

SP-22 Delineate Wetlands, Waters of the United States, and Riparian Habitat, SP-23 Prepare Wetland And Riparian Mitigation And Monitoring Plan, SP-26 Avoid Impacts to Wetland and Riparian Areas and, SP-21 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat will be implemented prior to construction of the proposed components. Due to the fact that the delineations have yet to be performed, the exact extent of impact to wetlands cannot be determined.

Component 1 - Provide Recycled Water to New Non-Irrigated, Permitted Land, has the potential to impact existing wetlands that may be located on lands planned for application of recycled water. These impacts may include direct impacts to delineated waters of the U.S., such as removal or filling. Other impacts that may occur to wetlands include the introduction of recycled water or tailwater from recycled water application to existing wetlands, which could have negative effects over time. Recycled water has increased levels of salts that could accumulate in the root zone of wetland plants over time. Increased levels of salts will inhibit uptake of available nutrients by plants and could decrease the productivity of the wetland and essentially reduce its viability. This impact is considered significant due to the fact that regardless of implementation of Standard Practices which will avoid and mitigate impacts to wetlands, the potential exists for indirect impacts to water quality and subsequent overall wetland health.

Component 2 - Make Recycled Water Available to Irrigators in Nevada, has the potential to impact existing wetlands that may be located on lands planned for application of recycled water. These impacts may include direct impacts to delineated waters of the U.S., such as removal or filling. Other impacts that may occur to wetlands include the introduction of recycled water or tailwater from recycled water application to existing wetlands, which could have negative effects over time. The introduction of recycled water or tailwater from recycled water application sites to existing wetlands could have negative effects over time. Recycled water has increased levels of salts that could accumulate in the root zone of wetland plants over time. Increased levels of salts will inhibit uptake of available nutrients by plants and could decrease the productivity of the wetland and essentially reduce its viability. This impact is considered significant due to the fact that regardless of implementation of Standard Practices which will avoid and mitigate impacts to wetlands, the potential exists for indirect impacts to water quality and subsequent overall wetland health.

Component 3 - Capacity and Conveyance Improvements in the Diamond Ditch System, Component 4 - Provide Pressurized Recycled Water to the Fredericksburg System, Component 5 - Provide Pressurized Recycled Water Through Wade Valley, and Component 6 - Provide Pressurized Recycled Water to the Ranchettes, Component 14 - Pipe Recycled Water Systems to Minimize Setbacks and Human Contact, and Component 22 – Parallel Recycled Water Pipeline Along Existing Diamond Ditch could impact wetlands through direct removal or filling as a result of improvements to the Diamond Ditch or installation of pipelines as a result of project construction. Exact alignments of the pipelines for Components 4, 5, and 6 have yet to be determined: impacts to wetlands and waters of the U.S. cannot be determined at this time. Implementation of these components will require the inclusion of Standard Practices 21, 22, 23, and 16 which will decrease the impacts to wetlands and waters of the U.S. Inclusion of these Standard Practices into the project cannot ensure the elimination of all impacts to wetlands and waters of the U.S.: this impact is considered significant until further environmental documentation determines the level of impact based on project details and final locations.

Component 7 - Non-Flood Irrigation Application System and Component 16 - Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas, may have impacts to wetlands and waters of the U.S. as no delineations have been performed in the area of Component 7 and 16. The potential exists for wetlands to occur in this area and without delineations of wetlands, impacts cannot be ascertained. Implementation of Component 7 and 16 may have impacts to wetlands in the area through changes in surface water flow due to the introduction of recycled water through sub-surface means. Inclusion of Standard Practices into the project cannot ensure the elimination of all impacts to wetlands and waters of the U.S.: this impact is considered significant until further environmental documentation determines the level of impact based on project details and final locations.

Component 9 - Groundwater Recharge Using Infiltration Basins, depending on its location may have an impact on wetlands and waters of the U.S. As stated in the EPA definition of Waters of the U.S. 40 CFR 230.3(s)(7) “Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States.” Based on this definition, creation of infiltration basins with the use of recycled water are not determined waters of the U.S. and will not have an impact. Created infiltration basins that are immediately adjacent to existing waters of the U.S. may have an impact through the leakage of recycled water from the basins. Inclusion of Standard Practices into the project cannot ensure the elimination of all impacts to wetlands and waters of the U.S.: this impact is considered significant until further environmental documentation determines the level of impact based on project details and final locations.

Component 10 - Construct Zero-Discharge Basins, depending on its location may have an impact on wetlands and waters of the U.S. As stated in the USEPA definition of Waters of the U.S. 40 CFR 230.3(s)(7) “Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States.” Based on this definition, wetlands created with the use of recycled water are not determined waters of the U.S. and will not have an impact. Created wetlands (zero-discharge basins) that are immediately adjacent to existing waters of the U.S. may have an impact through the leakage of recycled water from the lined ponds. Inclusion of Standard Practices into the project cannot ensure the elimination of all impacts to wetlands and waters of the U.S.: this impact is considered significant until further environmental documentation determines the level of impact based on project details and final locations.

Component 11 - - Construct Irrigation Fields with Pumping Back to HPR, includes three alternatives of the HPR bypass pipeline location between the junction of SR 89 and Diamond Valley road and the locations of the proposed irrigation fields.

Of the three alternative alignments shown in Figure 2-5**,** Alignment B crosses the Millich Ditch in three separate locations. Millich ditch conveys fresh water from the West Fork of the Carson River. No survey has been performed to determine if the areas adjacent to the ditch are considered wetlands and waters of the U.S. This ditch and associated riparian habitats that are adjacent, will likely be considered waters of the U.S. and will be directly impacted as a result of project implementation. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and impacts to the adjacent riparian areas/wetlands. This impact is considered significant.

Alternative A alignment follows the shoulder of Diamond Valley Road from the junction of SR 89/Diamond Valley Road to the location of the infiltration basins. No delineations of wetlands have been performed for the three pipeline alignments and impacts to wetlands and waters of the U.S. cannot be ascertained at this time. This impact is considered significant.

Alternative B will cross the Millich Ditch in three locations, as illustrated in Figure 2-5. Details on this crossing are no included in the project description. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and this impact is considered significant.

Alternative C follows the dirt roadway as shown in Figure 2-5 that intersects with the Millich Ditch in one location. Details on this crossing are not included in the project description. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and this impact is considered significant.

Component 12 - Growing Biomass Crops for Pulp Production Using Recycled Water and Component 13 - Basin Sod and Seed Production, depending on its location may have an impact on wetlands and waters of the U.S. As stated in the EPA definition of Waters of the U.S. 40 CFR 230.3(s)(7) "Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States." Based on this definition, wetlands created with the use of recycled water are not determined waters of the U.S. and will not have an impact. Created wetlands (zero-discharge basins) that are immediately adjacent to existing waters of the U.S. may have an impact through the leakage of recycled water from the lined ponds. Inclusion of Standard Practices into the project cannot ensure the elimination of all impacts to wetlands and waters of the U.S., this impact is considered significant until further environmental documentation determines the level of impact based on project details and final locations.

Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity, will result in the decrease of transmissive losses from the Snowshoe Thompson No. 1 ditch through the construction of a pipeline adjacent to the ditch or lining the ditch. These transmissive losses have resulted in riparian vegetation and saturated areas along the edges of the ditch that may quality as wetlands. By decreasing the transmissive losses that is utilized by the riparian vegetation, the potential exists for the decreased viability of the wetland vegetation due to increased xeric conditions. This impact is considered significant as no details exist regarding the location of the improvements or how they will be implemented.

Component 19 - Pursue Permitting of More Land in Alpine County, may result in additional lands that receive recycled water for irrigation purposes. Because these lands have not been identified, they may contain waters of the U.S. and may be impacted. This impact is considered significant.

Components 23 (Route Mud Lake Winter Flows through ICR) and 24 (Transfer Additional Water Rights to Storage in ICR) are fisheries enhancing components. Flows in existing ditches (including Snowshoe Thompson No. 1, Millich, Upper Dressler and Diamond) will change under Component 23, Route Mud Lake Winter Flows through ICR, and Component 24, will result in changing the routing of diverted water after withdrawal from the West Fork of the Carson River. This change may impact wetlands that are associated with these ditches. This impact is considered significant.

Component 29 – Irrigate the District Pasture, will include irrigation of the District Pasture with recycled water. Details of the application rate and process by which the water application will occur (spray irrigation, flood irrigation) have yet to be determined. In addition, no wetland delineation has been performed in the area and impacts to waters of the U.S. and wetlands cannot be determined at this time. Subsequent to the delineation as required in SP-22, and additional environmental review, a determination as to impacts will be made. Due to the uncertainty, this impact is considered significant.

Component 30 - Irrigate the Jungle with Recycled Water, will include spray irrigation of the Jungle with recycled water. Currently the vegetation in the Jungle is a mix of riparian/mesic/hydric species (*Salix sp., Rosa woodsii*) as well as xeric (*Artemisia* and *Pinus* species). The riparian associated plants are more concentrated on and at the toe of the slope below the Snowshoe Thompson #2 ditch that conveys freshwater, which is likely to be considered waters of the U.S. The riparian plants are likely obtaining water from transmissive losses from this ditch. Application of recycled water in the area will likely result in increased growth of the riparian plants in the Jungle area. A wetland delineation has not been performed for the Jungle area, and it cannot be determined if an impact to wetlands and waters of the U.S. will occur; this impact is considered significant.

Component 31 – Divert Stormwater Flow Away from HPR and to ICR, will create a new channel that will act as a diversion of freshwater runoff resulting from storms and divert it from entering HPR to ICR. As a wetland delineation has not been performed in the area of the component, and details of the diversion have not been designed, a determination of impacts to waters of the U.S. and wetlands cannot be made; this impact is considered significant.

Component 32 – ICR Spillway Channel, will entail construction of a new channel between ICR and Indian Creek to allow for freshwater to pass from Indian Creek Reservoir to Indian Creek and bypass freshwater from entering HPR. As a wetland delineation has not been performed in the area of the component, and details of the diversion have not been designed, a determination of impacts to waters of the U.S. and wetlands can be made; this impact is considered significant.

Mitigation: **SP-23. Delineate Wetlands, Waters of the United States, and Riparian Habitat**

SP-24. Prepare Wetland And Riparian Mitigation And Monitoring Plan

SP-27. Avoid Impacts to Wetland and Riparian Areas

SP-32. Pre-construction Marking and Fencing of Wetlands and Riparian Habitat

BIO-7. Monitor Wetland And Riparian Mitigation Sites

After Mitigation: *Less Than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

The standard practices and recommended mitigation measure BIO-7 will allow the District to avoid or protect Wetlands and waters of the U.S.: it cannot be anticipated that these measures/practices will allow for full mitigation of impacts that have yet to be determined as the details of the components have not been finalized. Standard practices require the District to compensate, in kind, for disturbance or alteration of wetlands that may occur as a result of project/component implementation. Following implementation of the Standard practices, it is unable to be determined if the impact will be reduced to a level of less than significant as wetland delineations have yet to be performed. This impact is considered significant after mitigation.

Analysis: *Less Than Significant; Component 11 (Irrigation Fields)*

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will have no impact on wetlands and waters of the U.S. As stated in the USEPA definition of Waters of the U.S. 40 CFR 230.3(s)(7) "Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States." Based on this definition, creation of infiltration basins with the use of recycled water are not determined waters of the U.S. and will not have an impact. Created infiltration basins that are immediately adjacent to existing waters of the U.S. may have an impact through the interception of groundwater from the basins to waters of the U.S. (Carson River and Snowshoe Thompson Ditch #2). Inclusion of Standard Practices and compliance with the NMP prepared for the Diamond Valley (Wood Rodgers 2009) ensures less than significant impacts to groundwater from Component 11, and will not result in contaminated groundwater reaching waters of the U.S. and resultant negative effects to associated wetlands. Standard Practice SP-16, Slope Stabilization Design, will ensure the irrigation fields will be contained by berms and adequately maintained to prevent surface flow of recycled water from reaching Indian Creek, the Carson River and/or Snowshoe Thompson Ditch #2. The impact level is considered less than significant for the irrigation fields portion of Component 11.

Mitigation: *No mitigation is needed. Component 11 (Irrigation Fields)*

Analysis: *No Impact; Components 8, 15, 18, 20, 21*

Component 8 - Improve Recycled Water Quality, will improve the quality of the recycled water discharged from the treatment plant and will not result in any negative impacts to waters of the U.S. or wetlands within the project area.

Component 15 - Mitigation Wetland Creation Using Freshwater will rely on fresh water that the District owns through existing water rights. Use of this water which meets the definition of Waters of the U.S. will then create wetlands that will also fall under the USEPA definition of waters of the U.S. (40 CFR 230.3(s)). The expansion and creation of additional freshwater wetlands will not result in negative impacts to Waters of the U.S.

Component 18 - Optimize Application Rate on Existing Irrigated Lands will increase the application efficiency of recycled water on agricultural lands. Implementation of this component will reduce tailwater off existing fields and may reduce the impacts of recycled water on existing wetlands and improve their overall health. No impact to waters of the U.S. will occur as the tailwater from the irrigated fields will reduce the potential to contaminate waters of the U.S.

Component 20 - Improve Operation of the Diamond Ditch System to Meet District and User Needs, will not have an impact on waters of the U.S. as the issue of ownership and easements is addressed and not physical changes will occur to the system.

Component 21 - Develop Tailwater Control System, will result in a program to contain tailwater and to prevent tailwater from reaching adjacent non-permitted lands and may reduce the impacts of recycled water on existing wetlands and improve their overall health. No impact to waters of the U.S. will occur as the tailwater from the irrigated fields will reduce the potential to contaminate waters of the U.S.

Mitigation: *No mitigation is needed. Components 8, 15, 18, 20, 21*

11.7 Cumulative Impacts

There are significant adverse impacts identified in the Biological Resources section above. These impacts relate to the following: loss of individuals or occupied habitat of endangered and threatened species; loss of active raptor nests; disruption of fish or wildlife migration or travel corridors; loss of plant species listed by the CNPS; loss of sensitive native plant communities; and effects on wetlands or waters of the U.S. There are no projects in Alpine County and within the project vicinity that are reasonably foreseeable (personal communication, Brian Peters, Alpine County Planning Director, April 2009). As specific surveys have not been performed for special status species for all components with the exception of Component 11, impacts cannot be determined and are considered significant. Implementation of all the components will have a potential additive effect in the loss of sensitive habitats, sensitive species, wildlife nurseries and wetlands. The degree of cumulative impact cannot be ascertained at this time due to the fact that site specific locations of Project Components have not been determined.

Because of the small geographic area affected by project components as well the general lack of development and population growth in the agricultural areas of the Carson Valley that will impact habitat where the project facilities are located, it is unlikely that the Project impacts will contribute to significant cumulative impacts to biological resources.

11.8 Summary of Significant Impacts and Mitigation Measures

11.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 11-7 summarizes the significant impacts by project component and identifies the mitigations measures required for each impact.

Table 11-7

Summary of Significant Impacts and Mitigation Measures – Biological Resources

Impact	Level of Significance	Mitigation Measure
No Project Components		
BIO-1. Will the No Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	NP-1, NP-2 ●	No mitigation can be implemented under the No Project Alternative
BIO-2. Will the No Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?	NP-1, NP-2 ●	No mitigation can be implemented under the No Project Alternative
BIO-3. Will the No Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	NP-1, NP-2 ●	No mitigation can be implemented under the No Project Alternative

Table 11-7

Summary of Significant Impacts and Mitigation Measures – Biological Resources

Impact	Level of Significance	Mitigation Measure
BIO-5. Will the No Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	NP-1, NP-2 ●	No mitigation can be implemented under the No Project Alternative
BIO-7. Will the No Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	NP-1, NP-2 ●	No mitigation can be implemented under the No Project Alternative
Project Components		
BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**BIO-1**. Conduct Biological Resource Assessments **SP-25.** Sensitive Resource Program
BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**SP-26.** Sensitive Plant Protection Program
BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ~~●~~	**SP-30.** Pre-construction Surveys for Nesting Raptors and Wildlife Nurseries
BIO-4. Will the Project Components substantially block or disrupt major fish or wildlife migration or travel corridors?	2, ~~3,~~ 4, 5, 6, 11, 14, 17, ~~22~~ ⊙	**BIO-4A**. Fish Passage Structures and Deer Migration Corridors **BIO-4B.** Schedule Construction to Avoid Breeding and Migrating Wildlife
BIO-5. Will the Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22 ⊙	**SP-31.** Pre-construction Marking and Fencing of Sensitive Native Plant Communities **SP-32.** Pre-construction Marking and Fencing of Wetlands and Riparian Habitat **BIO-5A.** Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan **BIO-5B**. Monitor Habitat Restoration and Revegetation Sites

Table 11-7

Summary of Significant Impacts and Mitigation Measures – Biological Resources

Impact	Level of Significance	Mitigation Measure
BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11 (HPR Bypass Pipeline, A, B, C), 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32 ⊙ ●	**SP-23.** Delineate Wetlands, Waters of the United States, and Riparian Habitat **SP-24.** Prepare Wetland And Riparian Mitigation And Monitoring Plan **SP-27.** Avoid Impacts to Wetland and Riparian Areas **SP-32.** Pre-construction Marking and Fencing of Wetlands and Riparian Habitat **BIO-7.** Monitor Wetland And Riparian Mitigation Sites

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

11.8.3 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

The significant impacts identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3) are listed below. A discussion follows as to why the impact is significant and how the impact is mitigated to a level of less than significant. If impacts are significant and unavoidable, an explanation is provided.

BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?

The level of significance of this impact is reduced by the following standard practices that are part of the Project and recommended mitigation measures:

- SP-25. Sensitive Resource Program; and
- BIO-1. Conduct Biological Resource Assessment.

The standard practices and mitigation measures are outlined in Appendix D.

This impact is considered significant <u>before mitigation</u> due to the possibility of impacts to endangered, threatened or rare fish wildlife or plant species in areas that have not been surveyed for components 3, 4, 6, 22, 29 and 30 that compromise Alternative 3. Mitigation Measure BIO-1. Conduct Biological Resource Assessments and Standard Practice-25, Sensitive Resource Program, will allow the District to avoid or protect biological resources; it cannot be anticipated that the Sensitive Resource Program will allow for full mitigation of impacts that have yet to be determined as the details of the project components are not finalized. The District will compensate, in kind, for disturbance or alteration of habitat that may occur as a result of project component implementation. After ~~Until~~ implementation of the standard practices and recommended mitigation measure BIO-1,the level of impact ~~cannot be determined~~ is less than significant. This impact is considered less than significant after mitigation.

BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?

The level of significance of this impact is reduced by the following standard practice that is part of the Project:

- SP-26. Sensitive Plan Protection Program

This impact is considered significant before mitigation due to the possibility of impacts to CNPS List 2, 3, or 4 plant species in areas that have not been surveyed for components 3, 4, 6, 22, 29 and 30 that compromise Alternative 3. Standard Practice-26, Sensitive Plant Protection Program, will require the avoidance or protection of listed native plant species. When needed, mitigation will allow the Project to compensate, in kind, for loss of individuals of listed species. Many of the projects components may be implemented in the future. After ~~Until~~ implementation of the Sensitive Plant Protection Program, the level of impact ~~cannot be determined~~ is less than significant. This impact is considered less than significant after mitigation.

BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?

The level of significance of this impact is reduced by the following standard practice that is part of the Project:

- SP-30. Pre-Construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries

This impact is considered significant before mitigation due to the possibility of impacts to active raptor nests, wildlife nursery sites, or migratory bird nests in areas that have not been surveyed for components 3, 4, 6, 22, 29 and 30 that compromise Alternative 3. Standard Practice-30, Pre-construction Surveys for Nesting Raptors and Wildlife Nurseries, will allow the District to avoid and protect active raptor nests, migratory bird nests as well as nursery sites. After ~~Until~~ implementation of the Pre-Construction Surveys, the level of impact ~~cannot be determined~~ is less than significant. This impact is considered less than significant after mitigation.

BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?

The level of significance of this impact is reduced by the following standard practices that are part of the Project and recommended mitigation measures:

- SP-23. Delineate Wetlands, Waters of the United States and Riparian Habitat;
- SP-24. Prepare Wetland and Riparian Mitigation and Monitoring Plan;
- SP-27. Avoid Impacts to Wetland and Riparian Areas;
- SP-32. Pre-construction Marking and Fencing of Wetlands and Riparian Habitat; and
- BIO-7. Monitor Wetland and Riparian Mitigation Sites.

This impact is considered significant before mitigation because wetland delineations have not been performed on District, private or public lands in the locations of components 3, 4, 6, 22, 29 and 30 that compromise Alternative 3. Because delineations have yet to be performed, the level of impact to wetlands cannot be determined. Standard Practice-23, Delineate Wetlands, Waters of the United States, and Riparian Habitat, Standard Practice-24, Prepare Wetland And Riparian Mitigation And Monitoring Plan, Standard Practice-27 Avoid Impacts to Wetland and Riparian Areas, Standard Practice-32, Pre-construction Marking and Fencing of Wetlands and Riparian Habitat, and BIO-7, Monitor Wetland And Riparian Mitigation Sites, will allow the District to avoid or protect wetlands and waters of the U.S. The level to which these measures and practices reduce impacts cannot be determined until details of project components are finalized. The proposed Mitigation and Standard Practices require the District to compensate, in kind, for disturbance or alteration of wetlands that may occur as a result of project component implementation. This impact is considered less than significant after mitigation.

12 Traffic and Circulation

12 Traffic and Circulation

This chapter provides information regarding potential traffic and circulation impacts resulting from construction of the Project. Potential construction impacts may include roadway congestion, traffic delays, restricted access, increased traffic hazards, and damage to roadbeds. To provide a basis for this evaluation, the setting section describes the existing roadway network in the project area and presents existing peak hour and average daily traffic volume data where available. Other transportation facilities in the project area are also identified.

12.1 Impacts Evaluated in Other Chapters

The following subjects are related to the Traffic and Circulation Chapter, but are evaluated in other sections of this document:

- Air Quality. Air quality affected by project traffic is evaluated in Chapter 13, Air Quality.
- Transportation Noise. Transportation noise increases as a result of project traffic and is evaluated in Chapter 14, Noise.

12.2 Affected Environment (Setting)

As the basis for evaluating traffic and circulation impacts, this section describes the existing roadway system, transit services and bicycle and pedestrian facilities within the jurisdictions of the study area – Alpine County, CA and Douglas County, NV.

12.2.1 State Highways – Alpine County

State Highways serving the County within the project area are California Routes 88 and 89. These routes provide access to and through the County for inter-county and interstate travel and are sparsely interconnected with a network of major and minor County roads. The State Routes are classified by the County as Minor Arterial roads.

Route 88, a two-lane facility, enters Alpine County from Amador County, crosses Carson Pass at an elevation of 8,573 feet and provides a route across the northerly part of the County into Nevada. This route, which was formerly closed by snow during the winter, has been maintained open year round since 1972. Temporary brief closures occur periodically on Carson Pass for purposes of avalanche control.

Route 89, also a two-lane facility, enters the County from Mono County to the east, continues over Monitor Pass passing through Markleeville. It continues to Woodfords, crosses Luther Pass at elevation 7,740 feet and connects to Route 50 at Meyers Grade in El Dorado County.

Current and projected Average Annual Daily Traffic counts (AADT) along each highway in the County are shown in Tables 12-1 and 12-2. California's Department of Transportation (Caltrans) current traffic counts are based upon sample counts and calculations. Projected AADTs are derived using the past AADT estimates and straight-line projections.

Table 12-1

2007 Traffic Volumes
Alpine County – California State Highway 88

Location	Peak Hour	Peak Month Average Daily Traffic (ADT)	Average Annual Daily Traffic (AADT)
South of Picketts at West Jct. Rte. 89	390	3400	2950
North of Picketts at West Jct. Rte. 89	370	3600	3100
South of Woodfords at East Jct. Rte. 89	400	3400	2850
North of Woodfords At East Jct. Rte. 89	420	3900	3600
Nevada State Line	550	4200	3800

Source: Accessed March 23, 2009 - http://www.dot.ca.gov/hq/traffops/saferesr/trafdata/

Table 12-2

Projected Annual Average Daily Traffic (AADT)
Alpine County – California State Highway 88

Location	2010 AADT	2015 AADT
South of Picketts at West Jct. Rte. 89	4,669	5,441
North of Picketts at West Jct. Rte. 89	4,687	5,450
South of Woodfords at East Jct. Rte. 89	4,687	5,450
North of Woodfords at East Jct. Rte. 89	4,679	5,446
Nevada State Line	4,776	5,490

Source: 2020 County Model and 1990 is the base year

According to the Alpine County General Plan Transportation Element, as much as 90% of the traffic on State Routes in the County has its origin or destination outside the County, and a large amount of the traffic on the State Highways in the County is through-traffic or recreation-oriented. The peak month average daily traffic counts on Route 88 and 89 in the vicinity of the project area are typically 12 to 18 percent higher than the AADT on these segments.

Another factor affecting traffic on Route 88 is that it has become a major year-round trans-Sierra route, and one of only three trans-Sierra routes available in the winter. The increased use of this narrow, steep route by large trucks slows traffic and causes congestion. The six-mile long segment through Woodfords Canyon, located just north of the project area, with a steep westbound upgrade is one of the principal locations of such congestion, particularly at times of heavy recreational traffic.

12.2.2 State Highways – Douglas County

There are two Nevada State Highways in the Douglas County portion of the study area: State Route 88, which extends from the California state line to Minden, where it terminates at U.S. Highway 395; and State Route 206, which extends from Route 88 just north of the California state line, through Genoa, and terminating at Highway 395 just south of the Carson City boundary. Both of these routes are two-lane facilities in the project area. State Route 88 is classified by Douglas County as a rural principal arterial, while State Route 206 is classified as a major collector. Existing traffic volumes for these routes are shown in Table 12-3.

Table 12-3

Annual Average Daily Traffic on Nevada State Highways - Douglas County

Location	2004 AADT	2005 AADT	2006 AADT	2007 AADT
State Route 88, 0.5 miles north of Nevada / California State Line	3,905	3,000	3,850	3,800
State Route 88, 0.1 mile south of Kimmerling Rd	4,600	4,600	4,300	4,300*
State Route 206, 0.1 miles south of State Route 207	2,900	2,900*	2,250*	3,000
State Route 206, 1 mile west of State Route 88	660	660*	780*	670

Source: http://www.nevadadot.com/reports_pubs/traffic_report/2006/pdfs/Douglas.pdf

* Data Adjusted or Estimated

The existing traffic volumes on both of the State Routes in the project area are well within the capacity of the roads. At Level of Service (LOS) D, which is the Douglas County standard for State Routes, a two-lane rural principal arterial has a capacity of 15,800 Average Daily Traffic (ADT), while a two-lane rural major collector has a capacity of 8,800 ADT. Under projected 2015 traffic volumes, the Transportation Element of the Douglas County Master Plan indicates that the State Routes in the study area operate at LOS C or better (which is a higher LOS than the County standard for State Routes).

12.2.3 County Roads – Alpine County

Diamond Valley Road, which is a two-lane facility extending approximately 7.7 miles from Highway 88 at Paynesville to Highway 89 just east of Woodfords, is designated by Alpine County as a minor arterial road. All other County roads in the project area are designated as minor local roads. No traffic counts are available for county roads.

12.2.4 County Roads – Douglas County

All of the Douglas County roads in the project area are designated as minor collectors or local roads, except for Kimmerling Lane, located at the northern edge of the project area, which is designated as a minor arterial. This road, which had an ADT volume of 6,500 vehicles in 1999, connects State Route 88 to the Gardnerville Ranchos, and carries substantial local traffic. This road is also projected to operate at LOS C or better under 2015 traffic volumes.

12.2.5 Transit Service

Public transportation service in the project area within Alpine County is limited. In 1988 the County took over transit service formerly provided by the Central Sierra Area Agency on Aging (CSAA), and in 1990, the service was redesignated to include the general public. The service proved economically infeasible to operate and was discontinued in 1995; the County no longer provides designated transit service. The Intertribal Council of California transports preschool age children from low-income families to the Headstart Program in Woodfords. After school, the program also transports children to the Children's Center for Child Care Services. There is presently no public transit service in Douglas County.

12.2.6 Bicycle and Pedestrian Facilities

Bicycles are operated on roads and highways in both the Alpine County and Douglas County portions of the project area, with no special provisions to designate bicycle routes or to separate the bicycle traffic from motor vehicle traffic, except along California State Highway 89 between Markleeville and Woodfords, where four-foot wide paved shoulders were included on this section of the highway during its reconstruction in 1980. Bicycle use in the project area is generally limited to spring, fall, and summer months, and the State Highways and county roads are used by touring cyclists. No data exist to indicate the number of bicycle trips that are made in the area either by local residents or touring cyclists, although local or commuter cycling is presently minimal.

Pedestrian circulation in both Alpine and Douglas Counties is generally limited to existing developed areas, such as Markleeville, Minden and Gardnerville. Hiking, jogging and other nonvehicular recreational activities occur predominantly at Sierra trailheads and in dispersed areas. There are no designated trails or other pedestrian facilities in the project area.

12.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Traffic and Circulation Chapter the following subsections provide descriptions of applicable requirements.

12.3.1 California Department of Transportation (Caltrans)

Caltrans Guide for the Preparation of Traffic Impact Studies (Caltrans 2002) summarizes the state's policies applicable to state highways, including SR 4. These guidelines identify when a traffic impact study is required, what scenarios should be analyzed, and what analysis methodologies should be used. The state's LOS policy is stated in the guidelines as follows, Caltrans endeavors to maintain a target LOS at the transition between LOS "C" and LOS "D" on state highway facilities; however, Caltrans acknowledges that this may not be always feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing state highway facility is operating at less than the appropriate target LOS, the existing measure of effectiveness should be maintained.

12.3.2 Alpine County Regional Transportation Plan

The Alpine County Regional Transportation Plan (RTP) 2005–2025 (Alpine County 2005b) is designed to be a blueprint for the systematic development of a balanced, comprehensive, multi-modal transportation system within the County. The RTP was developed to provide a clear vision of the County's regional transportation goals, objectives, and policies, complimented by short-term and long-term strategies for implementation. The following are key objectives and policies identified in the County RTP.

Objective 5.3.1.B: Maintain roadways at acceptable safety standards.

- Policy: Identify and eliminate unsafe conditions on state highways, in coordination with Caltrans.

Objective 5.3.1.E: Maintain Caltrans' desired LOS on all state highways.

Objective 5.3.1.G: Construct passing lanes on SR 4 to improve safety and circulation.

- Policy: The County supports the construction of a passing lane on SR 4 between Arnold, in Calaveras County, and Bear Valley, in Western Alpine County, as its second highest priority.

Objective 5.3.1.I: The County will work with the developers and Caltrans to ensure that intersection improvements are installed at the appropriate time and in accordance with State and County highway standards.

- Policy: Developers shall be responsible for constructing or improving intersections at new developments, including resort communities and ski areas, to maintain acceptable LOS during the implementation of planned or phased development in these areas.

Objective 5.3.6.A: Plan and develop a continuous and easily accessible pedestrian and bikeway system within the region.

- Policy: Ensure accessibility to non-motorized facilities within new developments.

Objective 5.3.6.B: Provide a pedestrian and bikeway system that emphasizes the safety of people and property.

- Policy: Encourage secure facilities for bicycle storage at industrial, governmental, commercial, recreational, and educational locations.

Objective 5.3.6.C: Integrate pedestrian and bikeway facilities into a multi-modal transportation system.

- Policy: Incorporate non-motorized facilities when implementing improvements or new developments to the existing roadway network.

- Policy: Prioritize roadway and street designs that avoid bicycle-auto, pedestrian-auto, and bicycle-pedestrian conflicts.

12.4 Traffic and Circulation Goals, Objectives, and Policies

Table 12-4 identifies goals, objectives, and policies that provide guidance for development in relation to traffic and circulation within the project area. The table also indicates which criteria are responsive to each set of policies. Alpine County does not have any General Plan goals and policies related to potential project traffic and circulation impacts in the project area.

Table 12-4

General Plan Goals, Objectives, and Policies – Traffic and Circulation

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Douglas County Master Plan	Chapter 10	Goal 10.11	Provide safe and efficient vehicle circulation while continuing to preserve the rural character of the County	1, 2, 3, 4, 5

Source: Hauge Brueck Assoc. 2009

Notes:
1. The traffic and circulation evaluation criteria are provided in Table 12-5.

12.5 Evaluation Criteria with Points of Significance

Table 12-5 presents the evaluation criteria and points of significance used to determine potential impacts to traffic and circulation. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A traffic and circulation impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 12-5.

Table 12-5

Traffic and Circulation - Evaluation Criteria with Points of Significance

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will Project traffic cause congestion along project area roadways?	Increase in ADT on State Routes and arterial roadways	Greater than 10%	CEQA Checklist XV-a,b
2. Will lane closures due to Project construction cause traffic delays, restricted access, increased traffic hazards, and rerouting of traffic, including emergency vehicles?	a. Miles of lane closures not in compliance with Standard Transportation Procedures b. Duration and extent of lane closure	Greater than 0 miles Greater than 1 month over 1 mile segment and there are no reasonable detours	CEQA Checklist XV-g,e Alpine County Public Works Department; California Department of Transportation, and Professional Judgment Douglas County and NDOT
3. Will Project construction traffic increase traffic hazards to motor vehicles, bicyclists, or pedestrians?	Number of locations where there is ingress/egress of construction equipment onto a major roadway not in accordance with regulations	Greater than 0 locations	CEQA Checklist XV-c,d Alpine County Public Works Department; California Department of Transportation Douglas County and NDOT
4. Will Project construction traffic damage public or private roadbeds?	Number of miles of roadway which Project does not restore to existing conditions or better	Greater than 0 miles	Alpine County Public Works Department; California Department of Transportation Douglas County and NDOT
5. Will there be inadequate parking for Project activities?	Any on-road parking	Greater than 0 vehicles	CEQA Checklist XV-f Code requirements for Alpine County and Douglas County

Source: Hauge Brueck Assoc. 2009

Traffic and circulation impacts associated with project activities are evaluated against the criteria listed in Table 12-5. The existing circulation facilities and traffic volumes, described above in the Affected Environment section, serve as the basis for evaluation of impacts in the project area. The roadway network and other potentially affected circulation facilities are determined from General Plans for the respective jurisdictions. Existing traffic volumes are from County sources and Caltrans. The project team, as based on typical construction practices, estimates construction impacts on traffic. Construction activities can typically result in short-term increases in congestion associated with vehicle traffic and construction activities on the existing transportation network. This evaluation focuses on construction-related transportation impacts. Temporary impacts to affected roads are assessed for the addition of worker and construction vehicles as well as construction-related activities.

There are no permanent changes planned for the transportation network or project-generated traffic that will use the system after completion of construction, and therefore a LOS methodology was not used for evaluating traffic impacts. Worker parking and construction staging areas are discussed in relation to traffic impacts, along with temporary road closures or access disruptions during construction. Temporary lane closures on state highways, arterials, collectors, and local and rural streets are not considered significant if they are limited to less than a month in any one-mile section of road and alternative route/ access and/or traffic control is provided.

Estimates of typical construction-related equipment and vehicle usage as the basis for evaluating construction traffic impacts are shown in Table 12-6. Typically, at any given time during the implementation of construction activities, one dump truck will travel 100 miles and 15 worker vehicles will make one round-trip per day for a total of up to 32 daily vehicle trips (Table 12-6, Construction-Related Equipment and Vehicle Usage).

Table 12-6

Construction-Related Equipment and Vehicle Usage

Equipment / Vehicle	Number of Units	Hours per Day (Miles per Day)	Month Duration (Trips per Day)
Small Truck Crane	1	2 hr.	1
Tractor/Loader/Backhoe	1	4 hr.	1
Grader	1	4 hr.	1
Dump Truck	1	(100 miles)	1
Water Truck	2	4 hr.	1
Flat Bed Truck	1	5 hr.	1
Portable Generator	1	4 hr.	1
Hand Compactor	1	4 hr.	1
Worker Vehicles	15	(50 miles)	(2 trips)

Source: Hauge Brueck Assoc. 2009

Use of heavy equipment will be minimal and short-term, with the majority of activity being off-road (ditches and fields) construction of irrigation components.

The Standard Traffic Control Procedures are part of the standard practices adopted by the District and are discussed in Chapter 2 and detailed in Appendix D. They detail typical encroachment construction permit provisions within the project area road system rights-of-way. Elements of the Standard Traffic Control Procedures, SP-2, 3, 4 and 5, provide for encroachment permits, transportation permits, and alternative routes and detours; and provide procedures for mitigating construction along roadways, construction across roadways, construction near schools, trenches, access, road damage, emergency vehicle access, parking, oversize vehicles and equipment, construction hours, and ingress/egress of construction equipment onto a major roadway.

12.6 Environmental Consequences (Impacts) and Recommended Mitigation

12.6.1 No Project Components

Table 12-7 presents potential traffic and circulation impacts, outlines the point of significance, and also ranks the level of significance for the No Project Components.

Source: Hauge Brueck Assoc. 2009

Table 12-7

Traffic and Circulation Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
TRAFFIC-1. Will the No Project Components traffic cause congestion along project area roadways?	Greater than 10% increase on State Routes or principal arterials				NP-1, NP-2
TRAFFIC-2. Will lane closures due to the No Project Components construction cause traffic delays, restricted access, increased traffic hazards, and rerouting of traffic, including emergency vehicles?	Greater than 0 miles not in compliance with standard transportation procedures b. Greater than 1 month over 1 mile segment				NP-1, NP-2
TRAFFIC-3. Will the No Project Components traffic increase traffic hazards to motor vehicles, bicyclists, or pedestrians?	Greater than 0 locations				NP-1, NP-2
TRAFFIC-4. Will the No Project Components construction traffic damage public or private roadbeds?	Greater than 0 miles				NP-1, NP-2

Table 12-7					
TRAFFIC-5. Will there be inadequate parking for the No Project Components activities?	Any on road parking				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-4, TRAFFIC-5. Will the No Project Components impact traffic and circulation based on evaluation criteria 1 – 5?**

Analysis: *No Impact; NP-1, NP-2*

Under the No Project Components, there will be no traffic/circulation changes resulting from new project facilities because no construction will occur. Therefore, no traffic/ circulation impacts will occur as defined by the evaluation criteria. Continued operation of the existing recycled water systems will not increase traffic or circulation.

Mitigation: *No mitigation is needed. NP-1, NP-2*

12.6.2 Project Components

Table 12-8 presents potential impacts to Traffic and Circulation, outlines the points of significance, and also ranks the level of significance for the Project Components.

Table 12-8 Traffic and Circulation Impacts – Project Components					
Impact	**Point of Significance**	**Level of Significance by Component**			
		Significant Impact Before and After Mitigation	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
TRAFFIC-1. Will Project Component traffic cause congestion along study area roadways?	Greater than 10% increase on State Routes or principal arterials			2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 18, 19, 23, 24

Table 12-8

Traffic and Circulation Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
TRAFFIC-2. Will lane closures due to Project Component construction cause traffic delays, restricted access, increased traffic hazards, and rerouting of traffic, including emergency vehicles?	Greater than 0 miles not in compliance with standard transportation procedures b. Greater than 1 month over 1 mile segment			2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32	8, 11, 18, 19, 23, 24
TRAFFIC-3. Will Project Component traffic increase traffic hazards to motor vehicles, bicyclists, or pedestrians?	Greater than 0 locations				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
TRAFFIC-4. Will Project Component construction traffic damage public or private roadbeds?	Greater than 0 miles			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
TRAFFIC-5. Will there be inadequate parking for Project Component activities?	Any on road parking				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: **TRAFFIC-1. Will Project Component traffic cause congestion along study area roadways?**

Analysis: *Less than Significant Impact; Components 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Temporary construction activity associated with the conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will not result in significant daily traffic or circulation impacts. Project implementation is over an extended period of time with individual Project

Components generating only a few trips per day, based upon the typical component construction traffic, as shown in Table 12-6. Traffic increases will be well under 10 percent of existing traffic. State and County roadway capacities in the project area are sufficient to handle the additional traffic, and therefore the impact will be less than significant. No new access points to State Routes will be constructed as part of the conveyance components.

All of the application components 1, 7, 9, 10, 12, 13, 15, 16, 21, 29 and 30 will result in temporary increases in traffic due to construction activity associated with the on-site and off-site construction or installation of pipelines and other equipment, although temporary construction activity associated with these components will not result in significant daily traffic or circulation impacts. Project implementation is over an extended period of time with individual Project Components generating only a few trips per day, based upon the typical component construction traffic, as shown in Table 12-6. Traffic increases will be well under 10 percent of existing traffic. State and County roadway capacities in the project area are sufficient to handle the additional traffic and therefore the impact will be less than significant. No new access points to State Routes will be constructed as part of the application components.

The temporary containment component (Component 11) will result in temporary increases in traffic due to construction activity, although temporary construction activity associated with these components will not result in significant daily traffic or circulation impacts. The three alternative alignments of the HPR bypass pipeline will have minor impacts on traffic as the three alternative alignments cross Diamond Valley Road and SR 89 at the junction. Minor delays may result from this construction activity within the right-of-way (ROW). This Project Component will generate only a few trips per day, as shown in Table 12-6. The increase in traffic will be well under 10 percent of the existing traffic volume. State and County roadway capacities in the project area are sufficient to handle the additional traffic and therefore the impact will be less than significant. No new access points to State Routes will be constructed as part of the temporary containment component.

Water management Component 8 may result in increased traffic associated with construction of improvements at the District's wastewater treatment plant in South Lake Tahoe, CA. Construction traffic will be short-term in duration, will only involve minimal construction equipment at the treatment plant, and will not increase traffic more than 10% on state routes. This impact is less than significant.

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Application components 18 and 19 and water management components 8, 23 and 24 will not result in new traffic on project area roadways, as they do not involve new facilities.

Mitigation: *No mitigation is needed. Components 8, 18, 19, 23, 24*

Impact: traffic **TRAFFIC-2. Will lane closures due to Project Component construction cause delays, restricted access, increased traffic hazards, and rerouting of traffic, including emergency vehicles?**

Analysis: *Less than Significant Impact; Components 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

The construction activities associated with conveyance components 2, 3, 4, 5, 6, 11, 14, 17, 20, 22, 31 and 32 that may cause lane closures consist of: the mobilization of construction equipment; stockpiling lengths of piping or other material along pipeline and ditch alignments; delivery of gravel, asphalt, and water for pipeline trenches; pavement restoration; breaking and removing pavement; excavation of pipeline trench; pouring of concrete for ditch linings; and installation of pipe sections. The Alternative A alignment for the HPR bypass pipeline for Component 11 is proposed to be located in Diamond Valley Road ROW. Short sections of the westbound lane of Diamond Valley Road may be closed for short time periods during construction. The three HPR bypass pipelines also cross SR 89 at the junction of Diamond Valley Road and SR 89. Construction of the pipeline in this location may require temporary one-lane closures for a distance of less than a half mile for less than one month.

Construction activities associated with conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 could result in temporary partial lane or one-lane closures, for a distance of less than a mile and/or lasting for less than one month.

The following closures will primarily be due to construction activities associated with a pipeline or ditch crossing a roadway:

- Component 5 - Provide Pressurized Recycled Water Through Wade Valley;
- Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity;
- Component 31 – Divert Storm water Flow Away from Harvey Place Reservoir and to Indian Creek Reservoir; and
- Component 32 – ICR Spillway Channel.

Closures due to the construction of a pipeline within an existing right-of-way will be for a longer distance than for road crossings, but will be limited to sections of road less than one mile in length. The following components will involve segments within roadways:

- Component 4 - Provide Pressurized Recycled Water to Fredericksburg System
- Component 6 - Provide Pressurized Recycled Water to the Ranchettes

The District will conduct construction in accordance with existing regulations as outlined under the Standard Traffic Control Procedures, Measures SP-3 through SP-7.

As part of the Standard Traffic Control Procedures, the District adopted the following:

SP-2. Emergency response vehicles will not be impeded. The District will provide advance notice to emergency service providers and coordinate alternate response routes during construction.

SP-4. Maintain maximum number of open lanes on roadways. The District commits to keeping at least one lane of through traffic open whenever feasible.

SP-5. Avoid traffic disruption on major highways. To avoid disrupting traffic and delaying commerce, construction on State highways will be done in accordance with Caltrans requirements.

SP-7. Access to businesses and residences. The District will notify businesses and residences in advance of scheduled construction. The District will also maintain access to businesses and residences during pipeline construction.

Lane closures for more than one month in duration will occur on only a few sections of road less than one mile in length, and will not result in the complete closure of any road. With implementation of the Standard Traffic Control Procedures, specifically SP-3, SP-4, SP-55, and SP-7, these impacts are considered to be less than significant.

Construction activities associated with the implementation of the following application components may cause partial lane closures on Diamond Valley Road during construction and installation of pipelines and associated equipment.

- Component 12 - Grow Biomass Crops for Pulp Production Using Recycled Water;
- Component 13 - Basin Sod and Seed production;
- Component 29 - Irrigate the District Pasture; and
- Component 30 – Irrigate the Jungle with Recycled Water.

With implementation of the Standard Traffic Control Procedures, specifically SP-2, SP-3, SP-4, and SP-6, these impacts are considered to be less than significant.

The other application components do not involve construction affecting public roadways. Pipelines to the other application areas are addressed under conveyance components.

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32*

Analysis: *No Impact; Components 8, 18, 19, 23, 24*

Application components 18 and 19 do not involve construction of physical facilities and will not require lane closures.

Construction of the water management components 23 and 24 do not construct physical facilities and will not require lane closures. Construction of improvements at the District's treatment plan in South Lake Tahoe, CA (Component 8) will not require land closures as none of the construction will occur within the public rights-of-way.

Mitigation: *No mitigation is needed. Component 8, 18, 19, 23, 24*

Impact: TRAFFIC-3. Will Project Component traffic increase traffic hazards to motor vehicles, bicyclists, or pedestrians?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

As identified in the discussion of Impact TRAFFIC-2, construction activities related to components 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 will occur along public roadways, requiring construction equipment to enter and leave the construction zone. The District will conduct construction in accordance with existing regulations as outlined under the Standard Traffic Control Procedures, SP-2, 3, 4, and 5. These regulations require the District to obtain an Encroachment Permit and

Transportation Permit, where applicable, from the appropriate agency to minimize hazards due to construction traffic entering and leaving the construction area.

The construction of the components 1, 4, 5, 6, 10, 11, 15, 17, 31, and 32 will result in short-term impacts to bicycle usage along Diamond Valley Road, Fredericksburg Road, State Route 88 and State Route 89. There are no permanent changes planned for these facilities after completion of construction. All affected facilities will be returned to existing conditions after construction. Because construction will be required to abide by applicable regulations and permits, no impact to pedestrian or bicycle safety has been identified.

The construction associated with the Alternative A pipeline alignment for temporary containment Component 11 and construction of components 9, 12 and 13 on the Diamond Valley Ranch property will affect bicycle usage along Diamond Valley Road, but there will be no permanent changes to this facility after completion of construction. Because construction will be in accordance with applicable regulations and permits, no impact to pedestrian or bicycle safety has been identified.

As identified in the discussion of Impact TRAFFIC-2, no construction of temporary containment facilities (Component 11 Alternatives B and C) or water management facilities (Component 8) will occur within a public ROW. Construction will involve construction traffic accessing the project area from Diamond Valley Road. The District will conduct construction in accordance with existing regulations as outlined under the Standard Traffic Control Procedures. These regulations require the District to obtain an Encroachment Permit and Transportation Permit, where applicable, to minimize hazards due to construction traffic entering and leaving the construction area.

Heavy vehicles used in the construction process may travel on non-designated truck routes in the project area. The District will conduct construction in accordance with existing regulations as outlined under the Standard Traffic Control Procedures. These regulations require the District to obtain a Transportation Permit, where applicable, prior to using non-designated roadways. This permit will control signage, timing, or the need for flag persons along the roadway.

Because construction will be in accordance with applicable regulations and permits, no impact to pedestrian or bicycle safety is identified. Components 18, 19, 23 and 24 do not involve the construction of new physical facilities and will not impact pedestrian or bicycle safety.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: TRAFFIC-4. Will Project Component construction traffic cause damage to public or private roadbeds?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Though heavy vehicles used in the construction process may damage project area roadways, the District will restore all affected roadways as required under the Standard Traffic Control Procedures. Standard Traffic Control Procedure SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites, will ensure that affected roadways are returned to existing or better conditions.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: TRAFFIC-5. Will there be inadequate parking for Project Component activities?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Standard Traffic Control Procedures SP-9, Park within Construction Easements, requires that all construction equipment and construction worker vehicles be parked within the construction easements.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

12.7 Cumulative Impacts

There are three impacts – both of which are less than significant – identified in the Traffic and Circulation section, related to traffic congestion and lane closures during construction. Construction of some of the Project Components is expected to begin in 2010. Construction activity will generally be limited to only one or two components at a time, and construction will continue over the next 15-20 years. Traffic in the project area will continue to increase over this time period, although at a very slow rate, reflecting the limited growth possibilities in rural Alpine County.

For analysis of congestion impacts, the point of significance is set very low at a 10 percent increase over existing traffic, and even if multiple components are under construction at one time, the total temporary increase in traffic levels will not exceed 10 percent (e.g., anticipated daily trips for a component is up to 32 trips). Although a comprehensive cumulative traffic scenario has not been developed for every affected roadway, all affected roadways have the capacity to handle two or three times the current traffic volumes, which is well below the potential for increased traffic resulting from development of Alpine County to its projected population of 2,000 in year 2015, which is a 30 percent increase over current levels. There will not be a cumulative impact on congestion levels in the project area.

As indicated above, construction activity will generally be limited to only one or two components at a time, and construction will continue over the next 15-20 years. The lane closures will be for relatively brief periods of time (less than one month) and only three of the components will potentially cause lane closures on a State Route. Project Component construction will not result in the complete closure of any road. Though overlap with other construction projects on the affected roads (State Route 88, State Route 89, Fredericksburg Road and Diamond Valley Road) is extremely unlikely, if they do occur on the same road during the same time period, the District will coordinate with Caltrans and Alpine County (as required under standard traffic control measures) so that lane closures are kept to a minimum. There will not be a cumulative impact due to lane closures in the project area.

12.8 Summary of Significant Impacts and Mitigation Measures

12.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant impacts related to traffic and circulation are identified.

12.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to traffic and circulation are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

13 Air Quality

13 Air Quality

This chapter discusses the Project's potential to generate emissions that exceed air quality threshold levels. The potential for creation of odors and the impacts of greenhouse gases (GHG) on global warming are addressed. Background information on air quality regulations and ambient air quality standards is presented to provide a context for a discussion of existing air quality in the project area. Topography and meteorology are discussed because they affect local air quality.

13.1 Impacts Evaluated in Other Chapters

Impacts relating to air quality are discussed in this chapter.

13.2 Affected Environment (Setting)

13.2.1 Factors Affecting Local Air Quality

13.2.1.1 Topography

From an airshed prospective, the project area lies within a series of valleys (Diamond Valley, Wade Valley, Dutch Valley, and Upper Carson Valley) on the eastern slope of the Sierra Nevada mountain range with the Sierra Nevada to the west of the Project area and the Lower Carson Valley to the east. The Project area is drained by the West Fork of the Carson River and Indian Creek, along with various smaller streams and ditches. Elevations range from about 5,600 feet above sea level at Woodfords to about 4,800 feet at the California-Nevada state line.

13.2.1.2 Meteorology

During the summer, the entire west coast of North America is dominated by high pressure centered in the Pacific Ocean to the west of California. At the same time, a thermal low pressure caused by intense ground heating generally extends from southern California northward along the eastern slopes of the Sierra Nevada. While there are layers of maritime air over the ocean and along the coast, they are shallow and seldom penetrate to the crest of the Sierra.

In the winter there is a deep, strong low-pressure area in the Gulf of Alaska, while the Pacific High off the California coast weakens and retreats to the southwest. This provides for a strong flow of maritime air from the Pacific Ocean across the west coast of the United States. This causes precipitation that increases with altitude, generally to a height of about 5,000 feet above sea level. Above that level, precipitation generally decreases because of the lower water content of the colder air aloft.

Precipitation

The strong influence of the Sierra Nevada causes a wide differential in precipitation between the east and west slopes of the range. Average precipitation from November through March at Woodfords (elevation 5,671 feet) is 16.4 inches, and 6.71 inches at Minden (elevation 4,700 feet in the Carson Valley) (Alpine County 2005). Precipitation most often occurs as snowfall in Alpine County during the winter months. Summers are generally dry, with average precipitation varying from 0.74 inch at Woodfords to 0.49 inch at Minden. Summer showers are often associated with thunderstorm activity.

Temperature

Annual temperature data in the project area is reported at South Lake Tahoe (elevation 6,260 feet). These temperature data can be viewed as generally indicative of the Project area. Annual average low temperatures range from 21°F in January to 51°F in March. Annual average high temperatures range from 45°F in January to 92°F in July (NOAA 2001). The annual frost-free period generally exceeds 120 days at Woodfords (Alpine County 2005).

Winds

Prevailing winds in Alpine County are from the south or southwest. Daily changes in temperature and pressure can create complex slope and valley winds or breezes. Wind speeds are generally low, with South Lake Tahoe data indicating average wind speeds from six to nine mph depending on the season (NOAA 2001).

13.2.1.3 Current Air Quality

As stated above, the project area is under jurisdiction of the GBUAPCD for air quality control. There are no permanent ambient air quality monitoring stations located in Alpine County. The nearest monitoring stations for particulates are at Lee Vining and Mono Lake, in Mono County. The nearest station measuring O_3 and CO is at Mammoth Lakes, Mono County. Since these stations are over 100 miles from the project area, they cannot be considered as representative of the area's current ambient air quality (GBUAPCD 2009).

The BAQP conducted ambient air quality monitoring for PM_{10} at two stations in Minden and Gardnerville. Measured PM_{10} concentrations at these stations were well below the Nevada annual and 24-hour standards during the period 1993-1998. Measurements at these stations were discontinued in 1998 to make way for monitoring of $PM_{2.5}$ at Gardnerville, which began in January 1998. Measured data from 1998-2003 showed "low" $PM_{2.5}$ concentrations at Gardnerville which did not exceed the ambient air quality standard (NDEP 2003). Current and future monitoring in the airshed follow the Ambient Air Monitoring Network Plan prepared by BAQP in 2006.

13.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Air Quality Chapter the following subsections provide descriptions of applicable requirements.

13.3.1 Federal Air Quality Requirements

Pursuant to the federal Clean Air Act (CAA) of 1970, and its subsequent amendments, USEPA established ambient air pollutant concentration standards and maximum allowable emission rates for individual sources of air pollutants. Air quality is controlled through the attainment and maintenance of ambient air quality standards and enforcement of air pollutant emissions limits. A system (i.e., the State Implementation Plan or SIP) also was set up in which USEPA holds each state responsible for attaining ambient air quality standards within its borders.

National Ambient Air Quality Standards (NAAQS) have been established for six criteria air pollutants: ozone (O_3), carbon monoxide (CO), particulate matter less than 10 microns in diameter (PM_{10}), nitrogen dioxide (NO_2), lead (Pb), and sulfur dioxide (SO_2). Annual average standards are never to be exceeded. Short-term standards (e.g., 1-hour, 8-hour, and 24-hour averages) are not to be exceeded more than once a year. Primary standards for air pollutants were established to protect public health, while secondary standards were established to protect the public welfare by preventing impairment of visibility and damage to vegetation and property. These six air pollutants are termed "criteria" pollutants because the standards are based upon documented human health criteria.

In July 1997, USEPA revised the PM_{10} NAAQS and issued an NAAQS for 2.5 micron diameter particulate matter ($PM_{2.5}$). The NAAQS for particulates is revised in several respects. First, compliance with the current 24-hour PM_{10} standard is now based on the 99th percentile of 24-hour concentrations at each monitor within an area. Two $PM_{2.5}$ standards were added: a standard of 15.0 micrograms per cubic meter ($\mu g/m^3$), based on the three-year average of annual arithmetic means from single or multiple monitors (as available); and a standard of 35 $\mu g/m^3$, based on three-year average of the 98th percentile of 24-hour average concentrations at each monitor within an area.

USEPA issued a NAAQS for O_3, which became effective on September 16, 1997 replacing the previous one-hour standard of 0.12 parts per million (ppm) by an 8-hour average standard at a level of 0.08 ppm. Compliance with this standard is based on the three-year average of the annual fourth-highest daily maximum eight-hour average concentration measured at each monitor within an area. In 2008, USEPA transitioned to the updated 8-hour standard of 0.075 ppm. As of June 15, 2005 USEPA revoked the one-hour ozone standard in all areas except the 8-hour O_3 non-attainment Early Action Compact Areas.

Table 13-1 summarizes the characteristics, health effects, and major sources of these pollutants. Table 13-2 lists the federal ambient air quality standards, and ambient air quality standards for the states of California and Nevada.

Table 13-1

Major Criteria Pollutants

Pollutant	Characteristics	Health Effects	Major Sources
Ozone	A highly reactive photochemical pollutant created by the action of sunshine on ozone precursors (primarily reactive hydrocarbons and oxides of nitrogen.) Often called photochemical smog.	Eye irritation. Respiratory function impairment.	The major sources of ozone precursors are combustion sources such as factories and automobiles, and evaporation of solvents and fuels.
Carbon Monoxide	Carbon monoxide is an odorless, colorless gas that is highly toxic. It is formed by the incomplete combustion of fuels.	Impairment of oxygen transport in the bloodstream. Aggravation of cardiovascular disease Fatigue, headache, confusion, dizziness. Can be fatal in the case of very high concentrations.	Automobile exhaust, combustion of fuels, combustion of wood in wood stoves and fireplaces.
Nitrogen Dioxide	Nitrogen dioxide is a reddish-brown gas that discolors the air, formed during combustion.	Increased risk of acute and chronic respiratory disease.	Automobile and diesel truck exhaust, industrial processes, fossil-fueled power plants.
Sulfur Dioxide	Sulfur dioxide is a colorless gas with a pungent, irritating odor.	Aggravation of chronic obstruction lung disease. Increased risk of acute and chronic respiratory disease.	Diesel vehicle exhaust, oil-powered power plants, industrial processes.
PM10	Solid and liquid particles of dust, soot, aerosols and other matter, which are small enough to remain, suspended in the air for a long period of time.	Aggravation of chronic disease and heart/lung disease symptoms.	Combustion, automobiles, field burning, factories and unpaved roads. Also a result of photochemical processes.

Source: Donald Ballanti, Certified Consulting Meteorologist, 1995

Table 13-2

Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Primary Standard	State of California Standard	State of Nevada Standard*
Ozone	1-Hour 8-Hour	-- 0.075 ppm	0.09 ppm 0.070 ppm	0.12 ppm --
Carbon Monoxide	8-Hour 1-Hour	9 ppm 35 ppm	9.0 ppm 20 ppm	9 ppm** 6 ppm*** 35 ppm ****
Nitrogen Dioxide	Annual 1-Hour	0.053 ppm --	0.030 ppm 0.18 ppm	0.053 ppm
Sulfur Dioxide	Annual 24-Hour 3-Hour 1-Hour	0.03 ppm 0.14 ppm -- --	-- 0.04 ppm -- 0.25 ppm	0.030 ppm 0.14 ppm 0.5 ppm --
PM_{10}	Annual 24-Hour	 150 µg/m^3	20 µg/m^3 50 µg/m^3	50 µg/m^3 150 µg/m^3
$PM_{2.5}$	Annual 24-Hour	15 µg/m^3 35 µg/m^3	12 µg/m3 --	-- --
Lead	Quarterly Average 30 Day Average Rolling 3-Month Average	1.5 µg/m^3 -- 0.15 µg/m^3	-- 1.5 µg/m^3 --	1.5 µg/m^3 -- --

Sources: USEPA 2009; CARB, 2008. NDEP, 2008

ppm = Parts per Million
µg/m^3 = Micrograms per Cubic Meter
* = Portion of state outside Lake Tahoe Basin
** = Less than 5,000 feet above sea level
*** = Over 5,000 feet above sea level
**** = Any elevation

In 1977 the CAA was amended to include the Prevention of Significant Deterioration Program (PSD). The program is based on the determination that air pollution should be limited to quantifiable amounts depending on an area's classification, whether Class I, II or III. The Mokelumne Wilderness in Alpine County is mandated as Class I. The remainder of the county is Class II. In Class II areas, emissions limits for industries must show that their emissions will not exceed the increment for their area's classification, based on specific percentages of the National Standards.

The 1977 Amendments to the CAA require that each State identify areas within its boundaries that do not meet the NAAQS and develop and obtain USEPA approval of a State Implementation Plan (SIP) that demonstrates how the State will attain NAAQS.

Major amendments to the CAA were signed into law on November 15, 1990. These amendments prescribe new planning requirements and attainment deadlines for areas that do not attain NAAQS. Procedures and guidelines for conforming to the 1990 CAA amendments (1990 CAAA) have been prepared and continues to be updated by the USEPA. The 1990 amendments also direct the USEPA to set control standards for hazardous air pollutants (HAP) and require certain industries to significantly reduce emissions of HAP.

13.3.2 California Air Quality Requirements

The California Air Resources Board (CARB) coordinates and oversees the activities of California's many single-county Air Pollution Control Districts (APCDs) and multi-county Unified APCDs (UAPCDs) and Air Quality Management Districts (AQMDs). CARB and the APCDs/UAPCDs/AQMDs operate numerous air quality monitoring stations throughout the State. Data collected at those stations are used to classify areas and air basins as attainment or nonattainment for each criteria air pollutant based on whether ambient air quality standards have been achieved. CARB also is responsible for incorporating local nonattainment plans into the SIP.

CARB establishes State ambient air quality standards, many of which are more stringent than the corresponding NAAQS. These standards are shown in Table 13-2. In addition to the six criteria pollutants regulated by the CAA, CARB has also established standards for hydrogen sulfide, sulfates, and vinyl chloride. State standards for SO_2 and Pb are not to be equaled or exceeded. Other State ambient air quality standards are never to be exceeded.

An area is considered to be nonattainment for a certain air pollutant if violations of the applicable standard occur in each of the last three years. One violation per year contributes toward State designation of nonattainment; federal designation occurs with two or more violations per year. For the purposes of considering an air basin as attainment with respect to a standard, CARB and USEPA both consider multiple violations of short-term standards on the same day as one violation.

The Project is located in Alpine County, which lies in the Great Basin Valleys Air Basin. This basin encompasses the counties of Alpine, Mono, Inyo, Kern, the Antelope Valley portion of Los Angeles County, the Mojave Desert portion of San Bernardino County, and eastern Riverside County. USEPA designates Alpine County as an unclassified/attainment area for the O_3, CO, and PM_{10} federal standards. The GBUAPCD is responsible for air pollution control within the Great Basin Valleys Air Basin. The GBUAPCD is 13,975 square miles or almost 9 million acres with a population of around 32,000 people. There are no SIP requirements for Alpine County.

The California Clean Air Act (CCAA), which became effective on January 1, 1989, provides a planning framework for attainment of State ambient air quality standards. Local APCDs and AQMDs with areas in violation of State ambient air quality standards are required to prepare plans for attaining the State standards. The CCAA provides for the classification of nonattainment air basins into three classes: moderate, serious, and severe. For each class, the CCAA specifies attainment guidelines that must be followed. For all classes, attainment plans are required to demonstrate a five percent per year reduction in the emissions of nonattainment pollutants or their precursors, unless CARB determines that all feasible measures are being employed to reduce emissions.

The Great Basin Valleys Air Basin is classified as nonattainment for the California PM_{10} ambient air quality standards. The California legislature, when it passed the CCAA in 1988, recognized that PM_{10} attainment is not easily obtained and excluded it from the requirements of the CCAA. The CCAA requires CARB to produce a report regarding the prospect of achieving the State ambient air quality standard for PM_{10}. CARB recommends that certain actions be taken, but does not yet impose a planning process to require attainment within a specified time frame. The GBUAPCD adopted an implementation schedule in July 2005 and then began working to cost-effectively implement measures to make progress towards meeting the State particulate matter standards.

The Great Basin Valleys Air Basin is classified as attainment by the CARB for sulfate, and is unclassified for O_3, CO and hydrogen sulfide (H_2S). None of the monitoring sites used to determine the above classifications are located in Alpine County.

13.3.3 Nevada Air Quality Requirements

NDEP, Bureau of Air Quality Planning (BAQP) oversees air quality management in the state, and specifically in Douglas County, which is located on the east side of the project area. One of the goals of the BAQP is determination of current and projected concentrations of ambient air contaminants in the State, and development and implementation of measures to achieve and maintain ambient air quality standards. BAQP has the authority to implement air pollution control requirements established in NRS 445B.100 through 445B.825, inclusive and NRS 486A.010 through 486A.180, inclusive.

BAPC has jurisdiction of air quality programs over all counties in the State except for Washoe and Clark Counties, which have their own air quality jurisdictions. BAPC also has the authority to implement air pollution control requirements established in NRS 445B.100 through 445B.825, inclusive and NRS 486A. 010 through 486A.180, inclusive.

The state of Nevada has state air quality standards that are generally based on federal standards, as shown in Table 13-2. In addition to the State standards for the criteria pollutants, Nevada has an air quality standard for H_2S. Monitoring for H_2S is generally confined to the proximity of industrial sources of this pollutant.

Pollutants of particular concern in Douglas County include PM_{10}, CO and O_3. No locations in Douglas County are designated nonattainment for ambient air quality standards.

13.3.4 Greenhouse Gases and Global Warming

13.3.4.1 Background and U.S. Greenhouse Gas Emissions

The burning of fossil fuels, such as coal and oil, and destruction of forests increase the amount and concentrations of "GHG" in the atmosphere. These gases retain heat in the atmosphere and contribute to increases in average global atmospheric temperatures and climate change. U.S. average temperatures increased during the 20th and into the 21st century, and the last decade is the warmest in more than a century of direct observation. Other aspects of the climate change include an increase in the number of U.S. heat waves, changes in rainfall patterns, reduced snow and ice cover, and sea-level rise (CCSP, 2008).

If GHG emissions continue to increase, climate models predict that the average temperature at the Earth's surface could increase 4.7ºF to 7.2ºF (or higher) by 2100 (CCCC, 2006).

13.3.4.2 California Greenhouse Gas Emissions

Table 13-3 lists 2004 California GHG emissions estimated by the CARB based on carbon dioxide (CO_2) equivalent emission rates. As shown in the table below, California CO_2 equivalent emissions were approximately 497 million tons in 2004. As shown in the table, over 87 percent of GHG emissions from within California occur from energy production/consumption, with electricity generation comprising 20 percent (100 million metric tons) and road transportation comprising 33 percent (167 million metric tons). It is important to note that federal and State regulatory processes apply to both motor vehicle emissions and electrical generation facility emissions.

Table 13-3

California 2004 Greenhouse Gas Emissions Inventory

Category	CO2 Equivalent (million metric tons)[1]	Percent Total (of gross)
Energy Total	437.11	87.58
Energy - Electricity Generation	100.095	20.06
Energy - Road Transportation	166.747	33.41
Energy - All Other	170.268	34.12
Industrial Processes and Product Use	27.65	5.54
Agriculture, Forestry and Other Land Use	27.45	5.50
Waste Total	6.88	1.38
Waste – Solid Waste Disposal	5.83	1.17
Waste - Wastewater Treatment and Discharge	1.05	0.21
Total (gross)	499.09	100.00
Sinks and Sequestrations	-2.14	0.43
Total (net)	496.95	

Source: California Air Resources Board, April 9, 2009

1 One metric ton is the equivalent of 2,200 pounds and one U.S. ton (short ton) is 2,000 pounds, resulting in a conversion of 499.09 million metric tons to 549 million tons.

The California Global Warming Solutions Act of 2006 (AB 32) establishes the first comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost effective reductions of GHG and makes the CARB responsible for monitoring and reducing GHG emissions.

One requirement of AB 32 is the preparation of a Scoping Plan to reduce the state's GHG emissions to 1990 levels by 2020. On December 11, 2008 the CARB approved the Scoping Plan and is now preparing detailed strategies to implement all of the recommended measures by 2012. The plan includes a cap-and-trade program covering 85 percent of the state's emissions strategies to enhance and expand energy efficiency programs, implementation of California clean car standards the use of clean and renewable energy, and implementation of a low-carbon fuel standard.

13.3.4.3 Carbon Sequestration

Carbon storage (sequestration) occurs in forests and soils primarily through the natural process of photosynthesis. Atmospheric CO_2 is taken up through leaves and becomes carbon in the woody biomass of trees and other vegetation. Approximately half of vegetation mass (biomass) is carbon. When vegetation dies and decays, some of this carbon makes its way into soils. Carbon (in the form of CO_2) can return to the atmosphere when agricultural tillage practices stir up soils or when biomass decays and/or burns. Forests and agricultural soils can both sequester and release carbon dioxide and the net effect is dependent upon site-specific circumstances.

The term "sinks" is used to refer to forests, croplands, and grazing lands, and their ability to sequester carbon. Agriculture and forestry activities can release CO_2 to the atmosphere. A carbon sink occurs when carbon sequestration is greater than carbon releases over some time period. Carbon sequestration rates vary by tree species, soil type, regional climate, topography and management practice.

Carbon can be sequestered in forests/woodlands over decades or even centuries, until mature ecosystems reach a stage of carbon saturation. When natural decay or other events such as fire or harvesting occur carbon is released back to the atmosphere as CO_2. Carbon from forests can be stored in wood products like furniture and housing lumber for up to several decades. Ultimately much of the carbon in wood products eventually decays and can be released back to the atmosphere as carbon dioxide. (USEPA, 2009)

In terms of its global warming impact, one unit of CO_2 released from a car's tailpipe has the same effect as one unit of CO_2 released from a burning forest. Likewise, CO_2 removed from the atmosphere through tree planting can have the same benefit as avoiding an equivalent amount of CO_2 released from a power plant. The climate benefits of sequestration practices can be partially or completely reversed because terrestrial carbon can be released back to the atmosphere through decay or disturbances. Trees that sequester carbon are subject to natural disturbances and harvests, which could suddenly or gradually release the carbon back to the atmosphere. And if carbon sequestration practices in agriculture, such as reduced tillage, are abandoned or interrupted, most or all of the accumulated carbon can be quickly released. Some sequestration practices, like tree planting and improved soil management, reach a point where additional carbon accumulation is no longer possible. For example, mature forests will not sequester additional carbon after the trees have fully grown. At this point the mature trees or practices still need to be sustained to maintain the level of accumulated carbon (USEPA, 2009).

13.4 Air Quality Goals, Objectives and Policies

Table 13-4 identifies goals, objectives, and policies that provide guidance for development in relation to air quality in the project area. The table also indicates which criteria in the Air Quality Chapter are responsive to each set of policies.

Table 13-4

General Plan Goals, Objectives, and Policies – Air Quality

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County, California, General Plan (1999)	Conservation Element, Section B - Air	Element 1 - Section B G.P. Goal No. 3 Policy No. 3	Meet or exceed federal and state air quality regulations. The County should continue to consult with the Great Basin Unified Air Pollution Control District regarding any proposed project, that has the potential to adversely affect ambient air quality.	1, 2
Douglas County, Nevada, General Plan (2007)	Conservation Element - Air Quality	NA	Insure preservation of clean, pure air.	1, 2

Source: Hauge Brueck Assoc. 2009

1. The air quality evaluation criteria are provided in Table 13-5.

13.5 Evaluation Criteria with Points of Significance

The evaluation criteria for air quality are presented in Table 13-5. These criteria are drawn primarily from local, State and federal agency policies and procedures, adapted where necessary to fit CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. An air quality impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 13-5.

Table 13-5

Evaluation Criteria with Point of Significance - Air Quality

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will construction of the Project generate emissions, which exceed allowable limits?	Emissions of Organic Compounds, Nitrogen Oxides, Sulfur Dioxide, Carbon Monoxide, and Particulates	Greater than 150 pounds/ day for each pollutant, except CO, which is 1500 pounds/day	Great Basin Unified Air Pollution Control District Rule 401 and Regulation 21 CEQA Checklist III-a, b
2. Will Project operational emissions cumulatively exceed allowable limits?	Emissions of Organic Compounds, Nitrogen Oxides, Sulfur Dioxide, Carbon Monoxide, and Particulates	Greater than 150 pounds/ day for each pollutant, except CO, which is 1500 pounds/day	Great Basin Unified Air Pollution Control District Regulation 219 CEQA Checklist III-c
3. Will the Project cause potential impacts from objectionable odors or expose sensitive receptors to substantial pollutant concentrations?	Record of complaints	A pattern of neglect, disregard or recurrence of the same or similar violations	Great Basin Unified Air Pollution Control District Regulation 109 CEQA Checklist III-d, e
4. Will the Project result in substantial greenhouse gas emissions and/or substantially contribute to global warming?	Estimated GHG emissions and Project Components constituting feasible GHG reduction strategies	Cumulatively considerable net increase in CO_2 and failure to apply feasible GHG reduction strategies	AB 32 (Global Warming Solutions Act)

Source: Hauge Brueck Assoc. 2009

Project implementation will involve the construction of infrastructure and operation of facilities. For purposes of air quality impact analysis, a "worst case day" for construction activity is assumed as the basis for developing construction equipment usage and resulting equipment exhaust and fugitive dust emissions. This worst-case day involves the construction of Project Components simultaneously at two separate sites with equipment used for excavation, grading, backfilling, hauling, installation of equipment, and construction worker vehicles.

There are a number of standard measures available to control construction equipment and vehicle exhaust emissions. The District will require that contractors implement the following vehicle and equipment exhaust control program during the construction of recycled water facilities:

1. Construction vehicles and equipment shall be maintained and tuned at the intervals recommended by the manufacturers to minimize exhaust emissions.

2. Equipment idling shall be kept to a minimum when equipment is not in use. No piece of unused equipment shall idle in one place for more than five minutes, as mandated by the California Air Resources Board and under California Health and Safety Code section 39,674. The District adopted an Idling Policy on March 7, 2009.

3. Construction truck work trips for trucks using nearby roadways shall be scheduled during non-peak hours to reduce the amount of additional emissions that may be generated due to slower traffic on the affected roadways.

4. The distance of a trip to and from the construction site shall be kept to the shortest distance possible.

The GBUAPCD, in its Rule 401 - Fugitive Dust, requires control of visible particulate matter from activities under normal wind conditions. Rule 401 does not apply to agricultural activities. The rule lists the following control measures for the control of fugitive dust:

1. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

2. Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can give rise to airborne dust;

3. Installation and use of hoods, fans, and fabric filters, to enclose and vent the handling of dusty material. Adequate contaminant methods shall be employed during such handling operations;

4. Use of water, chemicals, chuting, venting, or other precautions to prevent particulate matter from becoming airborne in handling dusty materials to open stockpiles and mobile equipment; and

5. Maintenance of roadways in a clean condition.

Construction of recycled water facilities by the District or its contractors will utilize the above emission control measures or their equivalents to reduce the amount of fugitive particulate matter escaping the construction site. Water spraying to reduce dust for example, will reduce fugitive particulate emissions from this source by approximately 50 percent. For analytical purposes, the emissions calculations in the following section do not take emissions controls into account in order to estimate a maximum worst case day emissions case for comparison with the evaluation criteria. With the planned implementation of construction emissions controls as part of the Project, actual PM_{10} and $PM_{2.5}$ emissions would be approximately one-half the estimated amounts. Waste discharge requirements outlined in Revised Order No. R6T-2004-0010 states "the District may also authorize other incidental recycled wastewater use such as dust control outside of the Lake Tahoe Basin in accordance with California Code of Regulations Title 22, Section 60307 (b)."

Operation of facilities that utilize electric-powered pumps and equipment will not directly generate air contaminant emissions. Operation of fossil-fueled equipment such as motor vehicles and agricultural equipment will generate air contaminant emissions. The District will require that the following motor vehicle and equipment exhaust emission control actions be implemented during the operational phase.

1. Motor vehicles and agricultural equipment shall be maintained and tuned at the intervals recommended by the manufacturers to minimize exhaust emissions.

2. Equipment idling shall be kept to a minimum when equipment is not in use. No piece of unused equipment shall idle in one place for more than 5 minutes, as mandated by the California Air Resources Board and under California Health and Safety Code section 39674. The District adopted an Idling Policy on March 7, 2009.

3. Operational phase truck trips for trucks using nearby roadways shall be scheduled during non-peak hours to reduce the amount of additional emissions that may be generated due to slower traffic on the affected roadways.

4. The distance of a trip to and from an operational phase activity site shall be kept to the shortest distance possible.

13.6 Environmental Consequences (Impacts) and Recommended Mitigation

13.6.1 No Project Components

Table 13-6 presents potential impacts to air quality, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 13-6					
Air Quality Impacts – No Project Components					
		Level of Significance by Component			
Impact	Point of Significance	Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AQ-1. Will construction of the No Project Components generate emissions, which exceed allowable limits?	Daily CO Greater than 1500 lbs/day				NP-1, NP-2
	Daily ROG Greater than 150 lbs/day				NP-1, NP-2
	Daily NOx Greater than 150 lbs/day				NP-1, NP-2
	Daily SOX Greater than 150 lbs/day				NP-1, NP-2
	Daily PM10 Greater than 150 lbs/day				NP-1, NP-2
AQ-2. Will the No Project Components operational emissions cumulatively exceed allowable limits?	Greater than 150 pounds/ day for each pollutant, except CO, which is 1500 pounds/day				NP-1, NP-2
AQ-3. Will the No Project Components cause potential impacts from objectionable odors or expose sensitive receptors to substantial pollutant concentrations?	A pattern of neglect, disregard or recurrence of the same or similar violations				NP-1, NP-2

Table 13-6

Air Quality Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AQ-4. Will the No Project Components result in substantial greenhouse gas emissions and/or substantially contribute to global warming?	Estimated GHG emissions and Project Components constituting feasible GHG reduction strategies				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **AQ-1, AQ-2, AQ-3 and AQ-4. Will the No Project Components impact air quality resources based on evaluation criteria 1 through 4?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction or operation of new facilities and will have no new air quality impacts. Standard practices for the protection of air quality during operations will continue as outlined in SP-15 to minimize vehicular emissions and dust and incremental contributions to GHG.

Mitigation: *No mitigation is needed. NP-1, NP-2*

13.6.2 Project Components

Table 13-7 presents potential impacts to air quality, outlines points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 13-7

Air Quality Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AQ-1. Will construction of the Project Components generate emissions, which exceed allowable limits?	Daily CO Greater than 1500 lbs/day			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
	Daily ROG Greater than 150 lbs/day			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
	Daily NOx Greater than 150 lbs/day			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
	Daily SOX Greater than 150 lbs/day			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
	Daily PM10 Greater than 150 lbs/day			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	
AQ-2. Will the Project Components operational emissions cumulatively exceed allowable limits?	Greater than 150 pounds/day for each pollutant, except CO, which is 1500 pounds/day			1, 7, 9, 10, 15, 16, 18, 19, 21, 29, 30	2, 3, 4, 5, 6, 8, 11, 14, 17, 20, 22, 23, 24, 31, 32

Table 13-7

Air Quality Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
AQ-3. Will the Project Components cause potential impacts from objectionable odors or expose sensitive receptors to substantial pollutant concentrations?	A pattern of neglect, disregard or recurrence of the same or similar violations			8, 23, 24	
AQ-4. Will the Project Components result in substantial greenhouse gas emissions and/or substantially contribute to global warming?	Estimated GHG emissions and Project Components constituting feasible GHG reduction strategies			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32	

Source: Hauge Brueck Assoc. 2009

Impact: **AQ-1. Will construction of the Project Components generate emissions, which exceed allowable limits?**

Analysis: *Less than Significant Impact; Components 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Worst-case day construction phase emissions were calculated for construction of Project Components simultaneously at two sites. Details of the calculation assumptions, methodology and results are presented in Appendix L.

Construction of the conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31, and 32 will not exceed the significance criteria for CO, reactive organic gases, oxides of nitrogen, oxides of sulfur, or PM_{10} and $PM_{2.5}$ microns in diameter. This impact is less than significant.

As shown in Table 13-7, construction of application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will not exceed the significance criteria for CO, reactive organic gases, oxides of nitrogen, oxides of sulfur, or PM_{10} and $PM_{2.5}$. This impact is less than significant.

As shown in Table 13-7, construction of the temporary containment Component 11 will not exceed the significance criteria for CO, reactive organic gases, oxides of nitrogen, oxides of sulfur, or PM_{10} and $PM_{2.5}$. This impact is less than significant.

As shown in Table 13-7, construction of the water management components 8, 23 and 24 will not exceed the significance criteria for CO, reactive organic gases, oxides of nitrogen, oxides of sulfur, or PM_{10} and $PM_{2.5}$. This impact is less than significant.

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: AQ-2. Will Project Components operational emissions cumulatively exceed allowable limits?

Analysis: *Less than Impact; Components 2, 3, 4, 5, 6, 8, 11, 14, 17, 20, 22, 23, 24, 31, 32*

Operation of conveyance component facilities (components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32) will not cause air significant contaminant emissions. Worst-case day construction phase emissions were calculated for construction of Project. Details of the conveyance component calculation assumptions, methodology and results are presented in Appendix L.

Operation of temporary containment facilities (Component 11) will cause less than significant air contaminant emissions from a diesel-powered water pump. Five electrically-powered central pivot irrigation systems will apply recycled water over approximately 393 acres and temporary containment will occur over 49 acres in the Diamond Valley Ranch. The potential impact from aerial applications of recycled water is addressed in Chapter 10, Public Health and Safety. Operation of the central pivot irrigation systems will not cause significant air contaminant emissions from electric generation. Details of the temporary containment facilities calculation assumptions, methodology and results are presented in Appendix L.

Implementation of water management components 8, 23 and 24 will not cause air contaminant emissions.

Mitigation: *No mitigation is needed. Components 2, 3, 4, 5, 6, 8, 11, 14, 17, 20, 22, 23, 24, 31, 32*

Analysis: *Less than Significant Impact; Components 1, 7, 9, 10, 15, 16, 18, 19, 21, 29, 30*

Operation of application components 1, 7, 9, 10, 15, 16, 18, 19, 21, 29 and 30 will not cause air contaminants. Operation of application components 12 and 13 will cause emission of criteria air contaminants from transportation and agricultural equipment operation and maintenance. Daily emissions will be highly variable depending upon activity or phase (biomass crop planting, growing, and harvesting), and type of biomass production or education/resource conservation activity being conducted.

Worst-case day emissions will be controlled to a level of less than significant with the utilization of the operational phase emission control measures described above under Evaluation Criteria with Points of Significance.

Mitigation: *No mitigation is needed. Components 1, 7, 9, 10, 15, 16, 18, 19, 21, 29, 30*

Impact: **AQ-3. Will the Project components cause impacts from objectionable odors or expose sensitive receptors to substantial pollutant concentrations?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Conveyance, application, and temporary containment of recycled water does not create objectionable odors or degrade air quality. There is a small potential for impacts from odors from HPR. This facility is located more that one half miles from the nearest sensitive receptors and thus will not cause odor complaints. Discharge of recycled water does not create objectionable odors or degrade air quality.

Component 11 will irrigate approximately 393 acres through central pivot aerial application and temporarily contain recycled waters over 49 acres for a ~~during~~ duration of one to 60 days during emergency situations. There is a small potential for impacts from odors from temporary containment fields. Sensitive receptors (located at the Alpine County School and associated residential neighborhood) are located over one half mile from the closest ~~sensitive receptors~~ proposed location of the containment and irrigation fields. ~~and o~~Odor complaints ~~will not cause odor complaints~~ are not expected due to distance and the location of the irrigation fields being downwind from the receptors.

Component 16 will be located in close proximity to a Diamond Valley Elementary School. Irrigation with recycled water in this portion of the project area will be subsurface application to reduce the potential to expose sensitive receptors to substantial pollutant concentrations.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Analysis: *Less than Significant Impact; Components 23, 24*

Components 23 and 24 will reroute freshwater for storage in ICR. The storage of freshwater will not cause impacts from objectionable odors or expose sensitive receptors to substantial pollutant concentrations.

Mitigation: *No mitigation is needed. Components 23, 24*

Impact: **AQ-4. Will the Project Components result in substantial GHG emissions and/or substantially contribute to global warming?**

Analysis: *Less than Significant; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

The Project Components will result in short-term GHG emissions from construction vehicle/equipment emissions during construction of the conveyance components. The Project Components will result in permanent/on-going direct and indirect GHG emissions associated with motor vehicle operation, energy consumption and other activities associated with the operation of the conveyance, application and emergency containment components.

GHG emissions totaling approximately 363.7 metric tons per year will occur as a result of electricity consumption, as shown in Appendix L. These emissions will occur at the source of production and could be located hundreds of miles distant from the Project; nonetheless, these emissions will contribute to total worldwide GHG emissions. The average 2002-2004 California Statewide GHG emissions are estimated at approximately 468.8 million metric tons of CO2 and CO2 equivalents (CARB, 2009). The California forecast CO_2 and CO_2 equivalents in 2020 is approximately 596.4 million metric tons. Thus, the proposed project represents approximately 0.6-millionith of the 2020 total.

There are no established legally binding or advisory federal, state, county or air district thresholds of significance to which emissions can be compared. The issue is really a matter of cumulative impacts, as the Project's GHG emissions, singularly, are so tiny as a percentage of statewide and worldwide GHG emissions as to create no discernible effects of the kind occurring cumulatively (rising temperatures, changed weather, etc.). The question becomes whether the Project Components incremental contribution to a significant worldwide cumulative impact is itself "cumulatively considerable."

Another factor to consider is how well the Project Components accord with Statewide policy set forth in AB 32, which envisions a changing regulatory climate in California over the next 12 years leading to dramatic reductions in overall Statewide GHG emissions. AB 32 sets forth the State's goals (a) of achieving by 2020 a statewide GHG emissions limit no higher than total 1990 Statewide GHG, and (b) of continuing after 2020 to achieve even further reductions in GHG emissions. The Act requires the CARB to adopt lists, plans, and regulations to advance these goals.

In enacting AB 32 the Legislature does not intend to so burden project proponents acting within the State economy as to render projects financially infeasible or uncompetitive. The State's heavy reliance on fossil fuels for transportation and energy sources is the primary problem to be addressed in achieving the Act's objectives. Land use decisions can exacerbate climate change by contributing to the needless consumption of electricity and GHG-emitting vehicle fuels; but, even so, good planning can achieve limited results as long as the energy and transportation sectors remain highly dependent on fossil fuels.

The Project Components include elements that are intended to promote energy efficiency, such as standard design guidelines, carbon sequestration methods, construction phasing, and optimization of irrigation rates. These elements will directly reduce Project Component contribution to GHG emissions. The project will also increase areas of irrigation, thereby increasing the abundance and health of project area vegetation.

Based on the District's approach to assessing the significance of the Project Component GHG emissions, implementation of standard measures to reduce construction related air quality effects will reduce impacts to a less than significant level, but will not completely avoid impacts.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

13.7 Cumulative Impacts

Less than significant Project impacts on air quality are identified, due to temporary effects of construction activity in Alpine County. Construction of some Project Components is expected to begin in 2010. Construction activity will generally be limited to only one or two components at a time, and construction will continue over the next 15-20 years in response to population growth and projected demands for service from the District. While additional construction activity, outside the scope of the Project is likely during this time period, implementation will occur at a very slow rate, reflecting the limited growth potential in rural Alpine County. The overall contribution of construction activities to emissions will be slight.

Since Alpine County is classified as attainment or unclassified for all criteria air contaminants except the state PM_{10} standard, the Project will not create a cumulative considerable impact for those pollutants. There is no standard mitigation requirements established for attaining the state PM_{10} standard.

13.8 Summary of Significant Impacts and Mitigation Measures

13.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant air quality impacts are identified in this section.

13.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to air quality are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

14 Noise

14 Noise

This chapter discusses the Project's potential to expose the public to high noise levels due to construction, construction traffic, operation and maintenance. To allow an understanding of the impact analysis, the setting section provides information on noise concepts and the existing noise environment. State and local noise policies are discussed as a basis for significance criteria.

14.1 Impacts Evaluated in Other Chapters

Impacts relating to noise are discussed in this chapter.

14.2 Affected Environment (Setting)

14.2.1 Regional Setting

Alpine County is predominantly rural, with a lack of sizable industrial operations. This, along with the County's small population and mountain/valley topography, limits existing noise sources to transportation facilities and corridors. Recreation and tourism use by out-of-County residents create higher levels of transportation noise along traveled routes and corridors than would otherwise be expected. State Highway 88 traverses the Project area in a general north-south direction from the California-Nevada state line, intersecting with State Highway 89 S. at Woodfords. State Highway 89 crosses the southwest corner of the Project area in a north-south direction. The County airport presently receives very limited use and is located approximately three miles from the nearest developed area and does not produce significant noise.

Future noise issues are expected to be noise produced by new industry and increased traffic along State highways. The County has a goal for the establishment of new industry. The only site with an Industrial land use designation in the County is located at the County airport, and is isolated from other uses.

14.2.2 Noise Terminology

Noise is most often defined as unwanted sound. Sound levels are easily measured; however, the variability is subjective and physical response to sound complicates the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as “loudness" or "noisiness." Physically, sound pressure magnitude is measured and quantified using a logarithmic ratio of pressures. The scale gives the level of sound in decibels (dB).

Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted decibel (dBA) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. This filtering network has been established by the American National Standards Institute (ANSI 1983). The A-weighted noise level is found to correlate well with people's judgments of the noisiness of different sounds and is used for many years as a measure of community noise. Figure 14-1 illustrates typical A-weighted sound pressure levels for various sound sources and responses of people to these levels.

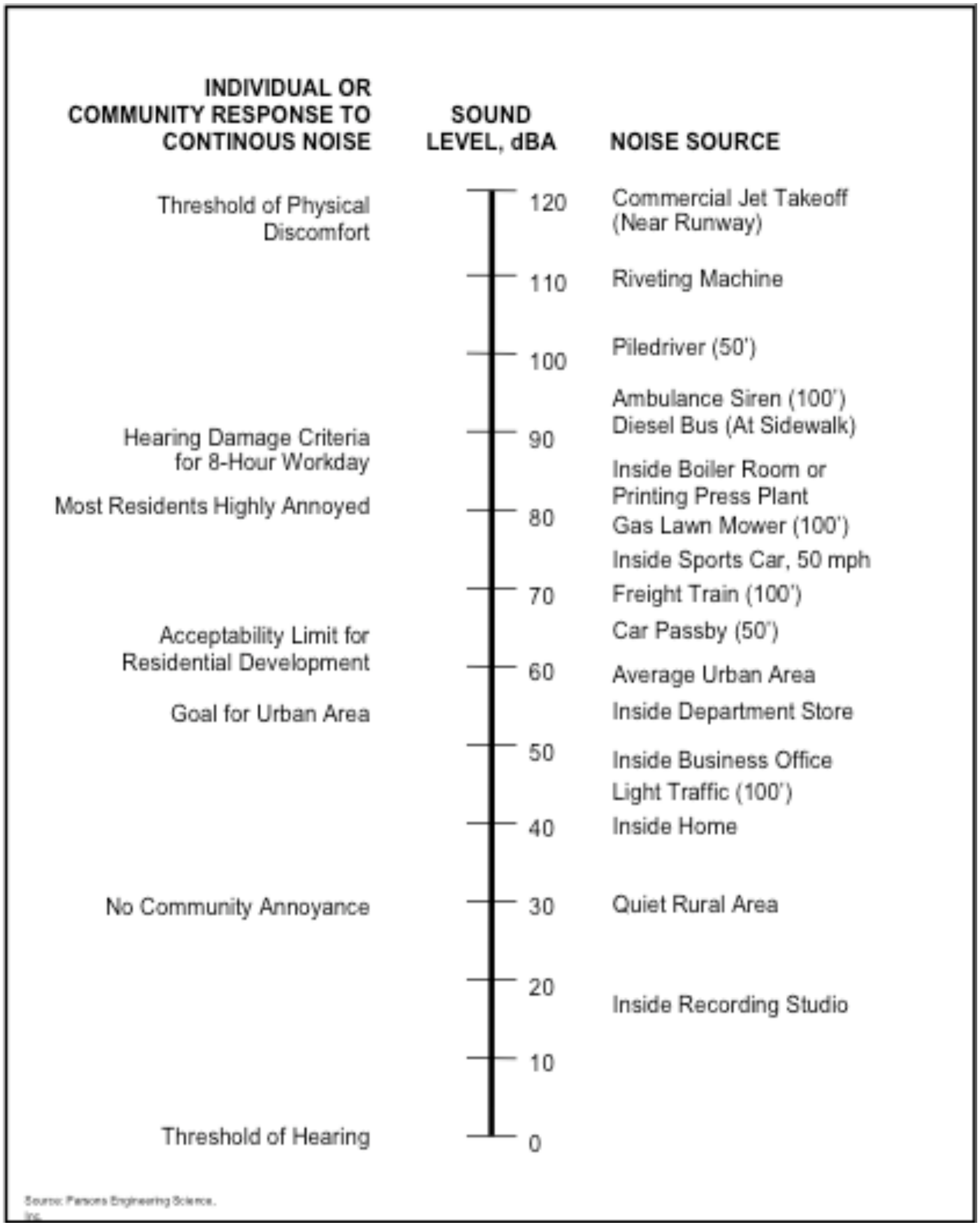
When sound levels are measured at distinct intervals over a period of time, they indicate the statistical distribution of the overall sound level in a community during that period. The most common nomenclature associated with such measurements is the energy equivalent sound level (L_{eq}). L_{eq} is a single-number noise descriptor representing the average sound level in a real environment, where the actual noise level varies with time.

While the A-weighted scale is often used to quantify the sound level of an individual event and is related to subjective response, the degree of annoyance and other response effects depend on a number of factors such as magnitude of the sound level in relation to the background, or ambient sound level; duration of the sound level; repetitiveness of event occurrences; and time of day the event occurs.

Several methods relate noise exposure over time to community response. USEPA developed the Day-Night Average sound level (L_{dn}) as the rating method to describe long-term annoyance from environmental noise. L_{dn} is similar to a 24-hour L_{eq} A-weighted level, but with a 10 dB penalty for nighttime (10 p.m. to 7 a.m.) sound levels to account for the increased annoyance that is generally felt during normal sleep hours.

The Community Noise Equivalent Level (CNEL) is adopted by the California Aviation Department for airport noise impact studies and by the State of California for environmental noise monitoring purposes. CNEL is similar to the A-weighted L_{eq}, but includes a 5 dB penalty during the evening hours (7 p.m. to 10 p.m.), while nighttime hours (10 p.m. to 7 p.m.) are penalized at 10 dB. For outdoor noise, L_{dn} noise descriptor is usually 0.5 to 1 dB less than the CNEL in a given environment.

Figure 14-1. Typical A-Weighted Noise Levels for Various Sources and Effects on People



14.2.3 Existing Noise Environment

Existing noise sources in Alpine County are generally limited to traffic on State Highways and major roadways. As stated above, the only sources of industrial-type noise are restricted to the vicinity of the County airport.

Noise data for existing (as of 1990) and projected future (2015) as noise exposure contours for highways and roadways was modeled for the Alpine County General Plan. The data include the distances from the centerline of the roadway to the 55, 60 and 65 L_{dn} contours. Noise measurements were also taken in 1992 at sample locations to validate the model.

Table 14-2 shows the measured and modeled noise levels for Woodfords and Fredericksburg, the locations evaluated within the Project area. The L_{eq} data are the site-specific measurements performed in 1992. The L_{dn} noise levels are the predicted noise levels at 50 feet from the center of the roadway in each community. These data indicate that the communities have acceptable noise levels for residential use at 50 feet from the centerline of the highway. In comparison to the rest of the County, the Woodfords and Fredericksburg areas are noisier than the average, due to higher traffic volumes.

Table 14-1

Community Noise Exposure Inventory

Community	Community Population*	Decibels in Leq	Decibels in Ldn
Fredericksburg/Paynesville area	193	N/A	65 dBA
Woodfords	267	61 dBA	65 dBA

Source: Alpine County 1999

*Includes seasonal residents. Estimates were calculated based on multiplying the average household in the County (2.47 persons per household) by the estimated number of housing units in each community.

The noise level performance standards for uses affected by non-transportation project in Alpine County are presented in Table 14-3. These standards apply to the project area and the Project Components.

Table 14-2

Noise Level Performance Standards for Noise-Sensitive Uses Affected by Non-Transportation Projects

Noise Level Descriptor	Daytime (7 a.m. to 10 p.m.)	Nighttime (10 p.m. to 7 a.m.)
Hourly L_{eq}	50	45
Maximum level, dB	70	65

Specific noise exposure contour data for State Route 89 south to the Nevada state line are shown on Table 14-4. These contours were developed based on annual average road conditions. Noise measurements and traffic counts taken for comparison with the modeled noise levels are shown on Table 14-5. The data presented in these table are the most recent data available for the areas. The data was compiled in 1999 for the Alpine County General Plan and was not updated for the 2005 revision of the General Plan.

Table 14-3

Noise Contour Data

Segment	Distance to L_{dn} Contour, dB (in feet)					
	Year 1990			Year 2015		
State Route 88	55	60	65	55	60	65
From State Route 89 S. to Nevada State Line	126	59	27	176	82	38

Source: Alpine County 1999

Table 14-4

Comparison of Modeled and Measured Noise Levels

Roadway Location	Vehicles/hour			Observed Speed (mph)	Distance (feet)	L_{eq} dB	
	Autos	Med. Trk.	Hvy. Trk.			Measured	Modeled
S.R. 89 at Barber Road	152	12	0	50	50	60.0	61.2

Source: Alpine County 1999

14.3 Regulatory Setting

This section identifies the local ordinances and other regulations and guidelines that comprise the regulatory framework for noise. General Plan policies related to the noise environment are identified in the next section titled “Noise Goals, Objectives and Policies.” The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Noise Chapter the following subsections provide descriptions of applicable requirements.

14.3.1 Alpine County

The Noise Element of the Alpine County General Plan contains the recommendation that the suggested criteria for evaluating land use compatibility provided in the State of California’s Guidelines for the Preparation and Content of the Noise Element of the General Plan be used in determining compatibility of new proposed projects with existing or planned uses on surrounding sites. These criteria are shown in Figure 14-2.

Construction noise has its greatest effect on sensitive noise receptors, also known as noise sensitive land uses. The Alpine County General Plan defines these uses as hospitals, clinics, schools, libraries or residences. Alpine County does not have quantitative noise limits for construction activities. It is County Policy (Noise Element Policy No. 24c) that the “Planning Commission may allow noise level standards to be exceeded on a temporary basis.” Temporary activities would include construction.

The Model Community Noise Control Ordinance of the State’s Office of Noise Control includes noise limits for construction activities. Table 14-1 presents the construction noise limits recommended by the State's Office of Noise Control, which are used as Project criteria for the construction noise evaluation.

14.3.2 State of California

The state of California has compatibility guidelines for different land uses (California 1976). For each land use, the level of acceptability of the noise environment is dependent upon the activity that is conducted and the type of building construction (for indoor activities). Figure 14-2 illustrates the state of

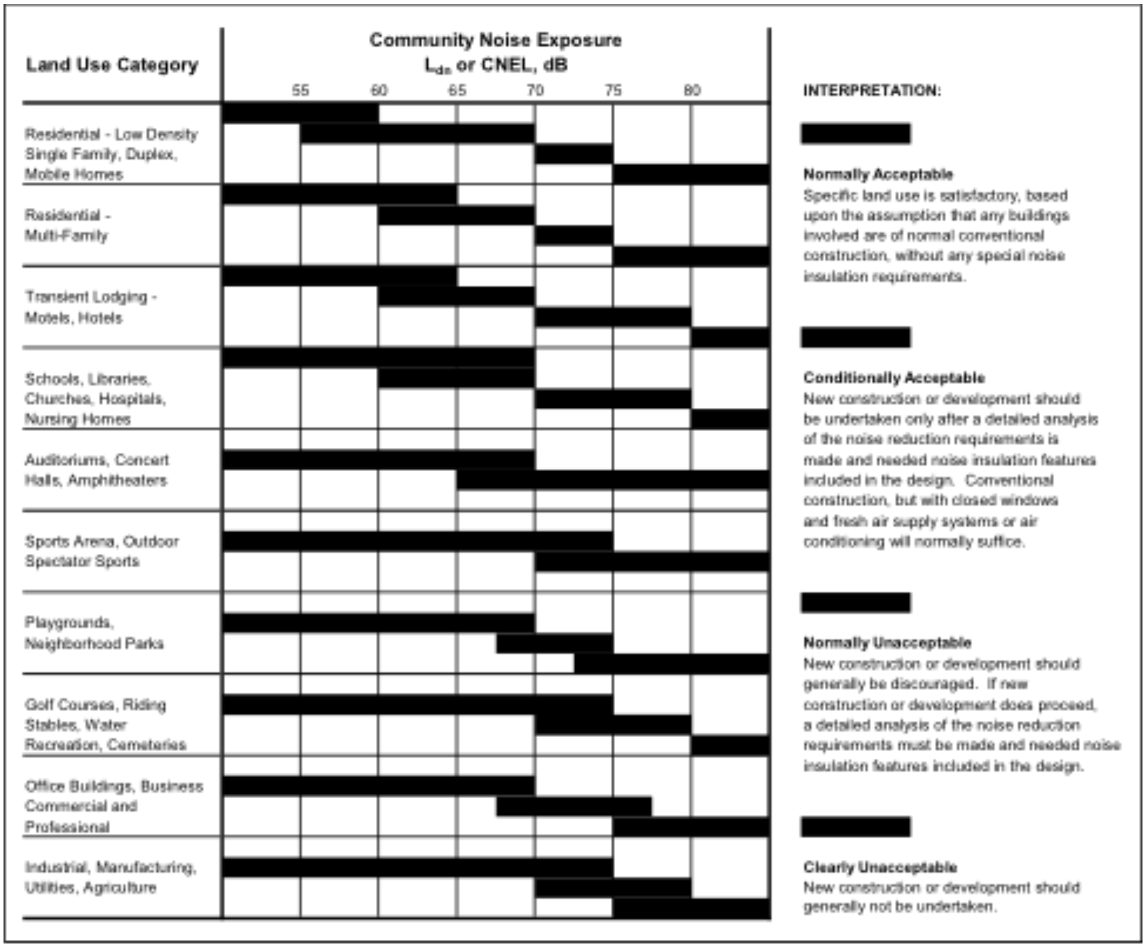
California land use compatibility standards for community noise environment. The land use compatibility guidelines are applicable for both CNEL and L_{dn}.

Caltrans establishes noise standards for traffic noise on highways. When these standards or Noise Abatement Criteria (NAC) are approached or exceeded, noise impacts occur. The NAC for most sensitive receptors (including parks, residences, schools, churches, libraries, and hospitals) are an L_{eq} of 67 dBA at areas for outdoor activities and an L_{eq} of 52 dBA at the interior of schools and residences (Caltrans 1987). Although these standards only apply to state routes, they can be used as guidelines for a local street noise impact study.

14.3.3 Douglas County

The Noise section of the Conservation Element of the Douglas County Master Plan outlines the Noise Capability Guidelines for jurisdictions that have established noise standards for zoning categories: Industrial; Commercial; and Residential. The project area, which is zoned Agriculture, does not have established noise standards. There are no impact criteria for noise for Douglas County used for impact analysis. The Master Plan does call for the separation of noise-sensitive uses and noise generators. Land uses sensitive to noises include residences, religious institutions, schools, hospitals, and some recreational uses. Noise generators include traffic, airport, and industrial activities. The Master Plan also calls for the impacts of noise to be reduced through a variety of structural techniques. Construction is considered a temporary source of noise.

Figure 14-2. Land Use Compatibility for Community Noise Environments



Source: California Department of Health Services, 1990

Table 14-5

Maximum Noise Limits for Construction and Stationary Equipment, L_{eq}

Time	Single-Family Residential	Multi-Family Residential	Mixed-Residential and Commercial
Daily, except Sundays and Legal Holidays, 7 a.m. to 10 p.m.	55 dBA	65 dBA	65 dBA
Daily, 10 p.m. to 7 a.m. and all day Sunday and Legal Holidays	50 dBA	55 dBA	65 dBA

Source: California Department of Health, Office of Noise Control, Mode Community Noise Control Ordinance, 01/09/2002 Update.

14.4 Noise Goals, Objectives and Policies

Table 14-6 identifies the applicable goals, objectives and policies that provide guidance for development in relation to noise impacts in the project area. The table also indicates which criteria in the Noise Chapter are responsive to each set of policies.

Table 14-6

General Plan Goals, Objectives, and Policies – Noise

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County, California, General Plan	Safety Element, Section E - Noise	Element II Section E G.P. Goal No. 24	Reduce or minimize the number of nuisances created by noise affecting citizens of Alpine County.	1, 3
Alpine County, California, General Plan	Safety Element, Section E - Noise	G.P. Goal No. 24 Policy 24a	No development shall be allowed that would subject persons living in existing or planned residential areas to unhealthful noise levels.	2
Alpine County, California, General Plan	Safety Element, Section E - Noise	G.P. Goal No. 24 Policy 24b	Noise created by new proposed non-transportation noise sources shall be mitigated so as not to exceed the noise level standards[2] at the property line of noise-sensitive uses. This policy shall not apply to noise sources associated with agricultural operations on lands zoned for agricultural uses, or residential units established in conjunction with industrial or commercial uses.	2
Alpine County, California, General Plan	Safety Element, Section E - Noise	G.P. Goal No. 24 Policy 24c	The Planning Commission may allow noise level standards to be exceeded for temporary activities.	1, 3

Source: Hauge Brueck Assoc. 2009

1. The noise evaluation criteria are provided in Table 14-7.
2. Noise Level Performance Standards for Noise-Sensitive Uses Affected by Non-Transportation Projects in Table 14-3

14.5 Evaluation Criteria with Point of Significance

The evaluation criteria for noise are presented in Table 14-7. These criteria are drawn primarily from Alpine County and state of California agency policies and procedures, adapted where necessary to reflect CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A noise impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 14-7.

Table 14-7

Evaluation Criteria with Point of Significance – Noise

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will construction of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line[1]	Greater than L_{eq} of 60 dBA	CEQA Checklist XI-a, b California Office of Noise Control recommended construction noise limits

Table 14-7

2. Will operation and maintenance of the Project expose the public to high noise levels?	Projected noise levels at property line or "yard" line1	a. Greater than L_{eq} of 45 dBA	CEQA Checklist XI-a, b, c General Plan of Alpine County
		b. Greater than 5 dBA increase in noise, L_{eq}	CEQA Checklist XI-a, b, c An increase of 5 dBA or more will be readily noticeable
3. Will construction of the Project cause temporary or periodic increases in ambient noise levels from construction traffic?	Projected traffic volume due to construction	Greater than 10 % increase in traffic volume	CEQA Checklist XI-d A 10 % increase in traffic volume will increase the noise by less than 1 dBA, which normally will not be noticeable

Source: Hauge Brueck Assoc. 2009

Notes:
1. The property or yardlines of the affected receptor whichever is closer to the affected structure.

14.5.1 Noise Control Practices

14.5.1.1 Construction Phase

Construction of recycled water facilities by the District or its contractors will utilize the following standard noise control practices, which are included as part of the Project to minimize noise disturbances at sensitive receptors during construction activities:

- Newer construction equipment with improved noise muffling shall be used and all construction equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational;
- All construction equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.);
- Wherever possible, hydraulic tools shall be used instead of pneumatic impact tools;
- Construction activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals or convalescent homes. Noise generating construction shall be restricted within 1,600 feet of these facilities on Saturdays, Sundays, or holidays;
- Heavy construction truck trips shall be routed over streets that will cause the least noise disturbance to residences or businesses in the vicinity of the project area;
- Construction staging areas, maintenance yards, and other construction-oriented operations shall not be located within 1,600 feet of a sensitive receptor; and
- Blasting shall be keep to a minimum to reduce ground-borne vibrations.

- Where construction occurs within 1,600 feet of a school, the construction manager shall implement measures to insure that construction noise does not interfere with the learning activity of the students. The following noise control practices may be implemented:

  - Limit construction to non-school hours or weekends; or

  - Utilize temporary noise barriers, as needed, to protect schools from excessive noise levels from construction activities. Noise barriers may be made of heavy plywood, vinyl curtain material, or natural or temporary earth berms.

14.5.1.2 Operation Phase

During the operation of the pressurized recycled water conveyance and distribution pipelines, the potential for noise exists due to pressurized water flow in the pipelines. Generally, noise is caused by high velocity water turbulence, water surge or thrust, and water hammering. The pipeline systems will be buried below the ground surface along their routes, which will provide a natural noise barrier. The operation of pipelines will not produce significant noise impacts.

- Some components will require the use of pumps in their operations. The following standard noise control practices will be used to reduce pump noise.

- The District shall retain a qualified noise engineer to determine if there would be any noise impacts from pumps. If noise modeling shows that there would be potentially significant noise impacts, a noise engineer would assist in the final design of the pump stations. The noise engineer shall be responsible for ensuring that the following noise reduction measures are incorporated into the design of the pump stations.

- Outdoor pump stations that exceed the noise criteria shall be designed to include noise barriers to reduce the noise at nearby sensitive receptors to a level that is within the noise criteria. Noise barriers reduce noise by approximately 20-30 dBA.

- The design of pump stations shall be such that all openings, such as for ventilation and doors, shall face away from sensitive receptors. This provides for approximately a 10-15 dBA noise reduction.

- All exterior doors for the pump stations shall be constructed of metal assemblies and weather-stripped. This will provide for approximately a 3-5 dBA noise reduction.

- Acoustical louvers or an air intake/exhaust plenum shall be used for pump station housing air ventilation openings. This will provide for approximately a 7-10 dBA noise reduction.

During operation of the biomass production activities (including planting, growing, harvesting, and transportation phases), noise will be generated by mobile equipment such as trucks and other motor vehicles, and agricultural and related equipment.

To minimize impacts from these activities, the following measures will be used to reduce motor vehicle, biomass production, and related equipment noise:

- Newer motor vehicle and agricultural equipment with improved noise muffling shall be used and all equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational.

- All operational equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

- Biomass production and harvesting activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals or convalescent homes. Noise generating equipment use shall be restricted within 1,600 feet of these facilities on Saturdays, Sundays, or holidays.

- Heavy operational-phase truck trips shall be routed over streets that will cause the least noise disturbance to residences or businesses in the vicinity of the project area.

14.6 Environmental Consequences (Impacts) and Recommended Mitigation

14.6.1 No Project Components

Table 14-8 presents potential noise impacts, outlines the point of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 14-8

Noise Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
NOISE-1. Will the construction of the No Project Components expose the public to high noise levels?	Greater than L_{eq} of 60 dBA				NP-1, NP-2
NOISE-2. Will operation and maintenance of the No Project Components expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA				NP-1, NP-2
	b. Greater than 5 dBA increase in noise, L_{eq}				NP-1, NP-2
NOISE-3. Will construction of the No Project Components cause temporary or periodic increases in ambient noise levels from construction traffic?	Greater than 10 % increase in traffic volume				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **NOISE-1, NOISE-2 and NOISE-3. Will the No Project Components impact noise based on evaluation criteria 1 through 3?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction or operation of new facilities and will have no new noise impacts.

Mitigation: *No mitigation is needed. NP-1, NP-2*

14.6.2 Project Components

Table 14-9 presents potential noise impacts, outlines the point of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 14-9

Noise Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than significant Impact; no mitigation proposed	No Impact
NOISE-1. Will construction of the Project Components expose the public to high noise levels?	Greater than L_{eq} of 60 dBA			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32	
NOISE-2. Will operation and maintenance of the Project Components expose the public to high noise levels?	a. Greater than L_{eq} of 45 dBA			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32	
	b. Greater than 5 dBA increase in noise, L_{eq}			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32	

Table 14-9

NOISE-3. Will construction of the Project Components cause temporary or periodic increases in ambient noise levels from construction traffic?	Greater than 10 % increase in traffic volume			1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32	

Source: Hauge Brueck Assoc. 2009

Impact: **NOISE-1. Will construction of the Project Components expose the public to high noise levels?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

Construction of the Project Components will not exceed the significance criteria for sensitive receptors or expose persons to excessive ground borne vibration or ground borne noise levels. The standard noise control practices, SP-12, are incorporated as part of the Project and will be complied with during construction to reduce noise and ground borne impacts to a less than significant level.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

Impact: **NOISE-2. Will operation and maintenance of the Project Components expose the public to high noise levels?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

Operation and maintenance of Project Component facilities will not exceed the significant criteria for sensitive receptors, expose persons to excessive ground-borne vibrations or ground-borne noise levels, or cause substantial permanent increase in noise levels.

Operation of Project Components will involve the use of pumps and some aerial irrigation systems that produce some periodic increases in noise levels. The increase in noise levels are not permanent, excessive or persistent and will not exceed the significant criteria for sensitive receptors.

The standard noise control practices, SP-13, are incorporated as part of the Project and will be complied with during operation and maintenance activities to reduce noise and ground borne impacts to a less than significant level.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

Impact: **NOISE-3. Will construction of the Project Components cause temporary or periodic increases in ambient noise levels from construction traffic?**

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

Construction-related traffic will be less than 10% of present traffic volumes. Noise levels from construction related traffic will not be perceptible at these levels. This impact is less than significant.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

14.7 Cumulative Impacts

Less than significant project impacts related to noise are identified due to temporary effects of project construction activity in Alpine County. Construction of the Project Components is expected to begin in late 2009. Construction activity will generally be limited to only one or two components at a time, and construction will continue over the next 15-20 years in response to projected growth and service demands. While there is likely to be other construction activity during this time period, it is likely to occur at a very slow rate, reflecting the limited growth potential in Alpine County. The construction activity will occur for relatively short periods of time, and although this could overlap with other construction projects the effects will be temporary and localized and will not contribute to significant cumulative noise impacts.

14.8 Summary of Significant Impacts and Mitigation Measures

14.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant noise impacts are identified in this chapter.

14.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts from noise are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

15 Historical and Archeological Resources and Paleontology

15 Historic and Archaeological Resources and Paleontology

This chapter discusses the Project impacts on cultural resources related to disturbance of archaeological, historical, architectural, and Native American/traditional heritage resources. The chapter also addresses disturbance of unknown archaeological resources, as well as paleontological resources (fossils). To provide a basis for this evaluation, the setting section describes broad periods of cultural history in the project area including the prehistoric period.

15.1 Impacts Evaluated in Other Chapters

Items pertinent to historic and archaeological resources and paleontology are included in this chapter.

15.2 Affected Environment (Setting)

15.2.1 Cultural Resources

The following is a summary of the broad periods of cultural history within the Carson Valley area of Alpine County, CA and Douglas County, NV. This information is based on field studies and archival research.

15.2.1.1 Prehistoric Period

The northern Sierra Nevada and its eastern slopes have been occupied for the past 11,000 to 12,000 years. The prehistory of this region is divided by researchers into separate cultural periods, divisions based on perceived changes in prehistoric adaptive strategies (Elston 1986:137). These changes are presumed to result from the combination of local population pressure, environmental changes during the Holocene, and possibly migration/intrusion of other populations. This change is especially apparent when comparisons are made between pre-Archaic and archaic cultural components (Elston 1986:137).

Pre-Archaic sites are typically surface manifestations and consist of diffuse lithic scatters. The lithic tool assemblage generally contains large bifacial knives, gravers/punches, scrapers, and choppers; the projectile points are stemmed and concave base (Elston 1986:137). Seed-grinding implements are rare or absent. Larger sites are located on high ground near water sources, such as marsh areas or stream terraces and gravel bars. Upland sites exist but are smaller (Elston 1986:137).

The Martis complex (Middle Archaic) occurred during a cooler and moister period of the Holocene, and archaeological visibility increases compared to Early Archaic times. The major adaptive changes appear to be in settlement and subsistence patterns, apparent population density, and stylistic elaboration (Elston 1986:141-142). The diversity of resources was greater and the settlement pattern reflects this diversity. Base camps are located on valley margins to exploit these varieties of resources, and smaller task-specific field camps and sites for processing and hunting were located in the uplands. These base camps and upland sites began to be revisited, resulting in accumulations of artifacts and the formation of cultural midden (Elston, Stornetta, Dugas, and Mires 1994:14). Dwellings consisted of pit houses with associated interior features, such as hearths, storage pits, and burials (Elston 1986:141-143). Big game hunting remained the predominant meat-getting strategy. The flaked stone technology relied on the production of large bifaces, retouched flakes, and perforators/gravers, and Elko series and Martis series projectile points, indicative of the use of the atlatl and dart, abound at Middle Archaic sites (Elston 1986:142-143; Elston, Stornetta, Dugas, and Mires 1994:16).

The Late Archaic is synonymous with the Kings Beach phases in the northern Sierra Nevada and western Great Basin region. Adaptive changes from Middle Archaic times are considered the result of increasing stress of population pressure and not so much from the environmental warming and drying trend that began around A.D. 1 and peaked at A.D. 500 (Elston 1986:145). Human subsistence strategies increasingly used more diverse resources and exploited a greater number of ecozones (Elston 1986:145). Plant foods and small game, especially jackrabbits, and fish became the subsistence base. Seed processing equipment became more specialized and abundant with the introduction of shallow bedrock mortars and stone hullers (Elston 1986:147; Elston, Stornetta, Dugas, and Mires 1994:17), the bow and arrow replaced the atlatl and a preference for cryptocrystalline tool stone was evident (Elston 1986:147; Elston, Stornetta, Dugas, and Mires 1994:17).

While much more widely scattered, sites of similar content are found all the way south along the Eastern Sierra. Sites in Long Valley Caldera and Upper Owens Valley have been dated from 5500-3500 before present (BP) with mostly minimally used upland hunting camps. Sites similar to the Martis Complex are found along Mammoth Creek and Hot Creek, with new emphasis on seed utilization.

15.2.1.2 Ethnographic Period

The project area falls within the territory of the Washoe. The estimated population of Washoe individuals prior to contact with Europeans is a highly debated topic. As with most Native American populations, accuracy of census data is sporadic at best. Kroeber (1925) estimates their population at 1,500 individuals. Kroeber speculates on a population of 900 individuals in 1859, decreasing to 300 individuals by 1910. It is postulated that the 300 individuals may represent one-fifth of the original population. The Washoe, according to their website accessed on October 12, 2001, estimate their original population at 5,000, with currently 1,500 individuals living on reservation lands in California and Nevada (http://www.itcn.org/tribes/washoe/washo.html).

The area of habitation for the Washoe consisted of parts of what are now California and Nevada. The Washoe occupied a transitional zone between the Sierra Nevada and the Great Basin culture areas. This transitional area contains three major life zones providing a diversity of plant and animal life. The boreal zone around Lake Tahoe and along the crest of the Sierra Nevada at elevations from 6,000 to 10,000 feet includes forests of Jeffrey pine, fir, sugar pine, and hemlock. Although deep snows may cover a majority of this region in the winter, numerous lakes, streams, and rivers provide ample supply of fish, mountain sheep, deer, and antelope. Over the crest of the Sierra Nevada, toward the west, the Washoe followed such drainages as the Feather, American, Yuba, Consumnes and Mokelumne rivers to acorn rich areas, which could be exploited in late summer or fall. The wide flat valleys on the eastern side of the Sierra Nevada provided deer, antelope, numerous birds, and lacustrine resources from major lakes such as Washoe, Honey, and Topaz lakes. The major habitation centers for the Washoe were on the floors of the large valleys, where water, vegetation, and game were abundant (d'Azevedo 1986).

The extensive Washoe territory was more than likely used by both Washoe and neighboring groups without exclusionary propriety. The territory was located at a point between the Sierra Nevada and Great Basin, where multitudinal trade routes would pass. The Washoe of course, took advantage of trade and movement throughout their homelands. The Washoe exported salt, obsidian, pine nuts, and rabbit skins to the Maidu in the northwest, in exchange for acorns, salmon and deer. The Washoe also traded with the Mono and Paiute people in the south for pam pam bulbs, tubers, skins, and kutsavi, a small grub of the Ephydra fly. The Washoe also traded to western groups for acorns, skins, and seashells. The unique locality of the Washoe provided for exploitation of multifarious resources available throughout their territory.

Permanent Washoe settlements were located on high ground near rivers and springs, close to a variety of ecological zones, each seldom more than one or two days away from another. The central village was one of semi-permanency. Smaller satellite encampments were placed in subsistence zones, and the resources were brought back to the village for further processing and use. The typical Washoe structure was a wooden framed conical structure with wood plank siding. A temporary summerhouse may be dome shaped and made of brush; the Washoe also utilized windbreaks and sunscreens. The basic viable unit of social organization was the kinship group, comprising extended family and members of closely related households. These groups shared the same or nearby winter camps and subsistence areas.

15.2.1.3 Historical Period

By most accounts, it was Peter Skeene Ogden that first entered what is now the state of Nevada sometime in 1826, although mountain man Jedediah Smith had apparently passed through the area in route to California about the same time. Ogden, an Englishman in the employ of the mammoth Hudson Bay Company became the first Euro-American to follow the Humboldt River and cross the Carson Sink. Ogden had acquired knowledge of the area from local Native American groups while trapping the upper reaches of the Humboldt River. By the spring of 1829, Ogden and his party had followed the Humboldt River past the present site of Lovelock to its mouth on Humboldt Lake. While encamped on the eastern shore of Carson Sink, Ogden's party was encircled by "seemingly hostile Indians armed with rifles" (Bard 1981). Once peace was established, Ogden was given valuable information concerning the geography of the area west to the Sierra-Nevada. Though Ogden's party had to return to Fort Vancouver (Oregon Territory), he returned the following year on his last such expedition. On this trip, local tribes would not assist him in his endeavors; hence, the party had to fend for itself. Ogden led his party along the most natural and best-watered path away from the Humboldt River. He followed the Humboldt Slough across a natural dam and into the Sink of the Carson River. After skirting the western edge of the desert, his party moved southward to Walker Lake, continuing on through the Owens Valley in present-day California. This trek made Ogden the first Caucasian to visit the area between the Humboldt and Walker Rivers (Cline 1963).

The first recorded sighting of Lake Tahoe by Euro Americans was by John C. Fremont and Charles Preuss in February 1844 (Gudde 1969:328). Fremont named the body of water "Lake Bonpland" in honor of Aimé Bonpland, the French botanist who had accompanied Humboldt on his exploration of South America. In 1853, the official mapmaker of the State of California gave the lake the name of "Bigler" after John Bigler, the third governor of California, and this official designation remained for many years. During the Civil War, the Union sentiment objected to this name because Bigler was an outspoken secessionist, and a movement was started to restore to the lake its original Washoe appellation, understood to be "Tahoe" and to mean 'big water' (Lindström 1994:10). Dr. Henry De Groot had explored the mountains in 1859 and suggested the Indian name of the lake, and William Henry Knight placed the name Lake Tahoe on Bancroft's map of the Pacific States in 1862 (Gudde 1969:329). The California State Legislature, oblivious to the popular acceptance of the name "Tahoe," inexplicably legalized "Bigler" in 1870, and this act was not repealed until 1945 (Hoover et. al. 1990:257).

John Calhoun "Cock-Eye" Johnson, of Johnson's Ranch above Hangtown (Placerville), is credited as the first "white man" to discover Lake Valley in the Lake Tahoe Region (Scott 1957:179). Early in 1848 while searching for a shorter, lower, and more direct route over the Central Sierra than the Kit Carson Pass, Johnson found this valley between the Carson and Sierra Nevada ranges (Scott 1957:179).

The Johnson Cutoff, also historically known as the Johnson Trail, the Johnson Emigrant Road, or the Johnson Pass Route (Goodwin 1971:6), was laid out in the spring of 1852 by John Calhoun Johnson (Bennyhoff et al. 1982:115). The Cutoff stretched from Placerville over Johnson Pass, down Johnson Hill to Upper Lake Valley above Meyers, and then across the southern portion of the Lake Tahoe region to the vicinity of present Edgewood (Goodwin 1971:6). In his California Wagon Road report of September 20, 1855, Surveyor Sherman Day described Johnson Trail as follows: "the route lies along a very steep, natural slope, through a thicket of manzanita chaparral, interspersed with large and small boulders of granite. The present road attains the summit by a length of only three-fourths of a mile, or 3,960 feet, which gives a grade of over 14½ degrees or about three and one-half to four times what it should be (actually the grade was more than 25%)" (Scott 1957:181). The entire Johnson Cutoff was used to some extent by emigrant wagon trains during the period 1852-1858, but after that only the Johnson Pass - Johnson Hill portion into Upper Lake Valley was used.

After the decline of the fur trade in the early 1840s, a new breed of adventurer entered the fray with regards to western exploration. A movement was afoot in Washington, D.C. to gain control of the lands west of the Rocky Mountains for future settlement. To some in Washington, and specifically Senator Thomas Hart Benton of Missouri, there was a dire need to learn more about the country in the Far West. By 1842, Senator Benton had cleared the way for his son-in-law, John C. Fremont, to lead five expeditions west between 1842 and 1854. As a lieutenant in the Army Topographical Corps, Fremont had extensive experience as a surveyor and mapmaker (Hulse 1978). Fremont's first expedition of 1842 explored as far as the central Rocky Mountains; his second and third trips brought him into the Great Basin and portions of present-day Nevada.

The need to transport people and supplies to the mines of the Comstock generated a greater demand for trans-Sierran routes between California and Nevada in the late 1850s and 1860s. With the great influx of population heading east over the Sierra Nevada to the Washoe mines, a more direct route was followed to the Carson Valley, bypassing the Luther Pass route, skirting the south shore of Lake Tahoe, and heading eastward over the lower, shorter Daggett Pass (Scott 1957:231). Although the route between Meyers and Luther Pass experienced a marked decrease in traffic because of the improvements to other roads, the road was still used through the late 1800s into the early 1900s (Scott 1957:159).

From 1856 to 1876, John "Snowshoe" Thompson made legendary 90-mile treks over snowdrifts up to 50 feet high and through blizzards with up to 80 mile per hour winds, to deliver mail to those living in isolation. He was the sole link between California and the Atlantic states during the long winter months. The legend begins in 1851, when at the age of 24 Thompson drove a herd of milk cows to California and settled in Placerville. For a short while he mined in Kelsey Diggings, Coon Hollow, and Georgetown. With the small amount he saved, he bought a small ranch at Putah Creek, in the Sacramento Valley. Two to four times a month for 20 winters, regardless of weather, Snowshoe Thompson set out at the appointed hour. His mail run took three days from Placerville to Mormon Station, UT (Nevada's first town, later called Genoa when Nevada became a state), and two days on the return trip.

Carson Valley's history is intertwined with the mining of both gold and silver. For as much as settlement occurred during the 1850s, this early settlement (prior to the mining frontier) was in association with the emigrant trails, primarily along the Humboldt River. Small-scale commercial enterprises and agricultural pursuits that benefited the traveler along these routes went on with some regularity. It wasn't until the 1860s and the opening of mines such as the Comstock in the western part of the state, that widespread settlement commenced. Nevada's early history, from about 1849 to the onset of World War I, is largely a history of mines and mining camps. Mineral discoveries, mainly of precious metals, provided the reason for settlement and agriculture and other industries were established to serve the mining population. Mining continued to be important to the state during the period from World War I into the early 1960s, but various base metals such as copper, lead, zinc, mercury, tungsten, and iron replaced precious metals in importance (Horton 1964:1-4).

Farming and stock raising in the Carson Valley was undertaken from the time of the emigrant migration west primarily along the Humboldt River and associated trail. More extensive activity occurred during the 1860s in the response demanded by the mining communities within the Humboldt Range. Miners required hay and grain for their horses and mules as well as flour, potatoes, dairy products, vegetables, and fruit for their own consumption. In the early boom years of mining, most of these products were imported from California and sold to prospectors at extremely inflated prices. Recognizing the ready market for agricultural products, many who initially entered the area to make their fortune in mining, turned instead towards the development of farmlands (Hulse 1978:156).

Irrigation eventually reached the parched lands of the Carson Valley on a much larger scale. Under the Arid Lands Reclamation Act of 1902, the Truckee-Carson Project (also known as the Newlands

Reclamation Project) began in the following year. The Truckee-Carson project diverted waters from the Truckee and Carson Rivers into the Carson Sink. In addition to the construction of Derby Dam (which was part of the project), was the Truckee Canal, which was more than 30 miles long and irrigated the lands of the Carson Sink Valley as well as the fertile bench lands of Wadsworth near the town of Fernley. Later in the 1930s, the Rye Patch Dam was constructed in the Lovelock Valley to supplement water that the Truckee-Carson Project could not provide (Bard, et al. 1981:45-47; Smythe 1905:213-220).

Ranching in the Carson Valley has its origins with emigrants along the Humboldt River. The availability of water and fertile land dictated where this enterprise thrived within Nevada's borders. Ranching was also influenced by the locations of mines, and later by the arrival of the railroads. As mining died out and railroads made outside markets possible, small farms were then able to expand, giving way to enormous grazing areas with "most ranches located in or near the foothills of mountain ranges close to springs or streams" (Bard, et al. 1981:45-47) and natural meadows.

One of the most noted agriculturalists in the Carson Valley was W.F. Dressler. The Indian colony at Dresslerville, located on the Carson River's East Fork in the southern portion of Carson Valley, came into existence when Dressler, later a state senator from Douglas County between 1919 and 1945, donated a forty-acre tract of bench land west of the East Fork to the local Washoe Indian Tribe for a settlement. The land of the Dressler Ranch actually dates back to 1859, when the ranch operations pioneered the development of irrigation systems utilizing the Carson River. Also near the Dressler Ranch was the 12 Mile Site, situated at the crossroads of several famed territorial roads that included the Cradlebaugh or Esmeralda Toll Roads, the Van Sickle and Haines Toll Roads and the Bryan and Desert Creek roads (Dangberg, 1972).

By the decade of the 1930s, recreation centers were on the rise despite the onset of the Great Depression. Along the south shore, the hamlets of Meyers, Al Tahoe, Bijou, Zephyr Cove and even Stateline began to show signs of life. Summer homes were on the increase with many becoming full-time residents, requiring the need for schools and other facilities to complete the needed infrastructure. The south Tahoe region experienced a minor building boom in the five years leading up to America's entry into World War II. After World War II, population growth increased and expansion of the Carson Valley was well underway, and continues at present in generally all the economic areas cited above (Strong 1984).

15.2.2 Paleontological Resources

The project area is located within the Lahontan Basin geomorphic region, the lithology and stratigraphy types include some Mesozoic granitics, but silicified sedimentary granitics predominate. During the Pliocene to middle Pleistocene, pluvial lakes in the western Great Basin repeatedly rose to levels much higher than those of the well-documented late Pleistocene pluvial lakes, and some presently isolated basins were connected. Sedimentologic, geomorphic, and chronologic evidence indicates that Lakes Lahontan and Columbus-Rennie were as much as 70 meters higher in the early-middle Pleistocene than during their late Pleistocene high stands. Lake Lahontan at its 1400-meter shoreline level would submerge present-day Reno, Carson City, and Battle Mountain, and would flood other now-dry basins.

Recently, new fossil finds from the Pliocene Epoch were found within the Carson Valley. Reference to this recent find is found in the University of California Museum of Paleontology's research publication called PaleoBios. An excerpt from this publication identifies known vertebrate fossils from the Carson Valley. The fossil containing formations are located on the east side of the Carson Valley, on the western flanks of the Pine Nut Mountains. The reader is referred to this publication for further research, as the finds are not in the immediate vicinity of the project area.

The project area is located on the fluvial plain of the Carson River Valley and no fossil bearing formations are identified in this area. The project area consists of irrigated agricultural and pasture land and does not border any of the above mentioned Pine Nut Mountains. It is possible that erosion activities can transport paleontological resources away from the original host rock formation.

15.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Historical, Archaeological Resources and Paleontology Chapter the following subsections provide descriptions of applicable requirements.

15.3.1 Historic and Archaeological Resources – Federal

15.3.1.1 National Register of Historic Places

The significance of cultural resources is evaluated under the criteria for inclusion on the National Register of Historic Places (NRHP), authorized under the National Historic Preservation Act of 1966, as amended. The criteria defined in 36 CFR 60.4 are as follows:

The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess integrity of location, design, setting, materials, workmanship, feeling, association, and

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. that are associated with the lives of persons significant in our past; or

c. that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d. that have yielded, or may be likely to yield, information important to prehistory or history.

Sites younger than 50 years, unless of exceptional importance, are not eligible for the NRHP.

An integral part of assessing cultural resource significance, aside from applying the above criteria, is the physical integrity of the resource. Prior to assessing a resource's potential for listing in the NRHP, it is important to understand the seven kinds of integrity mentioned above. To summarize a National Park Service bulletin, entitled How to Apply the National Register Criteria for Evaluation (National Park Service 1984), the types of integrity are defined as:

- Location is the place where the historic property was constructed or the place where the historic event occurred;
- Design is the combination of elements that create the form, plan, space, structure, and style of a property;
- Setting is the physical environment of a historic property;
- Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property;
- Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory;

- Feeling is a property's expression of the aesthetic or historic sense of a particular period of time; and

- Association is the direct link between an important historic event or person and a historic property.

To qualify for the NRHP, a property must be significant; that is, it must represent a significant part of the history, architecture, archeology, engineering, or culture of an area and it must have the characteristics that make it a good representative of properties associated with that aspect of the past.

All properties change over time. It is not necessary for a property to retain all its historic physical features or characteristics to be eligible for the NRHP. The property must retain the essential physical features that enable it to convey its historic identity. The essential physical features are those features that define both why a property is significant and when it was significant. A property that is significant for its historic association is eligible if it retains the essential physical features that made up its character or appearance during the period of its association with the important event, historical pattern, or persons. A property important for association with an event, historical pattern, or person ideally might retain some feature of all seven aspects of integrity. A basic integrity test for a property associated with an important event or person is whether a historical contemporary would recognize the property as it exists today (National Park Service 1984:6, 46, 48).

15.3.2 Historic and Archaeological Resources – State

15.3.2.1 California Environmental Quality Act

CEQA includes provisions for significance criteria related to historical and prehistoric archaeological resources. Section 15064.5 of CEQA characterizes significant impacts as those causing damage to an "important archaeological resource." The Public Resource Code was amended (in 1992) with the addition of Section 5024.1, which authorized the establishment of the California Register of Historical Resources. Any identified cultural resources must be evaluated against the California Register criteria. In order to be determined eligible to the California Register, a property must be significant at the local, state, or national level under one or more of the following four criteria, modeled after the NRHP criteria:

- It is associated with events or patterns of events that have made a significant contribution to the broad patterns of the history and cultural heritage of California and the United States;

- It is associated with the lives of persons important to the nation or to California's past;

- It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or

- It has yielded, or may be likely to yield, information important to the prehistory or history of the state and the nation.

In addition to meeting one of the above criteria, a significant property must exhibit a measure of integrity. Properties eligible for listing in the California Register must retain enough of their historic character or appearance to be recognizable as historic properties and to convey the reasons for their significance. Integrity is judged in relation to location, design, setting, materials, workmanship, feeling, and association. It must also be judged with reference to the particular criteria under which a property is thought to be eligible. Resources listed on the California Register must be 50 years or older.

An impact is considered to be significant if it meets any of the following criteria:

- the project may disturb historical architectural resources;

- the project may disturb known prehistoric or historic cultural resources; or
- the project may disturb buried, unknown prehistoric or historic archaeological resources.

15.3.2.2 Nevada State Register

The State of Nevada developed the Nevada State Register of Historic Places for the protection of historic properties within the state. The criteria for evaluation are similar to those employed by the NRHP. The quality of significance in Nevada history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects:

a. that are associated with events that have made a significant contribution to the broad patterns of our history; or

b. that are associated with the lives of persons significant in our past; or

c. that embody the distinctive characteristics of a type, period or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d. that have yielded, or may be likely to yield, information important in prehistory or history.

Ordinarily cemeteries, birthplaces or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures which have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties which have achieved significance within the 50 years shall not be considered eligible for the Register. Such properties will qualify if they fall within one or more of the following categories:

- A religious property deriving primary significance from architectural or artistic distinction or historical importance;
- A building or structure removed from its original location but which is significant primarily for architectural value or which is the surviving structure most importantly associated with a historic person or event;
- A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his/her productive life;
- A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features or from association with historic events;
- A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan and when no other building or structure with the same association has survived;
- A property primarily commemorative in intent if design, age, tradition or symbolic value has invested it with its own historical significance; or
- A property achieving significant within the past fifty years if it is of exceptional importance.

15.3.2.3 Nevada Revised Statues 383

The State of Nevada also developed procedural methods, penalties and restrictions for the inadvertent discovery of Native Indian remains. The statutes that govern these historic properties are listed in the NRS 383.150-383.190. The statutes provide protection of Native Indian burials and provide consultation guidelines for the Native Indian tribe and the appropriate state agency. The following is a brief excerpt from the NRS, the remainder of the statute can be found on the World Wide Web at www.leg.state.nv.us/nrs.

A person who disturbs the cairn or grave of a native Indian through inadvertence while engaged in a lawful activity such as construction, mining, logging or farming or any other person who discovers the cairn or grave of a native Indian that has not been previously reported to the office shall immediately report the discovery and the location of the Indian burial site to the office. The office shall immediately consult with the Nevada Indian commission and notify the appropriate Indian tribe. The Indian tribe may, with the permission of the landowner, inspect the site and recommend an appropriate means for the treatment and disposition of the site and all artifacts and human remains associated with the site.

If the Indian burial site is located on private land and:

(a) The Indian tribe fails to make a recommendation within 48 hours after it receives notification pursuant to subsection 1; or

(b) The landowner rejects the recommendation and mediation conducted pursuant to NRS 383.160 fails to provide measures acceptable to the landowner, the landowner shall, at his own expense, reinter with appropriate dignity all artifacts and human remains associated with the site in a location not subject to further disturbance.

If the Indian burial site is located on public land and action is necessary to protect the burial site from immediate destruction, the office may cause a professional archeologist to excavate the site and remove all artifacts and human remains associated with the site for subsequent reinterment, following scientific study, under the supervision of the Indian tribe.

Any other excavation of an Indian burial site may be conducted only:

(a) By a professional archeologist;

(b) After written notification to the administrator; and

(c) With the prior written consent of the appropriate Indian tribe. Failure of a tribe to respond to a request for permission within 60 days after its mailing by certified mail, return receipt requested, shall be deemed consent to the excavation.

All artifacts and human remains removed during such an excavation must, following scientific study, be reinterred under the supervision of the Indian tribe, except that the Indian tribe may, by explicit written consent, authorize the public display of a particular artifact. The archeologist, Indian tribe and landowner shall negotiate an agreement to determine who will pay the expenses related to the interment. (Added to NRS by 1989, 574; A 1993, 928, 1594; 1995, 579)

15.3.3 Paleontological Resources

The significance of paleontological resources is evaluated using state guidelines. CEQA guidelines indicate that a project could have a significant effect on the environment if project activities disrupt or adversely affect a paleontological site (CEQA, Appendix G).

The California Public Resources Code, Section 5097.5, prohibits the excavation or removal of any "vertebrate paleontological site, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands." Public lands are defined as lands owned by or under the jurisdiction of the state or any city, county, district, authority, or public corporation. Any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands are considered misdemeanors.

According to standard procedures published by the Society of Vertebrate Paleontology (1991), sedimentary rock units with a high potential for containing significant nonrenewable paleontologic resources are those determined by previous studies to contain vertebrate or significant invertebrate (Society of Vertebrate Paleontology 1991). Significant paleontologic resources are fossils or assemblages of fossils that are unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and those that add to an existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (Reynolds 1988). The goal of the cultural resources analysis for this Project is to identify prehistoric and historic archaeological sites, architectural and historical sites, historical landscapes, and traditional cultural properties (including Native American heritage resources) that might be affected by implementation of the Project.

15.4 Historic and Archaeological, and Paleontological Resources Goals, Objectives and Policies

Table 15-1 identifies goals, objectives, and policies that provide guidance for development in relation to historic, archaeological, and paleontological resources in the project area. The table also indicates which criteria in this section are responsive to each set of policies.

Table 15-1

General Plan Goals, Objectives, and Policies – Historic and Archaeological Resources and Paleontology

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Element I, Section I: Culture	Policy 18a	The County should cooperate with the Washoe and the Miwok Tribes to develop policies for the identification and protection of significant archaeological sites.	1, 2
		Policy 18c	The proponents or applicants for development projects in areas known or suspected of containing historic artifacts should be required to protect any historic sites and/or artifacts that may be found.	1, 2
		Policy 18e	The County should promote proactive planning to avoid cultural resource impacts and promote historic preservation through appropriate standards, incentives and easements.	1, 2

Table 15-1

General Plan Goals, Objectives, and Policies – Historic and Archaeological Resources and Paleontology

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Douglas County Master Plan	Historic Preservation Element	Goal 6.01	To preserve Douglas County's historic, cultural, and archaeological resources as physical reminders of the County's past and as unique focal points to shape the County's identity, now and in the future.	1, 2
		Policy 6.01.01	Douglas County shall support, whenever feasible, the preservation of the County's rich cultural heritage, including the establishment of historic districts to protect significant historic properties.	1, 2
		Policy 6.01.07	Douglas County will coordinate with the Washoe Indian Tribe in the identification and preservation of structures and sites of cultural or archaeological significance. Developments proposed in areas of potential archaeological significance shall be required to conduct an investigation in order to determine whether valuable archaeological remains may be affected by the project.	1, 2

Source: Hauge Brueck Assoc. 2008

1 The evaluation criteria are in Table 15-2.

15.5 Evaluation Criteria with Point of Significance

Table 15-2 presents the evaluation criteria used for analysis of potential impacts to Historic and Archaeological Resources and Paleontology. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A historical, archaeological or paleontology resource impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 15-2.

Table 15-2

Evaluation Criteria with Point of Significance -
Historic and Archaeological Resources and Paleontology

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project disturb known, potentially eligible National, Nevada or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Number of sites affected by Project facilities	Greater than 0 sites	36CFR800, NHPA Section 106 and 110 CEQA, Section 15064.5; CEQA Checklist V-a PRC Section 5020-5024, 21084.1 Nevada State Register NRS 383
2. Will the Project disturb unknown archaeological resources or human remains?	Sensitivity analysis	Greater than 0 Projected locations	36CFR800, NHPA Section 106 and 110 CEQA, Section 15064.5; CEQA Checklist V-b,d PRC Section 5020-5024, 21084.1 Nevada State Register NRS 383
3. Will the Project disturb unknown important paleontologic resources?	Underground construction within geologic units with the potential to contain unknown important fossils.	Greater than 0 occurrences	CEQA Checklist V-c PRC Section 5097.5

Source: Hauge Brueck Assoc. 2009

The analysis uses the definitions: for prehistoric and historic archaeological sites in NRHP Bulletin 15 (How to Apply the National Register Criteria for Evaluation, National Park Service 1991); for historic landscapes in Preservation Briefs 36 (Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes, Birnbaum 1994); for traditional cultural properties in Bulletin 38 (Guidelines for Evaluating and Documenting Traditional Cultural Properties); and CRM 16 (Traditional Cultural Properties: What You Do and How We Think, Parker 1993).

On September 10, 2001, Parsons staff archaeologist conducted a records search at the Central California Information Center (CCIC) of the California Historical Resources Information System, located at California State University, Stanislaus. On October 3, 2001, staff archaeologists conducted a records search at the Nevada State Museum (NSM), Carson City, Nevada and at the Nevada State Historic Preservation Office (SHPO). Site records, reports, maps and other archival information pertinent to the project area were examined. Parsons staff also examined: the NRHP - National Register Information System (October 2001); California Inventory of Historic Resources (1976); Historic Properties Data File for Alpine County (September 15, 2001); Five Views: An Ethnic Sites Survey for California (1988); California Historical Landmarks (1990), Nevada's Historical Markers (October 2001), and NRHP, Douglas County (October 2001).

The area reviewed for the record search at the CCIC, Nevada SHPO, and NSM encompassed the project area. Within that area, 38 previously recorded cultural resources sites and seven isolated prehistoric artifacts were identified. In addition, there are two State of Nevada Historic Markers located within the project area of Douglas County. These markers identify Dresslerville, a Washoe Indian Colony (Nevada Historic Marker #131), and The Carson Valley (Nevada Historic Marker #207). There are also two Snowshoe Thompson Historical Monuments, one located along Diamond Valley Road, and another near the town of Genoa. The 38 identified sites, outlined in Table 15-3, consist of historic, prehistoric and multi-component sites. In addition, eight archaeological surveys occur within portions of the project area. These surveys are presented in Table 15-4.

A review of the files maintained at the CCIC of the California Historical Resources Information System was conducted on September 24, 2007 for the Diamond Valley study area. According to this review, the study area was partially surveyed in the past. The search was for a larger study area. Of the sites mentioned by the CCIC, five are located in the project area: CA-ALP-16, CA-ALP-63, CA-ALP-124, CA-ALP-198, and CA-ALP-206/H. In addition, the CCIC reported the Snowshoe Thompson monument placed by E Clampus Vitus, is located in the project area. \

As part of the pre-field research for this EIR, interested parties were contacted by letter for any comments concerning the cultural resources potentially affected by the Project. Interested parties include county historical societies, local Native American individuals and recognized groups, the Nevada and California SHPOs, and the California Native American Heritage Commission (NAHC).

For the Diamond Valley study area, in September 2007, a letter was sent to the NAHC requesting a check of the Sacred Lands files. The check failed to reveal any properties listed as Sacred Lands. The NAHC did provide a list of individuals and groups to contact regarding the property on September 11, 2007. Letters were sent to the two listed contacts on October 3, 2007: Waldo Walker, Chairperson of the Washoe Tribe of Nevada and California, and Lynda Shoshone, the Tribal Historic Preservation Officer for the Washoe Tribe of Nevada and California (these letters are on file at the District office). This was followed by a call to Lynda Shoshone, who expressed her desire to become involved in the Project.

A meeting was organized to field inspect the sites of the Project Components, learn about the Master Plan, and to discuss the concerns of the Washoe people. The Washoe kindly arranged to hold the meeting at the Woodfords Community on October 19, 2007. Attending the meeting were the following:

Melinda Peak	Peak & Associates, Inc.
Robert Gerry	Peak & Associates, Inc.
Paul Sciuto	STPUD
Jim Hoggatt	STPUD
Hal Bird	STPUD
Anders Hauge	Hauge Brueck Associates
DeAnn Roberts	Washoe Tribe
Phillip Bennett	Washoe Tribe
Lynda Shoshone	Washoe Tribe
Rob Beltrano	Washoe Tribe

Ed James	Washoe Tribe
S. James	Washoe Tribe
Dinah Pete	Washoe Tribe
Ramona Dick	Washoe Tribe

The Native American people who went on the field tour pointed out a traditional gathering area in the northern portion of the project area. The District assured them that no impact will occur in this portion of the Project Area. Phillip Bennett mentioned that he thought there were graves in the western portion of the project area, but a check of the area did not yield any evidence.

Existing paleontological and geological sources were reviewed (Society for Vertebrate Paleontology 1991). To identify Project Components that might affect vertebrate paleontologic resources in fossiliferous rocks, the project maps were compared with geologic maps for Alpine County, CA and Douglas County, NV.

Tables 15-3 and 15-4 disclose the previously identified sites and previously conducted surveys for the project area. Components 31, Divert stormwater flow away from HPR and to ICR, and 32, ICR spillway channel, are located outside of the original survey area and are not yet evaluated.

Table 15-3

Previously Identified Sites Within the Project Area

Site Number	Description	NRHP Evaluation
26DO15	Prehistoric and modern cemetery.	UND
26DO21	Lithic scatter, small campsite, one BRM.	UND
26DO23	Lithic scatter, obsidian and chert.	UND
26DO27	Large lithic scatter, obsidian, chert, jasper projectile points.	UND
26DO32	Habitation site; dew'lunana or loma.	UND
26DO33	Occupation site; burials, dew bayu'migibi detdeyi, petroglyphs, DSN point.	UND
26DO374	Lithic scatter, isolated chert flakes.	UND
26DO454	Historic refuse and prehistoric projectile point.	NE
26DO455	Historic refuse, sanitary can, crimped seam can.	NE
26DO456	Historic refuse, Prince Albert tobacco tin, sanitary cans, glass fragments.	NE
26DO524	Lithic scatter and prehistoric burials.	UND
26DO689	Prehistoric lithic scatter, tools. Historic residential feature, refuse.	UND
26DO692	Historic Mud Lake Dam.	NE
26DO693	Lithic scatter, basalt, jasper and chert.	UND
CA-ALP-	Fredricksburg Ditch.	UND
CA-ALP-016	Prehistoric metates, lithic scatter.	UND
CA-ALP-063	Prehistoric pinyon gathering /camp.	E
CA-ALP-124	Prehistoric shaped pestle, knife fragment, obsidian flake around active spring.	UND

Table 15-3

Previously Identified Sites Within the Project Area

Site Number	Description	NRHP Evaluation
CA-ALP-197/H	Historic rock wall, prehistoric chert core fragments and flakes.	UND
CA-ALP-198	Prehistoric, one BRM.	UND
CA-ALP-199	Prehistoric sparse lithic scatter.	UND
CA-ALP-200	Prehistoric lithic scatter, mano fragments, projectile point base fragment.	UND
CA-ALP-202	Prehistoric metates and manos, lithic scatter.	UND
CA-ALP-203	Prehistoric metates and manos, lithic scatter.	UND
CA-ALP-204	Prehistoric metates and manos, lithic scatter.	UND
CA-ALP-206/H	Historic cellar, glass, cut nails and ceramic fragments, prehistoric lithic scatter, metate.	UND
CA-ALP-208	Rose spring corner notch point, metate fragments, lithic scatter.	UND
CA-ALP-209	Prehistoric quarry, more than 500 flakes and debitage.	UND
CA-ALP-212	Lithic procurement and processing area, 200+ flakes and debitage.	UND
CA-ALP-218	Prehistoric lithic scatter, hammerstone.	UND
CA-ALP-219	Lithic scatter, 100+ obsidian, and basalt flakes.	UND
CA-ALP-222	Prehistoric rock wall, possible hunting blind, lithic scatter.	E
CA-ALP-223/H	Lithic scatter, obsidian, jasper, chert; historic refuse, ceramics and glass.	UND
CA-ALP-254H	Carson Emigrant Trail.	E
CA-ALP-260	Prehistoric lithic scatter 100+ flakes, two BRMs.	UND
CA-ALP-329/H	Two BRMs within historic residential ruins.	UND
CA-ALP-330/H	Irrigation ditch and prehistoric components.	UND
CA-ALP-331H	Segment of Carson Emigrant Trail.	E
ISO # 1-9	Five obsidian flakes, three white chert flakes, one small cobble mano/ hammerstone.	NE

Source: Hauge Brueck Assoc., CCIC, and NSM 2008

UND: Undetermined eligibility status.
E: Eligible for the National Register.
NE: Not eligible for the National Register

Table 15-4

Previous Surveys Within Project Area

Report #	Author(s), Year	Title	Sites Recorded
CCIC-22	Intermountain Research, 1985	Continuing Archaeological Investigations On Behalf Of South Tahoe Public Utility District In Alpine County, California	CA-ALP-222/H CA-ALP-223/H
CCIC-336	Intermountain Research, 1980	Archaeological Reconnaissance of 16 Proposed Washoe Residential Locations In Douglas County, Nevada and Alpine County, California For Raglund and Sun Architects	CA-ALP-148

Table 15-4

Previous Surveys Within Project Area

Report #	Author(s), Year	Title	Sites Recorded
CCIC-13	Intermountain Research, 1983	An Archaeological Survey of Proposed Wastewater Reservoir Facilities, Diamond Valley, Alpine County, California	CA-ALP-63, CA-ALP-16, CA-ALP-197/H, CA-ALP-198, CA-ALP-199, CA-ALP-200, CA-ALP-206H CA-ALP-210, CA-ALP-211, CA-ALP-212, CA-ALP-213, CA-ALP-214, CA-ALP-215, CA-ALP-216, CA-ALP-217, CA-ALP-218, CA-ALP-219.
CCIC-2614	Cindy Desgrandchamp, 1979	Cultural Resource Assessment For Tahoe Regional Environmental Evaluation Study	None
CCIC-39	Peak and Associates, 1978	Cultural Resources Assessment of Proposed South Tahoe Public Utility District Wastewater Facilities	CA-ALP-123, CA-ALP-124
CCIC-3805	CALTRANS, Christina Hibbard, 1999	Negative Archaeological Survey Report, P.M. 20.1, Highway 89	None
NSM-3-188	Carson Ranger District, USFS, 1998	U.S.D.A. Heritage resource Negative Inventory Report	None
NSM-3-185	Resource Concepts, Inc., 1998	An Intensive Inventory of Cultural resources Located In the Vicinity of Mud Lake, Douglas County, Nevada	One Prehistoric Site, Six Historic Sites

Source: Hauge Brueck Assoc., CCIC, and NSM 2008.

15.5.4 Paleontology

No fossil bearing rock formations are found in the project area.

15.6 Environmental Consequences (Impacts) and Recommended Mitigation

15.6.1 No Project Components

Table 15-5 presents the potential impacts to Historic, Archaeological and Paleontological Resources, outlines the points of significance, level or impact and type of impact and also ranks the level of significance for the No Project Components.

Table 15-5					
Historic, Archaeological, and Paleontological Impacts – No Project Components					
Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
ARCH-1. Will the No Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites				NP-1, NP-2
ARCH-2. Will the No Project Components disturb unknown archaeological resources or human remains?	Greater than 0 Projected locations				NP-1, NP-2
ARCH-3. Will the No Project Components disturb unknown important paleontologic resources?	Greater than 0 occurrences				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **ARCH-1, ARCH-2 and ARCH-3. Will the No Project Components impact historic, archaeological, and paleontological resources based on evaluation criteria 1 through 3?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction or new facilities and will have no new impacts on historic, archaeological or paleontological resources.

Mitigation: *No mitigation is needed. NP-1, NP-2*

15.6.2 Project Components

Table 15-6 presents the potential impacts to Historic, Archaeological and Paleontological Resources, outlines the points of significance, level or impact and type of impact and also ranks the level of significance for the Project Components.

Table 15-6

Historic, Archaeological, and Paleontological Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
ARCH-1. Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Greater than 0 sites	29, 30, 31, 32	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22,		8, 23, 24
ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains?	Greater than 0 Projected locations	29, 30, 31, 32	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22		8, 23, 24
ARCH-3. Will the Project Components disturb unknown important paleontologic resources?	Greater than 0 occurrences				1, 2, 3, 4, 5, 6, 7, 9, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: **ARCH-1. Will the Project Components disturb known potentially eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?**

Analysis: *Significant Impact; Components 29, 30, 31, 32*

Table 15-7 shows the number of prehistoric and historic archaeological sites occurring within the project area. This table may be amended upon completion of surveys for Components 29, 30, 31 and 32 which are located outside of the original Master Plan survey areas. Because surveys have not been completed for these portions of the project area to identify potentially eligible National or California Register properties, the impact is assumed to be significant.

Mitigation: **ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources**

Field surveys and cultural resource identifications (Phase I) must be directed by qualified archaeologists/historians/architectural historians who fulfill Secretary of the Interior standards, as set forth in 36 CFR Part 1210, Appendix C. These identification studies must be conducted in a manner consistent with 36 CFR Part 1210, Appendix B and with the recommendations of the SHPOs.

After Mitigation: *Significant Impact; Components 29, 30, 31, 32*

The impacts to prehistoric and historic archaeological sites for portions of the project area not yet surveyed remain significant until surveys are completed as outlined in mitigation measure ARCH-1.

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22*

The Project involves construction of conveyance facilities (components 2, 3, 4, 5, 6, 14, 17, 20 and 22) that could result in impacts to cultural resources. The Project involves ground disturbance associated with the placement of the pipelines or modification of ditches, including the effects of heavy equipment activity and possibly ongoing maintenance activities that will result in the destruction or alteration of known prehistoric and historic archaeological sites.

Construction of the irrigation systems, irrigation fields and infiltration basins for components 1, 7, 9, 10, 12, 13, 15, 16, 17, 18, 19 and 21 could result in impacts to cultural resources. Ground disturbance associated with the placement of the pipes, irrigation fields and infiltration basins, including the effects of heavy equipment activity and possibly ongoing maintenance activities, will result in the destruction or alteration of known prehistoric and historic archaeological sites.

Table 15-7 shows the number of prehistoric and historic archaeological sites occurring within the project area that must be avoided during construction and operation of components 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22.

Table 15-7

Number of Known Historic and Archaeological Sites Affected by Project Components

Prehistoric[1]	Historic[2]	Architectural[3]	Prehistoric/ Historic[4]	Total
13	6	4	4	27

Source: Hauge Brueck Assoc. 2009

Notes:
1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site/rock walls
4 - Site with both prehistoric and historic components

Construction of the impoundment facility for temporary containment (Component 11) could result in impacts to cultural resources. Ground disturbance associated with the placement of pipelines, central pivot systems and impoundments including the effects of heavy equipment activity and possibly ongoing maintenance activities will result in the destruction or alteration of known prehistoric and historic archaeological sites. Table 15-8 shows the number of prehistoric and historic archaeological sites potentially affected by temporary containment Component 11.

Table 15-8

Number of Known Prehistoric and Historic Archaeological Sites Affected by Temporary Containment Components

Prehistoric[1]	Historic[2]	Architectural[3]	Prehistoric/Historic[4]	Total
3	2	0	2	7

Source: Hauge Brueck Assoc 2009

Notes: 1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site
4 - Site with both prehistoric and historic components

Mitigation: **ARCH-1. Identification, Evaluation, and Avoidance of Cultural Resources**

After Mitigation: *Less than Significant After Mitigation; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22*

Implementation of the Programmatic Agreement (PA), as outlined for mitigation measure ARCH-1, Identification, Evaluation, and Avoidance of Cultural Resources, which presents measures to avoid, reduce, or mitigate impacts, requires: an evaluation of archaeological resources by a qualified archaeologist; a determination of resource significance, consultation with the Washoe Tribe, and resulting management/mitigation recommendations. The treatment of cultural resources to be affected by the Project Components will continue to be addressed under Section 106 process of the National Historic Preservation Act. The PA provides for a phased resource identification, evaluation and data recovery program. Phase I and Phase II have been completed for portions of the project area effected by Project Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22. Phase III and Phase IV of the PA will be implemented as necessary prior to and during construction of individual Project Components as determined by National Register significance. Phase III and Phase IV call for the development of a treatment plan and supervision of archaeological monitoring during construction, respectively with involvement of the Washoe Tribe.

These actions apply to all Project Components that result in a physical change to the project area to reduce the impacts to pre-historic and historic archaeological sites to a less than significant level. For impacts identified in California, the PA will be implemented under CEQA. For impacts identified in Nevada, the PA will be implemented under Nevada State Register standards.

Analysis: *No Impact; Components 8, 23, 24*

Table 15-9 shows the number of prehistoric and historic archaeological sites in the vicinity of water management components 8, 23 and 24. New physical facilities will not be constructed under 8, 23 and 24 and no impact to prehistoric and historic archaeological sites will occur due to changes in recycled and fresh water management.

Table 15-9

Number of Prehistoric and Historic Archaeological Sites Affected by Water Management Components

Prehistoric[1]	Historic[2]	Architectural[3]	Prehistoric/ Historic[4]	Total
13	5	4	3	25

Source: Hauge Brueck Assoc 2009

Notes: 1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site
4 - Site with both prehistoric and historic components

Mitigation: *No mitigation is needed. Components 8, 23, 24*

Impact: ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains?

Analysis: *Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

There is the possibility that surface or subsurface cultural resources not identified during the review of records at the CCIC and the NSM will be encountered during construction or operation/maintenance of pipelines, irrigation systems, irrigation fields, infiltration basins and impoundments, or that there are unexpected effects on known cultural resources.

Mitigation: **ARCH-1. Identification, Evaluation, and Avoidance of Cultural Resources; ARCH-2. Protect Undiscovered Cultural Resource Sites**

After Mitigation: *Less than Significant after Mitigation; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22*

An archaeological pedestrian survey as identified in Mitigation Measure ARCH-2**,** Protect Undiscovered Cultural Resource Sites, as well as the preparation of the PA required for measure ARCH-1 in cooperation with the Washoe Tribe**,** will reduce this impact to a less than significant level.

For all Project Components, the District will retain an archaeological monitor, who meets Secretary of the Interior standards, to be present during certain phases of project construction and to conduct in-field monitoring in areas of known resources and areas of high archaeological sensitivity. If human remains are discovered, the county coroner must be notified as soon as reasonably possible (CEQA Section 15064.5) and there will be no further disturbance to the site where the remains were found. Treatment of the remains will be dependent on the views of the most-likely-descendent.

After Mitigation: *Significant Impact; Components 29, 30, 31, 32*

The impacts to unknown archaeological sites for portions of the project area not yet surveyed remain significant until surveys are completed as outlined in mitigation measures ARCH-1 and ARCH-2.

Analysis: *No Impact; Components 8, 23, 24*

Water management components 8, 23 and 24 will not construct physical facilities in areas of known resources or areas of high archaeological sensitivity. No impacts will result from changes in management of recycled and fresh water.

Mitigation: *No mitigation is needed. Components 8, 23, 24*

Impact: ARCH-3. Will the Project Components disturb unknown important paleontological resources?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

None of the conveyance, application, temporary containment or water management component facilities are located on fossil bearing rock formations, as there are no fossil bearing rock formations identified within the project area.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24 29, 30, 31, 32*

15.7 Cumulative Impacts

There are significant Project impacts to cultural resources that may occur due to construction of the Project Components. Extensive cultural resources are known to exist throughout the project area. Significant impacts to these known resources could result from many different sources, and any future projects in the area could impact these resources. Although there are many other projects that could contribute to cumulative impacts, all Project impacts on known cultural resources are identified as significant and will be fully mitigated, and will not contribute to overall cumulative impacts on cultural resources.

15.8 Summary of Significant Impacts and Mitigation Measures

15.8.1 Significant Impacts and Mitigation Measures by Project Component

Table 15-10 summarizes the significant impacts by Project Component and identifies the mitigation measures required for each impact.

Table 15-10

Summary of Significant Impacts and Mitigation Measures – Historic and Archaeological Resources and Paleontology

Impact	Level of Significance	Mitigation Measure
Project Components		
ARCH-1. Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⊙ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources

Table 15-10		
Summary of Significant Impacts and Mitigation Measures – Historic and Archaeological Resources and Paleontology		
Impact	**Level of Significance**	**Mitigation Measure**
Project Components		
ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⊙ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources **ARCH-2.** Protect Undiscovered Cultural Resource Sites

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

15.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

The significant impacts identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3) are listed below. A discussion follows as to why the impact is significant and how the impact is mitigated to a level of less than significant. If impacts are significant and unavoidable, an explanation is provided.

ARCH-1. Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/ traditional heritage resources?

The level of this significant impact is reduced through implementation of the following recommended mitigation measure:

- ARCH-1. Identification, Evaluation and Avoidance of Cultural Resources.

The mitigation measure is detailed in Appendix D.

The impact is significant for Project Components 29 and 30 of Alternative 3. Project Components 29 and 30, are located outside of the original Master Plan survey areas. Because surveys have not been completed for these portions of the project area to identify potentially eligible National or California Register properties, the impact is assumed to be significant. The impacts to prehistoric and historic archaeological sites for portions of the project area not yet surveyed remain significant until surveys are completed as outlined in mitigation measure ARCH-1.

ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains?

The level of this significant impact is reduced through implementation of the following recommended mitigation measures:

- ARCH-1. Identification, Evaluation, and Avoidance of Cultural Resources; and
- ARCH-2. Protect Undiscovered Cultural Resource Sites.

The mitigation measures are detailed in Appendix D.

The impact is significant for Project Components 29 and 30 of Alternative 3. There is the possibility that surface or subsurface cultural resources not identified during the review of records at the CCIC and the NSM will be encountered during construction or operation/maintenance of pipelines, irrigation systems, irrigation fields, infiltration basins and impoundments, or that there are unexpected effects on known cultural resources. The impacts to unknown archaeological sites for portions of the project area not yet surveyed remain significant until surveys are completed as outlined in mitigation measures ARCH-1 and ARCH-2.

16 Visual Resources and Open Space

16 Visual Resources and Open Space

This chapter discusses impacts of the Project on the existing open space in the project area, including the effects on preservation of open space. This section discusses the project impacts on visual resources related to visual contrast, view obstruction, or loss of view. The section also addresses degradation in visual quality resulting from loss or alteration of a specific scenic resource (such as a designated scenic road). To provide a basis for this evaluation, the setting section describes the regional landscape character and the existing visual conditions of the project area. Sensitive scenic routes and other resources designated in local general plans are identified.

16.1 Impacts Evaluated in Other Chapters

The following items are related to visual resources and open space but are evaluated in other chapters of this document.

- Historic Sites and Structures. Construction of Project Components could impact the visual quality of historic sites and landscapes. Impacts of the proposed Project facilities on historic resources are discussed in Chapter 15, Historic and Archaeological Resources and Paleontology.

- Natural Resources in Open Space Areas. Construction of Project Components could affect various natural resources in open space areas, including biological resources, water resources, and soils and other geologic resources. Impacts on these resources are discussed in Chapter 4 - Land Use, Chapter 6 - Geology and Soils, Chapter 11 - Biological Resources, Chapter 9 - Hydrology, Chapter 7 - Groundwater, and Chapter 8 – Surface Water Quality.

16.2 Affected Environment (Setting)

The following section provides a general discussion of the regional landscape character and open space of the project area, provides a description of the existing designated scenic resources in the project area, and addresses the applicable plans and policies governing preservation of visual resources and open space.

16.2.1 Regional Setting

The project area consists of portions of the Carson Valley within Alpine County, CA, and Douglas County, NV, extending from the base of the Sierra Nevada Mountains through the valley along the West Fork of the Carson River to the outskirts of the Gardnerville-Minden urban area. In general, the area slopes gently from south to north, although there are interspersed areas of low hills and ridges separating the smaller valleys, such as Diamond Valley and Wade Valley. Grasslands and sagebrush predominate except along the streams, where riparian vegetation provides visual contrast. High rugged peaks and ridges are visible on either side of the valley, most prominently on the western side, where the Sierra Mountains rise rapidly and dramatically from the foothills above the valley floor. On the eastern side a range of lower hills border the valley, with the Pinenut Mountains visible further in the distance.

16.2.2 Open Space

The predominant type of open space within the project area is agricultural grasslands and brush; this open space is typically used for grazing. In addition to the private agricultural open space lands in the area, there is also public open space land in the valley that is managed by BLM (some of which is used for grazing), as well as Indian Trust lands and Washoe tribal lands. In the foothills and mountains that flank the valley, there are extensive Forest Service lands, as well as BLM lands. The only recreational open space is the land at the ICR, which is operated by BLM.

16.3 Regulatory Setting

The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1. Specific to the Visual Resource and Open Space Chapter the following subsections provide descriptions of applicable requirements.

16.3.1 Designated Scenic Resources

The counties containing the project area locally designate specific scenic resources. In addition, Caltrans also designates scenic highways on State routes.

16.3.1.1 Locally Designated Resources

Two Alpine County roads are designated as scenic roadways and neither of these roadways is located in the project area. In Douglas County, State Highways 88 and 206 are designated as scenic corridors and portions of these routes are located in the northern portion of the project area. Alpine County and Douglas County do not designate any other specific scenic resources.

16.3.1.2 Caltrans Scenic Resources and State Scenic Highways

Within the project area, two California State highways are formally designated as scenic highways:

- State Route 88 - Scenic Highway: From Amador County line to Nevada state line (26 miles). The portion in the project area extends from just south of Woodfords to the Nevada State line. Following the West Fork of the Carson River down from Woodfords Canyon, this portion gives the motorist a view of nearby meadow land with distant views of forested mountain sides at higher elevations and dense desert-like brush at lower elevations.

- State Route 89 - Scenic Highway: From El Dorado County line to the west junction of State Route 88 and from the east junction of State Route 88 to Mono County line (24 miles). The portion in the Project area extends a short distance east of the east junction with Highway 88, running across the Carson Valley before ascending into the low mountains west of Markleeville.

The designation as scenic highways according to Caltrans criteria indicates that visual quality along these highway corridors is generally high.

16.4 Visual Resources and Open Space Goals, Objectives and Policies

Table 16-1 identifies goals, objectives, and policies that provide guidance for development in relation to visual resources in the project area. The table also indicates which criteria in the Visual Resources Section are responsive to each set of policies.

Table 16-1

General Plan Goals, Objectives, and Policies – Visual Resources and Open Space

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Circulation Element	Goal GP 29	Maintain the existing scenic quality available along all of Alpine County's highways.	1, 2
Alpine County General Plan	Aesthetics Element	Goal GP 19 Policy 19 b	Protect steep slopes from grading, vegetation removal, road construction or other developments or activities that may impact the viewshed from any scenic route or General plan designated residential or recreation area.	1, 2
Alpine County General Plan	Aesthetics Element	Goal 19 Policy 19c	Protect open areas, ridges, peaks and other skyline features from structures that may impact the viewshed from any scenic highway or general plan designated open space, residential or recreational areas.	1, 2
Alpine County General Plan	Aesthetics Element	Policy 19d	Developments outside of the tree line in mountain meadow areas and on irrigated or cultivated agricultural lands should be prohibited.	3
Alpine General Plan	Aesthetics Element	Policy 19g	Protect nighttime views by minimizing outside exterior lighting. Light sources should not be visible from other properties.	4
Alpine County General Plan	Conservation Element	Goal GP 10	Preserve and protect agricultural practices in Alpine County.	3
Douglas County Master Plan	Land Use Element	Goal 7.04	To maintain agriculture as an important land use in the Carson Valley and to retain the open rural character, cultural heritage and economic value created by this land use.	3

Source: Hauge Brueck Assoc. 2009

1 The visual resources and open space evaluation criteria are provided in Table 16-2.

16.5 Evaluation Criteria with Points of Significance

The evaluation criteria for Visual Resources are presented in Table 16-2. The criteria are drawn primarily from local, State, and Federal agency policies and procedures, adapted where necessary to reflect CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A visual resource or open space impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 16-2.

Table 16-2

Evaluation Criteria with Points of Significance – Visual Resources and Open Space

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project affect viewsheds from any designated scenic route, scenic corridor or residential or recreation areas due to changes involving grading, vegetation removal, road construction or other construction activities?	a. Level of visual contrast (change in form, line, color, texture, scale of landscape) b. Amount of view obstruction (loss of view) c. Degradation in visual quality	a. Strong visual contrast b. Obstruction in viewed area[2] from foreground[3] or middleground[3] c. Loss or alteration of a specific scenic resource[4]	Alpine County General Plan Douglas County Master Plan Caltrans Scenic Resource Inventory CEQA Checklist I-a,b,c
2. Will structures constructed as part of the Project be inconsistent with the protection of views of open areas, ridges, and peaks any designated scenic route, scenic corridor, open space, residential or recreation area?	a. Level of visual contrast (change in form, line, color, texture, scale of landscape) b. Amount of view obstruction (loss of view) c. Degradation in visual quality	a. Strong visual contrast1 b. Obstruction in viewed area[2] from foreground[3] or middleground[3] c. Loss or alteration of a specific scenic resource[4]	Alpine County General Plan Douglas County Master Plan Caltrans Scenic Resource Inventory CEQA Checklist a,b,c
3. Will the Project create a new light source?	High intensity light or glare towards private residences	Greater than 0 residences affected	CEQA Checklist I-d
4. Will the Project result in the conversion of open space land, including agricultural open space, to non-open space uses?	Acres of land converted	Greater than 0 acres of land	Alpine County General Plan Douglas County Master Plan

Source: Hauge Brueck Assoc. 2009

1. Strong Visual Contrast - (one or more of the following) regraded land forms are flat with little to no contour: line of major ridgeline is altered and not consistent with surrounding ridgelines or minor ridgelines are eliminated; inconsistent color with adjacent landscape character; elimination of landscape texture created by exposed soil or removal of vegetation; form of project grossly exceeds scale of natural land forms.
2. Viewed area defined as area of landscape (i.e., everything except sky) as shown in a photograph from the closest sensitive viewpoint, taken with a normal (50 mm) lens.
3. 3Foreground: 0-1/2 mile; Middleground: 1/2-3 miles
4. Specific Scenic Resource - one or more of the following landscape components that creates striking features: Landform - peaks and ridges; Water - major bodies of water that provide reflective qualities and irregular shorelines, or major/permanent streams/rivers with diversity of meanders, flows, rapids, rock outcrops, or river-banks; Vegetation - mature stands of native or cultural species (oaks and eucalyptus) in natural groves or distinct planted patterns (i.e. along roads or as planted wind breaks).

For evaluation criteria 1 and 2, visual impact significance is measured by three variables: changes in visual contrast; amount of view obstruction; and degradation in visual quality. Visual contrast is significant if it is strong as a result of regraded landforms, alteration or elimination of ridgelines, and changes introduced by the Project that result in landscape colors, textures, and scale of visual components that are inconsistent with the natural surroundings. View obstruction is considered significant if foreground or middleground views of the viewed area seen from sensitive viewing areas are obstructed by the Project. Degraded visual quality is considered significant if the Project severely alters or displaces specific scenic resources composed of striking landform features, aesthetic water bodies, mature stands of native/cultural trees, or historic structures. More detailed definitions of strong visual contrasts and specific scenic resources are provided in the footnotes to Table 16-2. Visual impacts are considered significant if any one of the three measures of significance is identified.

Evaluation criterion 4 is considered significant if there is conversion of any existing open space as designated by the Alpine County General Plan, or conversion of existing agricultural land as designated in the Douglas County Master Plan as having an open space character, to non open space use whether directly, for non-open space project uses, or indirectly as a result of project actions.

16.6 Environmental Consequences (Impacts) and Recommended Mitigation

16.6.1 No Project Components

Table 16-3 presents the potential impacts to visual resources and open space, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 16-3

Visual Resource and Open Space Impacts – No Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
VISUAL-1. Will the No Project Components affect viewsheds from any designated scenic route, scenic corridor or residential or recreation areas due to changes involving grading, vegetation removal, road construction or other construction activities?	Strong visual contrast Permanent View Obstruction Loss or alteration of a specific scenic resource				NP-1, NP-2
VISUAL-2. Will structures constructed as part of the No Project Components be inconsistent with the protection of views of open areas, ridges, and peaks from any designated scenic route, scenic corridor, open space, residential or recreation area?	Strong visual contrast Permanent View Obstruction Loss or alteration of a specific scenic resource				NP-1, NP-2
VISUAL-3. Will the No Project Components create a new light source?	Greater than 0 residential units affected				NP-1, NP-2

Table 16-3						
Visual Resource and Open Space Impacts – No Project Components						
Impact	Point of Significance	Level of Significance by Component				
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact	
VISUAL-4. Will the No Project Components result in the conversion of open space land, including agricultural open space, to non-open space uses?	Acres of land converted				NP-1, NP-2	

Source: Hauge Brueck Assoc. 2009

Impact: **VISUAL-1, VISUAL-2, VISUAL-3 and VISUAL-4. Will the No Project Components impact visual resources or open space based on evaluation criteria 1 through 4?**

Analysis: *No Impact; NP-1, NP-2*

The visual resources within the project area will remain unchanged. Under the No Project Components, there will be no changes in visual contrast, landscape colors, textures, and scale of visual components that are inconsistent with the natural surroundings. No new light sources will be created. No new facilities will be constructed under the No Project Components, and it will not change the existing conditions for agricultural operations in the project area. There will be no impacts on the existing agricultural open space in the project area.

Mitigation: *No mitigation is needed. NP-1, NP-2*

16.6.2 Project Components

Table 16-4 presents the potential impacts to visual resources and open space, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 16-4

Visual Resource and Open Space Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
VISUAL-1. Will the Project Components affect viewsheds from any designated scenic route, scenic corridor or residential or recreation areas due to changes involving grading, vegetation removal, road construction or other construction activities?	Strong visual contrast Permanent View Obstruction Loss or alteration of a specific scenic resource			1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 32	8, 11, 23, 24, 31
VISUAL-2. Will structures constructed as part of the Project Components be inconsistent with the protection of views of open areas, ridges, and peaks from any designated scenic route, scenic corridor, open space, residential or recreation area?	Strong visual contrast Permanent View Obstruction Loss or alteration of a specific scenic resource			11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
VISUAL-3. Will the Project Components create a new light source?	Greater than 0 residential units affected				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
VISUAL-4. Will the Project Components result in the conversion of open space land, including agricultural open space, to non-open space uses?	Acres of land converted				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc. 2009

Impact: **VISUAL-1. Will the Project Components affect viewsheds from any designated scenic route, scenic corridor or residential or recreation areas due to changes**

involving grading, vegetation removal, road construction or other construction activities?

Analysis: *Less than Significant Impact; Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 32*

Portions of the conveyance facilities for components 3, 4, 6, and 17 are located along Caltrans designated scenic highways. Construction of these components, as well as component 2, 5, 14, 20, 22 and 32 will be visible from designated residential areas. Construction activities along these routes will involve removal of vegetation, grading and trenching of the landscape edge within the public right-of-way. This will result in a temporary bare, scarred appearance with a moderate degree of contrast to the existing vegetated edge. The scale of construction will not be sufficient to create strong visual contrast with the predominantly agricultural character of the surroundings, and the scale of construction will not be unlike that which may occur on adjacent agricultural lands. In addition, after the pipelines and other conveyance components are in place, the area will be restored to the current conditions as required by standard practice SP-8, Repair Road Damage and Revegetate Temporarily Disturbed Sites. There will be no permanent changes in visual contrast, landscape colors, textures, and scale of visual components that are inconsistent with the natural surroundings.

Application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will involve temporary construction activities for the installation of irrigation pipelines and equipment. This may involve construction activities along or visible from scenic routes and corridors that will require removal of vegetation, grading and trenching of the landscape edge. This will result in a temporary bare, scarred appearance with a moderate degree of contrast to the existing vegetated edge. In addition, construction may be visible from designated residential areas. The scale of construction will not be sufficient to create strong visual contrast with the predominantly agricultural character of the surroundings, and the scale of construction will not be unlike that which may occur for other activities on agricultural lands. In addition, after the pipelines and other irrigation equipment are in place, areas along public rights-of-way will be restored to essentially the same conditions as currently exist are required by standard practice SP-8, Repair Road Damage and Revegetate Temporarily Disturbed Sites. There will be no permanent changes in visual contrast, landscape colors, textures, and scale of visual components that are inconsistent with the rural visual character and surroundings.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 32*

Analysis: *No Impact; Component 8, 11, 23, 24, 31*

The temporary containment facilities of Component 11 and conveyance system of Component 31 are not located within the viewsheds of any designated scenic route, scenic corridor, residential area or recreation area, and will not generate impacts on any views from these areas.

The water management components, components 8, 23 and 24 do not include any physical improvements. There will be no permanent changes in visual contrast, landscape colors, textures, and scale of visual components that are inconsistent with the surrounding visual character.

Mitigation: *No mitigation is needed. Components 8, 11, 23, 24, 31*

Impact: **VISUAL-2. Will structures constructed as part of the Project Components be inconsistent with the protection of views of open areas, ridges, and peaks from any designated scenic route, scenic corridor, open space, residential or recreation area?**

Analysis: *Less than Significant Impact; Component 11*

Impoundment facilities of the temporary containment component 11 will be visible from surrounding open space. The berms surrounding the facility will be approximately six feet in height, and under standard practice SP-8**,** Repair Road Damage and Revegetate Temporarily Disturbed Sites, the berms will be covered with vegetation. The vegetated appearance and low height of the berms will tend to blend into the landscape, particularly from middleground and background viewpoints, and while there may be a slight visual contrast from foreground views, the facilities will not create a strong visual contrast. The facilities will not be visible from any designated scenic route, scenic corridor or designated residential or recreation areas.

Mitigation: *No mitigation is needed. Component 11*

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20 and 22 do not involve any permanent above ground structures and will not generate permanent impacts on any views. Components 31 and 32 will construct a new ditch to divert storm flow away from HPR and to ICR and a new spillway channel from ICR to Indian Creek, respectively. These facilities are above ground but at grade earthen structures that will not create inconsistencies with the protection of views of open areas, ridges and peaks.

The application components do not involve any permanent above ground structures and will not generate permanent impacts on any views.

The water management components 8, 23 and 24 do not involve any permanent above ground structures and will not generate permanent impacts on any views.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: **VISUAL-3. Will the Project Components create a new light source?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

No new light sources will be constructed as part of the conveyance, application components, temporary containment or water management components.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: **VISUAL-4. Will the Project Components result in the conversion of open space**
land, **including agricultural open space, to non-open space uses?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 and application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will not result in the conversion of open space, as all of the uses associated with these components are considered open space uses.

Implementation of the temporary containment component 11 and water management components 8, 23, and 24 will not result in the conversion of open space, as the use associated with these components is considered open space use.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

16.7 Cumulative Impacts

There is one impact identified in the Visual Resources and Open Space section as less than significant. The less than significant impacts are temporary and associated with short-term construction of project facilities. Although implementation of Project Components will occur over a 15- to 20-year period, ongoing construction for other future projects in the project area may overlap in time with project construction activities. Construction impacts on viewsheds are temporary and will affect only a limited number of specific viewsheds at any given time. There will be no significant cumulative construction impacts on viewsheds from designated scenic routes and corridors, or residential or recreation areas.

Project impacts on views of open areas, ridges and peaks are less than significant because the structures to be constructed as part of Project Components are typically small accessory structures or landforms that will tend to blend into the landscape, particularly in the middleground and background views. The Project Components will not have significant cumulative impacts on protection of views of open areas, ridges, and peaks from any designated scenic route, scenic corridor, open space, residential or recreation area.

16.8 Summary of Significant Impacts and Mitigation Measures

16.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant impacts to visual resources and open space are identified in this section.

16.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to visual resources or open space are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

17 Public Services and Utilities

17 Public Utilities and Services

This chapter discusses potential impacts of the Project on public utilities and services.

17.1 Impacts Evaluated in Other Chapters

The following items are related to public utilities and services but are evaluated in other chapters of this document:

- Water Systems and Quality. The issues related to water systems and quality are discussed in Chapter 8, Water Quality.
- Biological Resources and Recreational Activities. The issues related to biological resources and recreational activities, e.g., fishing; hazards related to public safety; or transportation, e.g. emergency vehicle access are discussed in Chapter 10, Public Health and Safety.
- Traffic and Circulation. The issues related to traffic and circulation are discussed in Chapter 12, Traffic and Circulation.

17.2 Affected Environment (Setting)

The following section provides a basis for analyzing project impacts on service standards within the respective jurisdictions (Alpine County, CA and Douglas County, NV) due to increased demands for police, fire, library, school facilities, social services, solid waste disposal, water and wastewater (sewage) treatment and storage, power and telephone, and park and recreation facilities.

17.2.1 Police Protection

17.2.1.1 Alpine County

The existing staff and facilities of the Alpine County Sheriff's Department are considered adequate to serve County needs during the short-term planning period, although the provision of a resident deputy at Kirkwood is a goal within the planning period. Over the long-term period, department needs could include jail facilities, an investigation branch, animal control personnel, or other expansions depending upon the type and intensity of growth.

17.2.1.2 Douglas County

Existing Sheriff's Department services are provided from facilities in Gardnerville. The proposed LOS for these facilities according to the Douglas County Master Plan is 100 square feet per 1,000 population based upon two new substations; one in the Gardnerville Ranchos area (which is adjacent to the project area) and the other in the Topaz Planning Area. Each substation will contain a reception area, three administrative offices and a holding cell. The approximate size of the substation is 1,200 square feet. The public will be provided four spaces and staff of the Sheriff's Office will be provided four spaces.

17.2.2 Fire Protection

17.2.2.1 Alpine County

In the short-term, mobile water source equipment for the eastern slope area and a continuing rotation and replacement of fire equipment, Countywide, are primary requirements for fire protection in Alpine County. Over the long-term, community water service improvements are foreseen for Markleeville,

(Markleeville Mutual Water Company) as well as smaller systems throughout the County. The use of mobile water source equipment is an alternative source of water for fire protection.

17.2.2.2 Douglas County

The current LOS for a fire station location is to be within a five-mile radius of developed properties. The level of service standard for "Standard Driving Time" is defined for the following areas:

Urban Service Areas - The current LOS for Standard Driving Time is 7 minutes. The proposed LOS is 7 minutes.

Rural Areas - The current LOS for Standard Driving Time is 12 minutes. The proposed LOS is 12 minutes.

The East Fork Fire and Paramedic District has defined "core" stations and adopted minimum equipment requirements to be located at these stations. The core stations are Minden, Gardnerville and Ranchos. Each of these stations is equipped with: a) two Type 1 Engines (Structure); b) one Type 3 Engine (Brush truck); c) one Type 2 Water Tender if no water system available; and d) one Multipurpose Apparatus (Aerial/Squad).

17.2.3 Emergency Medical Services

17.2.3.1 Alpine County

The existing health facility at Markleeville is considered adequate for the short-term planning period and able to handle increases in the LOS predicted during that time. Long-term plans may include a Human Services complex. Facility improvements in Bear Valley and Kirkwood will most likely be integrated into a firehouse expansion. Increased Environmental Specialist time is anticipated.

17.2.3.2 Douglas County

The East Fork Fire and Paramedic District services the Project area. The 1995 inventory of the County's emergency medical facilities for the East Fork Township consists of response units dispatched from six of the 12 fire stations and the new central facility in Minden (Station 14).

17.2.4 Schools

17.2.4.1 Alpine County

Based on population projections and past growth trends, it is anticipated that the Diamond Valley Elementary School in Woodfords will not reach capacity during the short-term planning period. Current arrangements by which Alpine County High School students attend school at Douglas High School in Nevada and Bret Harte High School in Calaveras County will probably continue through the short-term planning period.

The 1969 Alpine County General Plan identified Woodfords as the best centrally located area for a high school in Alpine County. As population increases over the long-term, the need for a high school in the County can be expected. The economic break-even point for establishment of a high school is estimated to be at least 100 students.

17.2.4.2 Douglas County

The Douglas County School District serves all of Douglas County. Currently, the District has seven Elementary Schools, three Middle Schools and two High Schools of which one elementary school, one middle school, and one high school are located within the Tahoe Basin.

17.2.5 Solid Waste

17.2.5.1 Alpine County

Markleeville, Woodfords and other east slope communities utilize the Douglas County Disposal service. Use of the Douglas dumpsite is expected to continue. The regulatory and financial requirements of operating a landfill site in Alpine County are prohibitive.

17.2.5.2 Douglas County

Solid waste disposal services in Douglas County are provided by Douglas Disposal, Inc., and South Tahoe Refuse, Inc. Collection services are provided by the Towns of Minden and Gardnerville, Douglas Disposal, and South Tahoe Refuse. Douglas Disposal owns and operates a transfer station west of Highway 395, south of Gardnerville, and south of Pinenut Road. This transfer station receives solid waste from the valley, either delivered by collection trucks or by local residents. Waste is transferred at the facility to large trailers that are transported to the Lockwood Landfill in Storey County, owned and operated by Reno Refuse, Inc.

The Douglas Disposal, Inc., transfer station that serves the valley was developed in 1993 as a temporary facility. The transfer station building has yet to be constructed and waste transfer operations currently take place in an area intended only for use for oversized materials and recycling. When fully developed, the transfer station is proposed to be sized to serve a population of 81,000 and should be adequate well past the year 2015. In 1994, Douglas County voters passed a Referendum, which only allows additional transfer stations to be owned by the County. There are no operating landfills in Douglas County that receive municipal solid waste.

17.2.6 Water and Wastewater (Sewage) Disposal

17.2.6.1 Alpine County

Water

There are presently a dozen water supply systems in Alpine County. All are managed by private entities except for those operated by the Washoe Indian people, or the Kirkwood Public Utility District. Water systems on the County's eastern slope are operated by three private entities and two government entities. The Markleeville Mutual Water Company, the Alpine Village Water Company, and the Sorensons Mutual Subdivision Homeowners Association System are each privately owned. Homeowners operate a system that serves the Shay Creek Tract and the Washoe Tribe operates a water system serving the Woodfords Community Council Housing Development in Dutch Valley.

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 has led the company to require that new developments in the Markleeville area provide wells, increased storage, and hookups. 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).

Wastewater

The four wastewater collection and treatment systems found in Alpine County include: 1) the Markleeville Public Utility District serving Markleeville; 2) the Washoe Tribe's system serving the Woodfords Indian Colony in Dutch Valley; 3) the Kirkwood Public Utility District serving the Kirkwood development; and, 4) the Bear Valley Water District system serving much of the Bear Valley Planning area. All other residential areas in the County utilize individual sewage disposal systems.

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 hookups 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.

17.2.6.2 Douglas County

Water

The Carson Valley Water Authority, presently comprised of the Town of Minden and the Gardnerville Town Water Company, was formed in 1995 for the purpose of administering substantial water rights owned by the two entities, which are well in excess of the supply required for the 2015 demand on the two systems. All major water purveyors in the Carson Valley should join the Water Authority, including the Gardnerville Ranchos General Improvement District, the Indian Hills General Improvement District, Washoe Tribe, Douglas County, and others. The Water Authority has the availability to provide water supply to several deficient water systems in the Carson Valley. Deficient systems in the Minden-Gardnerville vicinity may physically connect to the MindenGardnerville system for supply or may develop their own source using water rights from the Water Authority. Adequate and equitable compensation for use of individual entity's water rights should be provided.

Wastewater

The Minden Gardnerville Sanitation District (MGSD) serves the towns of Minden and Gardnerville and by contract, the Gardnerville Ranchos area, as well as other developments, such as the Bently Science Park. The treatment facility, located in Minden, currently has an average flow of 1.40-mgd and a design capacity of 2.0 mgd using a trickling filter/solids contact aeration process system. The secondary treated effluent is stored in a 500 AF reservoir located on Muller Lane. Effluent disposal is by irrigation on approximately 2,000 acres of land, the Gallepi Ranch and former Dangberg Ranch, which are north of the treatment facility. The MGSD Master Plan indicates flow-related phased plant expansions of 0.5 mgd per phase up to a final capacity of 4.0 mgd.

17.2.7 Power and Telephone

17.2.7.1 Alpine County

Electricity to the project area of Alpine County is currently provided to the County's east slope through facilities of the Sierra Pacific Power Company. Liquid petroleum gas (primarily propane) is supplied to individual users by distributors operating out of the Gardnerville/Minden area and South Lake Tahoe. Telephone service to the east slope of Alpine County is provided by Verizon. The company's main trunk and exchange lines nearly parallel Highway 88 and 89 as far as Sorensons and Markleeville.

17.2.7.2 Douglas County

Telephone service in Douglas County is provided by Verizon. Natural gas service (propane) is provided by Southwest Gas.

17.2.8 Parks And Recreation

17.2.8.1 Alpine County

Parks and recreational areas are not specifically defined in the Alpine County General Plan. There are numerous "natural areas" and "significant natural areas" in the county. These are areas where certain biological criteria have been established for the preservation of important vegetation and wildlife habitat. Within the project area the Cruz Lake - Environmental Study Area, is one such example of "natural areas" in Alpine County.

17.2.8.2 Douglas County

The County maintains a variety of smaller parks and two regional park facilities: the Douglas County Fairgrounds and Topaz Lake. These facilities are destination spots, which people are willing to travel more than 15 minutes to use. None of the County facilities are located in the project area.

17.3 Regulatory Setting

The regulatory setting is described within section 17.2 Affected Environment (Setting). The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1.

17.4 Public Services and Utilities Goals, Objectives and Policies

Table 17-1 identifies goals, objectives, and policies that provide guidance for development in relation to public utilities and services in the project area. The table also indicates which criteria in this section are responsive to each set of policies.

Table 17-1

General Plan Goals, Objectives and Policies - Public Utilities and Services

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County General Plan	Land Use Element, 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.	1, 2
		Policy No. 26a	Provide additional safety, community services, security personnel and facilities as dictated by growth and development.	1, 2

Table 17-1

General Plan Goals, Objectives and Policies - Public Utilities and Services

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Douglas County Master Plan	Chapter 10	Goal 10.01	To provide levels of services for its residents to maintain at a minimum, the current quality of life for the County's citizens.	1, 2
		Policy 10.01.01	The County shall determine public facility level of service standards and select specific capital improvements needed to achieve and maintain the standards for existing and future population, and to repair or replace existing public facilities.	1, 2
Washoe Tribe Lands	Land Use	Goal	Insure that facilities, services, and resource demands are compatible with population structure as found in the tribal census and comprehensive plan growth projections.	1, 2

Source: Hauge Brueck Assoc. 2009

1. The public utilities and service evaluation criteria are provided in Table 17-2.

17.5 Evaluation Criteria with Points of Significance

The evaluation criteria for air quality are presented in Table 17-2. These criteria are drawn primarily from local policies and procedures, adapted where necessary to fit CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A public services and utilities impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 17-2.

Table 17-2

Public Services and Utilities – Evaluation Criteria with Points of Significance

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project increase demand for police, fire, park and recreation facilities, water, sewage treatment and disposal or solid waste removal to such a degree that accepted service standards are not maintained?	a. Ratio of service personnel or facilities to population; ratio of park acreage to population b. Change in response time c. Availability of water service	a. Greater than 0 change in the ratio b. Exceeds established response time standard c. Ability to meet water demand	CEQA Checklist XIII-a, XVI-a,b,d,e,g Alpine County General Plan Douglas County Master Plan Washoe Tribe Lands Master Plan

Table 17-2			
Public Services and Utilities – Evaluation Criteria with Points of Significance			
Evaluation Criteria	**As Measured by**	**Point of Significance**	**Justification**
2. Will the Project construction disrupt police, fire, schools, parks and recreation facilities to such a degree that accepted service standards are not maintained?	Change in response times or distance away from Project construction	Greater than 0 change in the response time, or within 500 feet of construction	CEQA Checklist XIII-a Alpine County General Plan Douglas County Master Plan Washoe Tribe Lands Master Plan
3. Will the Project increase public use of services other than recreation, to a degree that accepted service standards are not maintained?	Percentage increase of population	Greater than stated standards for population to service ratio	Alpine County General Plan Douglas County Master Plan Washoe Tribe Lands Master Plan

Source: Hauge Brueck Assoc. 2009

17.6 Environmental Consequences (Impacts) and Recommended Mitigation

17.6.1 No Project Components

Table 17-3 presents the potential impacts, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the No Project Components.

Table 17-3					
Public Utilities and Services Impacts – No Project Components					
Impact	Point of Significance	Level of Significance by Component			
		Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PU-1. Will the No Project Components increase demand for police, fire, park and recreation facilities, water, sewage treatment and disposal or solid waste removal to such a degree that accepted service standards are not maintained?	a. Ratio of service personnel or facilities to population; ratio of park acreage to population b. Change in response time c. Availability of water service				NP-1, NP-2
PU-2. Will No Project Components construction disrupt police, fire, schools, parks and recreation facilities to such a degree that accepted service standards are not maintained?	Change in response times or distance away from Project construction				NP-1, NP-2
PU-3. Will No Project Components increase public use of services other than recreation, to a degree that accepted service standards are not maintained?	Percentage increase of population				NP-1, NP-2

Source: Hauge Brueck Assoc. 2009

Impact: **PU-1, PU-2 and PU-3 Will the No Project Components impact public utilities and services based on evaluation criteria 1 through 3?**

Analysis: *No Impact;NP-1, NP-2*

The No Project Components will involve no construction or operation of new facilities and will have no impacts on public utilities or services.

Mitigation: *No mitigation is needed. NP-1, NP-2*

17.6.2 Project Components

Table 17-4 presents the potential impacts, outlines the points of significance, level of impact and type of impact and also ranks the level of significance for the Project Components.

Table 17-4

Public Utilities and Services Impacts – Project Components

Impact	Point of Significance	Level of Significance by Component: Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
PU-1. Will the Project Components increase demand for police, fire, park and recreation facilities, water, sewage treatment and disposal or solid waste removal to such a degree that accepted service standards are not maintained?	a. Ratio of service personnel or facilities to population; ratio of park acreage to population b. Change in response time c. Availability of water service				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 , 32
PU-2. Will the Project Components construction disrupt police, fire, schools, parks and recreation facilities to such a degree that accepted service standards are not maintained?	Change in response times or distance away from Project construction			16	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 , 32
PU-3. Will the Project Components increase public use of services other than recreation, to a degree that accepted service standards are not maintained?	Percentage increase of population			11, 16	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 , 32

Source: Hauge Brueck Assoc. 2009

Impact: PU-1. Will the Project Components increase demand for police, fire, park and recreation facilities, water, sewage treatment and disposal or solid waste removal to such a degree that accepted service standards are not maintained?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 and 32*

Construction of the conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will not add population or new facilities that would create increased demand for utilities or other public services.

Construction of the application components 1, 7, 9, 10, 12, 13, 15, 18, 19, 21, 29 and 30 will not add population or new facilities that will create increased demand for utilities or other public services. Acceptable service standards will be maintained. There is no impact.

Construction of the temporary containment component 11 will not add population or new facilities that would create increased demand for utilities or other public services. Acceptable service standards will be maintained. There is no impact.

Implementation of the water management components 8, 23, 24 will not add population or new facilities that would create increased demand for utilities or other public services. Acceptable service standards will be maintained. There is no impact.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: PU-2. Will the Project Component construction disrupt police, fire, schools, parks and recreation facilities to such a degree that accepted service standards are not maintained?

Analysis: *Less than Significant Impact; Component 16*

Title 22 of the California Code of Regulations restricts irrigation on, or directly adjacent to, public areas. Component 16 will install and operate subsurface irrigation systems in close proximity (less than 1000 feet) of Alpine County's School Complex. A shallow groundwater network of perforated pipe will be installed on the property for distribution of recycled water and to reduce potential impacts to schools to a less than significant level.

Mitigation: *No mitigation is needed. Component 16*

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Construction of components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32 will not occur within 500 feet of a police or fire station, public service or utility provider, school, or park. Construction of these components will have no impact on emergency response times for fire and police services. There is no impact.

Implementation of components 8, 23, and 24 will not occur within 500 feet of a police or fire station, public service or utility provider, school, or park. Implementation of these components will have no impact on emergency response times for fire and police services. There is no impact.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32*

Impact: **PU-3. Will the Project Components increase public use of services other than recreation, to a degree that accepted service standards are not maintained?**

Analysis: *Less than Significant Impact; Components 11, 16*

Construction of Components 11 and 16 will not disrupt police, fire, schools, parks and recreation facilities to such a degree that accepted service standards are not maintained. Operation of Component 11 will likely result in a minor increase in electricity consumption due to pumping of water from the storage facility back to HPR and operations of central pivot irrigation systems. Operation of Component 16 will likely result in a minor increase in electricity consumption due to pumping for subsurface irrigation. Due to the minimal increase that will result, the level of impact is considered less than significant.

Mitigation: *No mitigation is needed. Component 11, 16*

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31 and 32 will not cause an increase in population due to the nature of the project facilities. There will be no increase in public use of service and acceptable service standards will be maintained.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

17.7 Cumulative Impacts

No significant Project impacts on public utilities and services were identified, and the Project will not contribute to cumulative impacts on public services and utilities.

17.8 Summary of Significant Impacts and Mitigation Measures

17.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant impact to public services and utilities are identified in this chapter.

17.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to public services or utilities are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

18 Population and Housing

18 Population and Housing

This chapter provides the general context for population and housing in which potential impacts of the Project will be evaluated. The Setting chapter focuses on the characteristics of Alpine and Douglas Counties that have the potential to be most immediately and significantly affected by the Project.

18.1 Impacts Evaluated in Other Chapters

Impacts directly relating to population and housing are discussed in this chapter. Population growth from the project could create secondary impacts, relating to factors such as traffic, air quality, noise, and public services. Issues associated with growth are discussed in Growth Inducing Impacts of Project Components.

18.2 Affected Environment (Setting)

18.2.1 Population

18.2.1.1 Population Growth

Alpine County

Alpine County is predominantly rural, with no incorporated cities. It has the smallest total population of any county in California. The county's total population was 1,148 in 1990 (DOF, 2001a); the county's population grew by just 60 persons (5%) to a total 1,208 in the decade from 1990 to 2000 (DOF, 2001b). Of the total year 2000 population, 1,207 persons resided in households as defined by the U.S. Census Bureau, and one person resided in group quarters. Of the total population, 276 persons are under the age of 18.

Douglas County

Douglas County is divided into four planning zones (Carson Valley, Topaz, Pinenut, and Tahoe/Sierra), with the majority of the population and urban development located in the Carson Valley planning area. The county's total population was 27,637 in 1990 (Douglas County, 1996); the county's population grew to 41,259 in 2000, an increase of 13,622 residents, or 49 percent. Of the total year 2000 population, 41,023 persons resided in households and 236 resided in group quarters. Of the total population, 9,910 persons were under the age of 18.

18.2.1.2 Ethnicity

Alpine County

The ethnic composition of household population in Alpine County, California as reported in the 2000 U.S. Census is as follows (DOF 2001b):

- White Alone - 890 (74%)
- Black or African American Alone - 7 ((<1%)
- American Indian or Alaskan Native Alone - 228 (19%)
- Asian Alone - 4 (<1%)

- Native Hawaiian/Other Pacific Islander Alone - 1 (<1%)
- Some Other Race Alone - 17 (1%)
- Two or More Races - 61 (5%)

Douglas County

The ethnic composition of the population of Douglas County, Nevada as reported in the 2000 U.S. Census is as follows (U.S. Census, 2001):

- White Alone - 37,908 (92%)
- Black or African American Alone - 129 (<1%)
- American Indian or Alaskan Native Alone - 692 (2%)
- Asian Alone - 517 (1%)
- Native Hawaiian/Other Pacific Islander Alone - 63 (<1%)
- Some Other Race Alone - 1,048 (3%)
- Two or More Races - 902 (2%)

18.2.1.3 Household Characteristics

Alpine County

As indicated above, virtually all of Alpine County's population resides in households. Of the total Universe of Households enumerated in the 2000 Census, 134 are 1-person households, 349 are two or more person households, and 54 are nonfamily households.

Douglas County

Most of Douglas County's population resides in households. Of the total Universe of Households enumerated in the 2000 Census, 3,396 are 1-person households, 11,894 are two or more person households, and 1,111 are nonfamily households.

18.2.1.4 Income and Employment

Alpine County

Per capita personal income for Alpine County in 1999, the latest year available, was $24,431. Alpine County per capita income was 113 percent of U.S. income in 1999 (BEA, 2001).

Unemployment is relatively high in Alpine County. The latest available data (October 2001) show that the services sector provides nearly all employment opportunities, with government alone providing nearly one-third of the service sector jobs. The unemployment rate ranged from a low of 10 percent in October 2000 to 11.1 percent in October 2001 (EDD, 2001).

Douglas County

Per capita personal income for Douglas County in 1999, the latest year available, was $27,288. Douglas County per capita income was 126 percent of U.S. income in 1999 (BEA, 2001).

The unemployment rate in Douglas County is lower than for the state of Nevada, State of California, or the United States as a whole. The latest available data (October 2001) show that the services sector provides the majority employment opportunities by far, with a major concentration in those services supporting the gaming and hotel industries. The transportation, communication and utilities sector is the second largest employment sector, and government is third. The unemployment rate for Douglas County in 2001 averaged 4.4 percent for the period January through October (NDETR, 2001).

18.2.1.5 Housing

Alpine County

The 2000 Census reports that there were a total of 1,514 housing units in Alpine County. Of these, 483 were occupied, including 328 occupied by owners and 155 by renters. The remaining 1,031 units were listed as vacant, and of these, only 19 were either for rent (14 units), for sale (3 units), or otherwise not occupied (2 units). Seasonal, recreational or other use accounted for the remaining 925 units, or 61.1 percent of the total housing stock. Eighty-seven units were listed as other. This reflects the large proportion of units that are recreational or second homes, largely associated with the Kirkwood and Bear Valley recreation areas. The data indicate a limited rental market, with less than one percent of housing units available for rent.

Douglas County

The 2000 Census reports that there were a total of 19,006 housing units in Douglas County. Of these, 16,401 units were occupied, including 12,174 occupied by owners and 4,227 by renters. The remaining 2,605 units were listed as vacant. Of these vacant units, 1,765 units were listed as seasonal, recreational, or occasional use units. The rental vacancy rate was 6.0 percent and the Homeowner vacancy rate was 1.9 percent.

18.3 Regulatory Setting

The General Plans of Alpine County and Douglas County identify the forecast and needs for population and housing within each county. The Project will comply with federal, State, and local regulations and permits as listed in Appendix D, Table D-1.

18.4 Population and Housing Goals, Objectives, and Policies

Table 18-1 identifies the applicable goals, objectives and policies that provide guidance for development in relation to population and housing impacts in the project area. The table indicates which criteria in the Population and Housing Section are responsive to each set of policies.

Table 18-1

General Plan Goals, Objectives, and Policies – Population and Housing

Adopted Plan Document	Document Section	Document Numeric Reference	Policy	Relevant Evaluation Criteria[1]
Alpine County, California, General Plan	Housing Element, Section J - Housing Program	Element V Section J G.P. Goal No. 45	Provide adequate housing for all present and future residents regardless of age, race, income, sex, or religion	1, 2, 3
Alpine County, California, General Plan	Housing Element, Section J - Housing Program	Element V Section J G.P. Policy No. 45a	Assist and encourage the development of housing to meet the needs of low- and moderate-income households	1, 2, 3
Alpine County, California, General Plan	Housing Element, Section J - Housing Program	Element V Section J G.P. Policy No. 45c	Promote the provision of adequate housing for all residents, regardless of race, income, age, sex, or religion	1, 2, 3
Alpine County, California, General Plan	Housing Element, Section J - Housing Program	Element V Section J G.P. Policy No. 47	Seek to provide public services such as water, sewer, roads, streets, fire protection, etc.	1, 2, 3
Douglas County, Nevada, Master Plan	Population and Housing Element	Goals and Policies Goal 8.01	To increase the availability of affordable housing for persons with special needs, in light of the housing needs identified in the Housing and Population Element	1, 2, 3
Douglas County, Nevada, Master Plan	Population and Housing Element	Goals and Policies Goal 8.02	To consider a tiered or incremental approach to progressively greater County involvement in housing programs and policy, as needed, in light of limited County resources, state legal requirements, and a County-wide focus	1, 2, 3
Douglas County, Nevada, Master Plan	Population and Housing Element	Goals and Policies Goal 8.03	To recognize and address the regional nature of the housing problems in the region	1, 2, 3
Douglas County, Nevada, Master Plan	Population and Housing Element	Goals and Policies Policy 8.03.01	Douglas County shall work to address housing needs that may be regional in nature through coordination with neighboring jurisdictions, including but not limited to, the Tahoe Regional Planning Agency, Carson City, and the City of South Lake Tahoe	1, 2, 3

Source: Hauge Brueck Assoc. 2009

1 The population and housing evaluation criteria are provided in Table 18-2.

18.5 Evaluation Criteria with Points of Significance

The evaluation criteria for population and housing are presented in Table 18-2. These criteria are drawn primarily from Alpine County and State of California agency policies and procedures, adapted where necessary to reflect CEQA requirements. For the purpose of this analysis, the following applicable points of significance have been used to determine whether implementing the Project will result in a significant impact. These points of significance are based upon Appendix G of the State CEQA Guidelines. A population and housing impact is considered significant if implementation of the Project exceeds the point of significance shown in Table 18-2.

Table 18-2

Evaluation Criteria with Points of Significance – Population and Housing

Evaluation Criteria	As Measured by	Point of Significance	Justification
1. Will the Project result in a net loss, through conversion or demolition, of homes occupied by low- or moderate-income households?	Number of year-round dwelling units occupied by low- or moderate-income households or seasonal farm worker housing units lost	Greater than zero dwelling unit occupied by a low- or moderate-income household or farm worker	Alpine County General Plan, Housing Element, Policy California Health & Safety Code, Section 33413 (for redevelopment areas) STPUD Environmental Evaluation Checklist Item CEQA Checklist XIII-b,c
2. Will the Project result in a net loss, through conversion or demolition, of multifamily rental housing?	Number of multifamily rental housing units lost or converted	Greater than zero net units lost	Alpine County General Plan, Housing Element Policy STPUD Environmental Evaluation Checklist Item CEQA Checklist XIII-b,c
3. Will the Project increase the demand for housing, thereby causing indirect environmental impacts?	Number of additional housing units required	More than zero additional housing units	Alpine County General Plan, Housing Element, Policy CEQA Checklist XII-a

Source: Hauge Brueck Assoc. 2009

18.6 Environmental Consequences (Impacts) and Recommended Mitigation

18.6.1 No Project Components

Table 18-3 presents the potential impacts to population and housing, outlines the points of significance, type of impact and level of impact and ranks the level of significance for the No Project Components.

Table 18-3					
Population and Housing Impacts – No Project Components					
		Level of Significance by Component			
Impact	Point of Significance	Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact after Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
HOUSING-1. Will the No Project Components result in a net loss, through conversion or demolition, of homes occupied by low- or moderate-income households?	Greater than zero dwelling unit occupied by a low- or moderate-income household or farm worker				NP-1, NP-2
HOUSING-2. Will the No Project Components result in a net loss, through conversion or demolition, of multifamily rental housing?	Greater than zero net units lost				NP-1, NP-2
HOUSING-3. Will the No Project Components increase the demand for housing, thereby causing indirect environmental impacts?	More than zero additional housing units				NP-1, NP-2

Source: Hauge Brueck Assoc, 2009

Impact: **HOUSING-1, HOUSING-2 and HOUSING-3. Will the No Project Components impact population and housing based on evaluation criteria 1 through 3?**

Analysis: *No Impact; NP-1, NP-2*

The No Project Components will involve no construction or operation of new facilities and will not have impacts to housing or population based on criteria 1, 2 and 3.

Mitigation: *No mitigation is needed. NP-1, NP-2*

18.6.2 Project Components

Table 18-4 presents the potential impacts to population and housing, outlines the points of significance, type of impact and level of impact and ranks the level of significance for the Project Components.

Table 18-4

Population and Housing Impacts – Project Components

Impact	Point of Significance	Significant Impact Before and After Mitigation	Significant Impact Before Mitigation; Less than Significant Impact After Mitigation	Less than Significant Impact; No Mitigation Proposed	No Impact
HOUSING-1. Will the Project Components result in a net loss, through conversion or demolition, of homes occupied by low- or moderate-income households?	Greater than zero dwelling unit occupied by a low- or moderate-income household or farm worker				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
HOUSING-2. Will the Project Components result in a net loss, through conversion or demolition, of multifamily rental housing?	Greater than zero net units lost				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32
HOUSING-3. Will the Project Components increase the demand for housing, thereby causing indirect environmental impacts?	More than zero additional housing units				1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Source: Hauge Brueck Assoc, 2009

Impact: **HOUSING-1. Will the Project Components result in a net loss, through conversion or demolition, of homes occupied by low- or moderate-income households?**

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Construction and operation of the Project Components will not result in the loss of low- or moderate-income dwelling units, since it will not be necessary to take any units for the facilities. No population or housing impacts will result.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: HOUSING-2. Will the Project Components result in a net loss, through conversion or demolition, of multifamily rental housing?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Construction and operation of the Project Components will not result in the loss of multifamily rental housing, since it will not be necessary to take any units for the facilities. There will be no population or housing impacts.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Impact: HOUSING-3. Will the Project Components increase the demand for housing, thereby causing indirect environmental impacts?

Analysis: *No Impact; Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

Construction and operation of the conveyance components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31 and 32 will not impact housing demand, since they will be constructed and operated by existing District and contractor personnel and will not require new employees.

Construction and operation of application components 1, 7, 9, 10, 12, 13, 15, 16, 18, 19, 21, 29 and 30 will not impact housing demand since they will be constructed and operated by existing District and contractor personnel, and will not require new employees. Operation of application Components 12 (Grow Biomass Crops for Pulp Production Using Recycled Water) and 13 (Basin Sod and Seed Production) will involve planting and harvesting operations. These operations will typically be conducted over relatively short periods of time occurring at varying intervals of up to six or more years in length. Because the size of the areas planted or harvested will be relatively small, those operations will utilize contract personnel who will either be current residents of Alpine County or from nearby locations and not need to relocate to Alpine County and obtain housing in order to perform their work. The application components will not create demand for new housing.

Construction and operation of the temporary containment component 11 or water management components 8, 23 and 24 will not impact housing demand, since they will be constructed and operated by existing District and contractor personnel and will not require new employees.

Mitigation: *No mitigation is needed. Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32*

18.7 Cumulative Impacts

No impacts on population and housing from the Project have been identified and the Project would not contribute to cumulative population and housing impacts.

18.8 Summary of Significant Impacts and Mitigation Measures

18.8.1 Significant Impacts and Mitigation Measures by Project Component

No significant population and housing impacts are identified in this chapter.

18.8.2 Environmentally Superior Alternative (Alternative 3) Significant Impacts and Recommended Mitigation Measures

No significant impacts to population and housing are identified for the environmentally superior alternative (Master Plan Recommended Project Alternative, Alternative 3).

19 Alternatives Comparison

19 Alternatives Comparison

CEQA requires that an EIR "describe a range of reasonable alternatives to the project, or to the location of the project, which feasibly attain most of the basic objectives of the project, but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives" (Guidelines §15126.6(a)). If a project alternative would substantially lessen the significant environmental effects of a project, the decision maker should not approve the project unless it determines that specific technological, economic, social, or other considerations make the project alternatives infeasible (PRC §21002, Guidelines Section 15091 (a)(3)). The EIR must identify alternatives that were considered by the lead agency but were rejected as infeasible during the scoping process and should briefly explain the reasons underlying the lead agency's determination (Guidelines §15126.6(c)).

One of the alternatives analyzed must be the No Project Alternative. The No Project analysis must discuss the existing conditions, as well as what would be reasonably expected to occur in the foreseeable future if the Project were not approved and development continued to occur in accordance with existing plans and consistent with available infrastructure and community services (CEQA Guidelines §15126.6(e)(2)). CEQA Guidelines §15126.6(e)(2) require that reasonably foreseeable projects must be based on available infrastructure and community services, for the purpose of defining the No Project alternative.

A description of the Project and the Project objectives are provided in Chapter 2. The evaluation of the Project Components that are included in the alternatives are evaluated in Chapters 4 through 18. This Chapter provides a description of the alternatives and compares the Alternatives. The Project and three alternatives are being evaluated in this EIR. Alternative 1 is the No Project Alternative, Alternative 2 is the Project Alternative, Alternative 3 is the Recommended Projects, and Alternative 4 is the Trigger Projects. An evaluation of other potential alternatives was conducted and the conclusion is that the alternatives considered provide a reasonable range of feasible alternatives.

Appendix E provides the tables summarizing the number of impacts for the Project Components, No Project Components and Alternatives 1, 2, 3 and 4. .

The significance of environmental impacts of the project alternatives are compared in Table 19-1. For the comparison of alternatives, Table 19-1 lists only the criteria where significant environmental impacts were identified in Chapters 4 through 18. The figure in graphic form, identifies the level of significance for each alternative by resource criteria. The following graphics are used in Table 19-1 to compare alternatives.

Graphic	Level of Significance
●	Significant and unavoidable impact
❍	No Impact or Less than significant impact;
⊙	Less than significant after mitigation

Following Figure 19-1 is a discussion comparing the four alternatives by resource criteria followed by a comparison of alternative benefits and disadvantages.

Table 19-1

Alternative Comparison Table of Impacts

Impact	Alternative 1 No Project Alternative	Alternative 2 Master Plan Projects Alternative	Alternative 3 Master Plan Recommended Projects Alternative	Alternative 4 Master Plan Trigger Projects Alternative
GEO-2 Will Project facilities be subject to ground rupture due to location near a surface trace of an active fault?	●	●	●	●
GEO-3 Will Project facilities be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?	●	❍	❍	❍
GEO-4 Will earthquake-induced strong ground shaking damage Project facilities?	●	❍	❍	❍
HYDRO-1 Will the Project cause flooding?	●	❍	❍	❍
HYDRO-2 Will the Project cause stream bank erosion?	●	❍	❍	❍
BIO-1 Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	●	●⊙	●⊙	●⊙
BIO-2 Will the Project cause loss of individuals of CNPS List 2, 3, or 4 plant species?	●	●⊙	●⊙	●⊙

Table 19-1				
Alternative Comparison Table of Impacts				
Impact	**Alternative 1 No Project Alternative**	**Alternative 2 Master Plan Projects Alternative**	**Alternative 3 Master Plan Recommended Projects Alternative**	**Alternative 4 Master Plan Trigger Projects Alternative**
BIO-3 Will the Project cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?	●	~~●~~⦿	~~●~~⦿	~~●~~⦿
BIO-5 Will the Project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	●	⦿	⦿	⦿
BIO-7 Will the Project have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	●	~~●~~⦿	~~●~~⦿	~~●~~⦿
GW-1 Will the Project degrade groundwater quality in the Carson Wade or Diamond Valleys?	❍	●	●	●
SW-2 Will the Project cause numeric criteria to be exceeded at West Fork Carson River at Stateline?	●	❍	❍	❍
SW-3 Will the Project cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	●	●	●	●

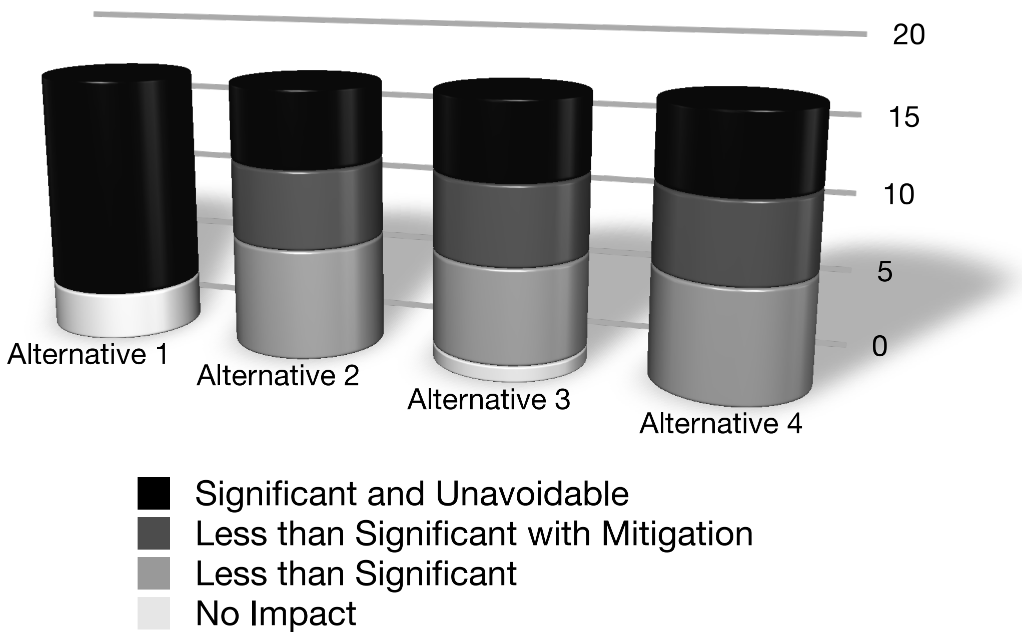
Table 19-1				
Alternative Comparison Table of Impacts				
Impact	**Alternative 1 No Project Alternative**	**Alternative 2 Master Plan Projects Alternative**	**Alternative 3 Master Plan Recommended Projects Alternative**	**Alternative 4 Master Plan Trigger Projects Alternative**
SW-5 Will the Project cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?	●	❍	❍	❍
PHS-1 Will the Project create a public health risk due to its use of recycled water?	●	❍	❍	❍
ARCH-1 Will the Project disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	❍	●	●	●
ARCH-2 Will the Project disturb unknown archaeological resources or human remains?	❍	●	●	●

Table 19-2 summarizes the level of impact associated with each Alternative followed by Figure 19-1 which graphically displays the information provided in Table 19-2.

Table 19-2				
Alternative Level of Impacts Comparison				
Impact	**Alternative 1 No Project Alternative**	**Alternative 2 Master Plan Projects Alternative**	**Alternative 3 Master Plan Recommended Projects Alternative**	**Alternative 4 Master Plan Trigger Projects Alternative**
No Impact	3	0	1	0
Less than Significant	0	7	6	7
Less than Significant with Mitigation	0	~~1~~ 5	~~1~~ 5	~~1~~ 5

Table 19-2				
Alternative Level of Impacts Comparison				
Impact	**Alternative 1 No Project Alternative**	**Alternative 2 Master Plan Projects Alternative**	**Alternative 3 Master Plan Recommended Projects Alternative**	**Alternative 4 Master Plan Trigger Projects Alternative**
Significant and Unavoidable	14	~~9~~ 5	~~9~~ 5	~~9~~ 5

Figure 19-1 Alternative Level of Impacts Comparison



The significant impacts identified for each alternative are summarized below.

19.1 Alternative 1 - No Project

GEO-2. The existing conveyance facilities are subject to ground rupture due to the presence of mapped active surface faults within the project area. Implementation of design features to decrease the chances of facility failure (pipeline or conveyance ditch break) reduce the effects of potential break, but cannot prevent a pipe or conveyance rupture in the event of a seismic event.

GEO-3. The existing conveyance facilities are located in areas adjacent to active surface faults which may contribute to liquefaction of existing soils during an earthquake.

GEO-4. The existing conveyance facilities are located in areas adjacent to active surface faults which may be damaged as a result of seismic activity.

HYDRO-1. The existing fresh and recycled water systems may experience flooding during unusual weather events.

HYDRO-2. The existing facilities when required to carry projected increases in recycled water may cause stream bank erosion.

BIO-1. The potential exists for the loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife and plant species directly or indirectly. This potential exists if there is an overtopping of HPR resulting in potential impacts on native rangeland that may contain sensitive species adjacent to Indian Creek.

BIO-2. The alternative may cause the loss of individuals of CNPS List 2, 3, and 4 plant species. This potential exists if there is an overtopping of HPR resulting in potential impacts on native rangeland that may contain sensitive species adjacent to Indian Creek.

BIO-3. The alternative may cause the loss of active raptor nests, migratory bird nests and wildlife nursery sites. This potential exists if there is an overtopping of HPR resulting in potential impacts on native rangeland that may contain sensitive species adjacent to Indian Creek.

BIO-5. The alternative may have a substantial adverse effect on riparian habitat and other sensitive natural communities identified in local and regional plans, policies, regulations and by the CDFG or USFWS. This alternative has the potential to have impacts on riparian habitat due to potential overtopping of HPR during a flood event.

BIO-7. The alternative may have an effect on federally protected wetlands due to impacts to waters of the U.S. and wetlands associated with Indian Creek due to flooding from HPR.

SW-2. The alternative may cause numeric criteria to be exceeded at West Fork Carson River at Stateline because no new conveyance, application, temporary containment or water management components will be constructed for the avoidance and minimization of impacts to surface water quality from flooding and tailwater.

SW-3. The alternative may cause numeric and narrative based criteria to be exceeded at the West Fork Carson River in California because no new conveyance, application, temporary containment or water management components will be constructed for the avoidance and minimization of impacts to surface water quality from flooding and tailwater.

SW-5. This alternative may cause narrative-based criteria to be exceeded in Indian Creek below HPR due to the potential for recycled waters stored in HPR to over top the dam and impact water quality in Indian Creek.

PHS-1. The alternative may create a public health risk due to non-optimized application rates of recycled water and resultant tailwater reaching drinking water sources.

Continued operation of the District recycled and freshwater facilities in Alpine County has a total of 14 significant and unavoidable impacts, five more than Alternatives 2, 3, and 4. A number of the existing significant and unavoidable impacts can be mitigated by implementing one of the action alternatives (Alternative 2, 3, or 4) of the Master Plan.

19.2 Alternative 2 - Master Plan Projects

GEO-2. The alternative is subject to ground rupture due to the presence of mapped active surface faults within the project area. Implementation of design features to decrease the chances of facility failure (pipeline or conveyance ditch break) reduce the effects of potential break, but cannot prevent a pipe or conveyance rupture in the event of a seismic event.

~~BIO-1. The potential exists for the loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife and plant species directly or indirectly. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-2. The alternative may cause the loss of individuals of CNPS List 2, 3, and 4 plant species. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-3. The alternative may cause the loss of active raptor nests, migratory bird nests and wildlife nursery sites. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-7. The alternative may have an effect on federally protected wetlands. Wetland delineations have not been performed for the alternative site to confirm the presence or absence of wetlands. Until delineations have been preformed the impact is considered to be significant.~~

GW-1. This alternative may degrade groundwater quality in the Carson Wade and Diamond Valleys because site-specific NMP have not been prepared.

SW-3. The alternative may cause numeric and narrative based criteria to be exceeded at the West Fork Carson River in California because Component 30, which will irrigate the portion of the project area named the Jungle, poses a significant impact to the West Fork of the Carson River in California.

ARCH-1. The alternative may disturb known, potentially eligible National or California Register properties. Components 29, 30, 31 and 32 have not been surveyed and it cannot be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

ARCH-2. The alternative may disturb unknown archaeological resources or human remains. Components 29, 30, 31 and 32 have not been surveyed and it cannot be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

Implementation of Alternative 2 results in ~~nine~~ five significant and unavoidable impacts. Alternative 2 has the disadvantage of impacting a larger land area because there are more components than Alternatives 3 and 4. An advantage of implementing Alternative 2 is that is provides the District with the greatest flexibility in responding to future changes in operations, regulation, and land use.

19.3 Alternative 3 - Master Plan Recommended Projects

GEO-2. The alternative is subject to ground rupture due to the presence of mapped active surface faults within the project area. Implementation of design features to decrease the chances of facility failure (pipeline or conveyance ditch break) reduce the effects of potential break, but cannot prevent a pipe or conveyance rupture in the event of a seismic event.

~~BIO-1. The potential exists for the loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife and plant species directly or indirectly. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not~~

~~been surveyed and the potential exists for their presence. This impact cannot be mitigated until site specific surveys have been completed.~~

~~BIO-2. The alternative may cause the loss of individuals of CNPS List 2, 3, and 4 plant species. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact cannot be mitigated until site specific surveys have been completed.~~

~~BIO-3. The alternative may cause the loss of active raptor nests, migratory bird nests and wildlife nursery sites. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact cannot be mitigated until site specific surveys have been completed.~~

~~BIO-7. The alternative may have an effect on federally protected wetlands. Wetland delineations have not been performed for the alternative site to confirm the presence or absence of wetlands. Until delineations have been preformed the impact is considered to be significant.~~

GW-1. This alternative may degrade groundwater quality in the Carson Wade and Diamond Valleys because site-specific NMP have not been prepared.

SW-3. The alternative may cause numeric and narrative based criteria to be exceeded at the West Fork Carson River in California because Component 30, which will irrigate the portion of the project area named the Jungle, poses a significant impact to the West Fork of the Carson River in California.

ARCH-1. The alternative may disturb known, potentially eligible National or California Register properties. Components 29, 30, 31 and 32 have not been surveyed and it cannot be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

ARCH-2. The alternative may disturb unknown archaeological resources or human remains. Components 29, 30, 31 and 32 have not been surveyed and it cannot be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

Alternative 3 (Master Plan Recommended Projects Alternative) results in ~~nine~~ <u>five</u> significant and unavoidable impacts. The disadvantage of Alternative 3 is that the District does not have as great a flexibility to respond future changes in operations, regulation, and land use as available in Alternative 2 or Alternative 4.

19.4 Alternative 4 - Master Plan Trigger Projects

GEO-2. The alternative is subject to ground rupture due to the presence of mapped active surface faults within the project area. Implementation of design features to decrease the chances of facility failure (pipeline or conveyance ditch break) reduce the effects of potential break, but cannot prevent a pipe or conveyance rupture in the event of a seismic event.

~~BIO-1. The potential exists for the loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife and plant species directly or indirectly. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-2. The alternative may cause the loss of individuals of CNPS List 2, 3, and 4 plant species. While Component 11 has been surveyed with the determination that no sensitive species are present on the site,~~

~~the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-3. The alternative may cause the loss of active raptor nests, migratory bird nests and wildlife nursery sites. While Component 11 has been surveyed with the determination that no sensitive species are present on the site, the remaining components have not been surveyed and the potential exists for their presence. This impact can not be mitigated until site specific surveys have been completed.~~

~~BIO-7. The alternative may have an effect on federally protected wetlands. Wetland delineations have not been performed for the alternative site to confirm the presence or absence of wetlands. Until delineations have been preformed the impact is considered to be significant.~~

GW-1. This alternative may degrade groundwater quality in the Carson Wade and Diamond Valleys because site-specific NMP have not been prepared.

SW-3. The alternative may cause numeric and narrative based criteria to be exceeded at the West Fork Carson River in California because Component 30, which will irrigate the portion of the project area named the Jungle, poses a significant impact to the West Fork of the Carson River in California.

ARCH-1. The alternative may disturb known, potentially eligible National or California Register properties. Components 29, 30, 31 and 32 have not been surveyed and it can not be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

ARCH-2. The alternative may disturb unknown archaeological resources or human remains. Components 29, 30, 31 and 32 have not been surveyed and it can not be determined if cultural resources are present or will be affected. This uncertainty results in the assumption of significant impacts.

Alternative 4 (Master Plan Trigger Projects Alternative) results in ~~nine~~ five significant and unavoidable impacts. The disadvantage of Alternative 4 is that the District does not have as great a flexibility to respond to future changes in operations, regulation, and land use as available in Alternative 2. An advantage is there is greater flexibility than Alternative 3.

20 Mandatory Environmental Analysis

20 CEQA Required Sections

This chapter includes environmental analysis mandated by CEQA, including the following topics:

- Growth-inducing impacts of project alternatives;
- Significant and unavoidable adverse impacts;
- Significant irreversible environmental changes; and
- Environmentally superior alternative.

20.1 Growth-Inducing Impacts of Project Alternatives

Section 15126.2(d) of the CEQA Guidelines states that an EIR should discuss "…the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas)." Growth is induced through the elimination of obstacles to growth or through the stimulation of economic activity within the region.

The Project serves development located in the Tahoe Basin. Growth in the Tahoe Basin is controlled by the TRPA under authority of the Tahoe Regional Planning Compact. TRPA regulates the number of residential units allowed to develop annually, and controls the number of sewer connections allowed each year. Due to the control on growth, there is a limit to the extent to which expansion of services such as wastewater treatment actually eliminates an obstacle to growth.

The Recycled Water Facilities Master Plan is the District's implementation program for expanding the reuse and/or application of recycled water to 5.8 mgd the amount required to meet the planned development allowed by TRPA within the District's service area. The Project does not require expansion of the District's treatment plant, which currently has a capacity of 7.7 mgd. The impacts of the plant's current capacity and the District's plan for accepting new sewer connections have been evaluated in previous environmental documents. The District evaluated the impacts of growth associated with accepting new sewer connections in the Draft EIR/EIS for the District Future Sewer Connections Plan (EIP Associates 1995). This document identifies potential significant impacts to water quality and air quality, traffic, public services, and recreational facilities. Mitigation measures were identified for impacts, reducing the identified impacts to a less than significant level. Mitigation measures included physical improvements to District facilities to avoid wastewater spills, financing for recreation facilities, participation in programs to achieve TRPA's vehicle miles traveled (VMT) reduction goal, and odor control at the treatment plant.

The Draft EIR/EIS for the District Future Sewer Connections Plan concludes that growth-inducing impacts of that project were less than significant. The additional sewer connections allowed under the plan are determined to have indirect growth inducing effects. The growth associated with the implementation of the Plan was considered to be "adequately planned for and unlikely to create environmental impacts that are considered unacceptable under CEQA and TRPA guidelines" (EIP 1995). The District Recycled Water Facilities Master Plan accommodates growth projected in the Draft EIR/EIS for the District Future Sewer Connections Plan. Future development ultimately will be determined through the TRPA planning process.

20.2 Significant and Unavoidable Adverse Impacts

Section 2100(b)(2)(A) of CEQA requires that an EIR identify any significant environmental effects that cannot be avoided if the project were implemented. Significant unavoidable impacts are summarized in Chapter 1 and discussed in detail in Chapters 4 through 18 and summarized in Chapter 19. Significant unavoidable impacts are those impacts that remain significant after implementation of proposed mitigation measures. Although the Project Components have the potential to result in a number of significant environmental impacts, most of these can be avoided through the adoption of appropriate mitigation measures that reduce those effects to a less than significant level.

Table 20-1

Summary of Significant and Unavoidable Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measure
GEO 2. Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32 ●	No additional mitigation is possible.
GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade and Diamond Valleys?	1, 2, 3, 4, 5, 6, ~~11~~,14, 21, 22, 30 ●	**SW-33.** Surface and Groundwater Protection Plan **GW-1A.** Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch **GW-1B.** Determine Maximum Duration for Temporary Containment
SW-3. Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	30 ●	**SW-3.** Develop Project-specific Nutrient Management Plan for the Jungle
~~**BIO-1.** Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?~~	~~1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ●~~	~~**BIO-1**. Conduct Biological Resource Assessments~~ ~~**SP-25.** Sensitive Resource Program~~
~~**BIO-2.** Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?~~	~~1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ●~~	~~**SP-26.** Sensitive Plant Protection Program~~
~~**BIO-3.** Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?~~	~~1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32 ●~~	~~**SP-30.** Pre-construction Surveys for Nesting Raptors and Wildlife Nurseries~~

Table 20-1

Summary of Significant and Unavoidable Impacts and Mitigation Measures

Impact	Level of Significance	Mitigation Measure
~~**BIO-7.** Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?~~	~~1, 2, 3, 4, 5, 6, 7, 9, 10, 11 (HPR Bypass Pipeline, A, B, C), 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32 ●~~	~~**SP-23.** Delineate Wetlands, Waters of the United States, and Riparian Habitat~~ ~~**SP-24.** Prepare Wetland And Riparian Mitigation And Monitoring Plan~~ ~~**SP-27.** Avoid Impacts to Wetland and Riparian Areas~~ ~~**SP-32.** Pre-construction Marking and Fencing of Wetlands and Riparian Habitat~~ ~~**BIO-7.** Monitor Wetland And Riparian Mitigation Sites~~
ARCH-1. Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/ traditional heritage resources?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⊙ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources
ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains?	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 ⊙ 29, 30, 31, 32 ●	**ARCH-1.** Identification, Evaluation, and Avoidance of Cultural Resources **ARCH-2.** Protect Undiscovered Cultural Resource Sites

Source: Hauge Brueck Assoc. 2009

Notes: Level of Significance

--	Not applicable	==	No impact
●	Significant impact before and after mitigation	⊙	Significant impact; less than significant after mitigation
❍	Less than significant impact; no mitigation proposed		

20.3 Significant Irreversible and Irretrievable Commitment of Resources

Section 21100(b)(2)(B) of CEQA requires that an EIR identify any significant irreversible changes that will result from project implementation. Section 15126.2(c) of CEQA provides guidance as to what sorts of changes might be considered irreversible. Such changes include use of nonrenewable resources, commitment of future generations to similar uses, and environmental accidents that could occur as a result of the project.

The Project will involve construction activities that commit non-renewable resources including fuels, construction materials and land. Once constructed, Project facilities will continue to use energy. Construction of new facilities will irretrievably commit lands to use for public facilities.

CEQA notes that environmental accidents can cause irreversible damage. The Project will use common construction-related hazardous materials during construction, but does not propose the use of such materials during project operation. Adequate procedures are in place to guard against accidental releases of hazardous materials or hazardous waste during construction. Measures to protect against these hazards are detailed in Chapter 10, Public Health and Safety.

20.4 Environmentally Superior Alternative

Alternative 3 Master Plan Recommended Projects is the Environmentally Superior Alternative. Typically Alternative 1, No Project, would be considered environmentally superior because no action is required. The analysis in Chapters 4 through 18 demonstrate Alternative 1 has four significant and unavoidable impacts. The Master Plan has been prepared to mitigate the impacts of the No Project alternative.

Alternative 3 meets the purpose, need, and objectives of the District and has a reduced footprint of activities by implementing nine components in comparison to Alternative 2, which implements 28 components, and Alternative 4, which implements 18 components.

21 Preparers/References

21 Preparers/References

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Appendix A - NOP

REVISED NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WATER FACILITIES MASTER PLAN

INVITATION TO PUBLIC SCOPING MEETING AND REQUEST FOR COMMENTS

ON
THURSDAY FEBRURARY 5, 2009
AT 2:30 PM
SOUTH TAHOE PUD BOARD ROOM, 1275 MEADOW CREST DRIVE, SOUTH LAKE TAHOE CA 96150

Project Title:	South Tahoe Public Utility District Recycled Water Facilities Master Plan EIR Focused on Four New Components.
Project Location:	Alpine County, CA
Lead Agency:	South Tahoe Public Utility District (District)
County:	Alpine County
Project Description:	This ***Revised*** Notice of Preparation expands upon the information provided in the previous NOP that was circulated by the District in May of 2007 and is herein referenced. The focus of this ***Revised*** NOP is four new components that have been added to the project description of the Recycled Water Facilities Master Plan. In addition, two new alternatives to the proposed action have been identified for study in the EI, The Master Plan Recommended Projects Alternative (Alternative 3) and the Master Plan Trigger Alternative (Alternative 4). The District is seeking focused comments only on the four new components and two new alternatives that are included in this ***Revised*** NOP. Comments submitted to the District during the circulation of the May 2007 NOP will still be considered during the preparation of the EIR.

The four new components added to the project description are as follows:

29. Irrigate the District Pasture Land

This component will irrigate the District Pasture using recycled water. The total amount of land is approximately 150 acres. Recycled water will be supplied either from a branch off the existing C-Line or from a new pipeline leading from the existing C-Line to the Diamond Valley Ranch. Minor grading will occur to the District Pasture to prevent recycled water from entering the Upper and Lower Harvey Channels. The primary use of the Upper Harvey Channel and the Lower

Harvey Channel is to direct Indian Creek flows (exceeding the conveyance capacity of the Upper Dressler Ditch) around the Harvey Place Reservoir. The Upper and Lower Harvey Channels carry freshwater only and enter Indian Creek below the dam of the Harvey Place Reservoir.

The configuration of the irrigation and associated minor grading will need to include a means of continuing the ability to spill very high flow rates (induced by flood or snowmelt) out of the Harvey Channel. Alternatively, the Upper Harvey Channel could be enlarged to contain the peak flow rate induced by a 100-year storm event with berms to prevent recycled water from entering the channel. A variation on this project component will be to irrigate the District Pasture with freshwater if the Diamond Valley Ranch is irrigated with recycled water. In this case the water rights from the District Pasture will be used to resume irrigating the District Pasture and a portion of the water rights of Diamond Valley Ranch will be used for storage in ICR. The basis of this variation is that the original water rights for irrigating the District Pasture were transferred to storage in ICR. Since the District Pasture is no longer irrigated, it may be desirable to resume irrigating to restore the land as a pasture.

30. Irrigate the "Jungle" with Recycled Water

The District obtained land known as the "Jungle" with its purchase of the Diamond Valley Ranch. The jungle is located northwest of the Snowshoe Thompson No. 2 Ditch and north of the Millich Ditch. At its nearest point the jungle is approximately 1,100 feet from the West Fork of the Carson River. The jungle is not currently irrigated and is characterized as sloping and bottom valley land. There are approximately 150 acres that will be irrigated with recycled water once infrastructure is constructed to convey water to this area. The need for additional lands may arise from loss of lands currently irrigated with recycled water due to subdivision or some other cause, or by increased annual volume of recycled water resulting from growth in the District's service territory. Spray irrigation methods will be utilized as the irrigation method. Water will be supplied under pressure from a pipeline branching off the existing C-Line or from the proposed pressurized line that would pump water back to Harvey Place Reservoir (Component 11).

31. Divert Stormwater Flow Away from Harvey Place Reservoir to Indian Creek Reservoir

This project component constructs a ditch near the southeast corner of the Harvey Place Reservoir to intercept stormwater and drainage flows that currently flow into the Harvey Place Reservoir and divert them to ICR. The purpose will be to reduce stormwater flow into the Harvey Place Reservoir thereby increasing the available recycled water storage volume of the Harvey Place Reservoir. Another benefit of this project component will be to increase the amount of freshwater entering ICR. A method of sediment control may be necessary to reduce sediment loading in ICR. This component will be implemented only if recycled water volume increases and additional storage volume for recycled water in Harvey Place Reservoir is needed, or if additional freshwater is needed in ICR to improve water quality and meet minimum water surface elevation obligations. The disadvantages of this project component include capital cost expenditure and additional operation and maintenance responsibilities.

32. Indian Creek Reservoir Spillway Channel

The ICR spillway originally discharged recycled water to Indian Creek in the event the reservoir filled beyond capacity. This was permissible when the District utilized tertiary treatment at its wastewater treatment plant in South Lake Tahoe. With the construction of HPR (to serve as the District's recycled water storage reservoir) ICR was converted to a fresh water reservoir. The construction of HPR resulted in an ICR spillway configuration which discharges to HPR. This component will construct a spillway channel for ICR that conveys reservoir spillage around HPR to Indian Creek. The component has an added benefit of intercepting stormwater flow entering the east side of the HPR, thereby increasing storage capacity in this reservoir for recycled water. This component will reduce the potential of emergency spills from HPR.

The implementation of this component is contingent upon the District's desire to reduce their liability of unauthorized releases of recycled water from HPR due to large flood events. Considerations for this component involve the likelihood of a spill from HPR. The 1997 flood event created operational problems for the District that required approval by the Lahontan Regional Water Quality Control Board (Lahontan) to land apply recycled water from HPR outside of the normal irrigation season. Component implementation is a question of the likelihood of very large flood events and the District's tolerance for risk.

Background

The South Tahoe Public Utility District (District) Recycled Water Facilities Master Plan includes a combination of actions to dispose treated effluent and associated actions to convey, store and apply fresh water. The Plan updates the 1989 Master Plan and includes new and revised information on increases in system demands and disposal opportunities and constraints.

The project area is located in Alpine County, California as shown on Figure 1. The Master Plan consists of a number of specific components that are capable of being grouped into alternative sets of actions for meeting the Plan's overall objectives. In addition to the No Project alternative that is required by CEQA, the program EIR will evaluate additional alternatives.

Each of the Master Plan project components that may be included in the alternatives are listed below (in no particular order of preference) and briefly described in the attached Initial Study (new components are listed in **bold**):

1. *Provide recycled water to new non-irrigated, permitted land*
2. *Make Recycled Water Available to Irrigators in Nevada*
3. *Capacity and Conveyance Improvements in the Diamond Ditch System*
4. *Provide Pressurized Recycled Water to the Fredericksburg System*

5. Provide Pressurized Recycled Water Through Wade Valley
6. Provide Pressurized Recycled Water to the Ranchettes
7. Non-Flood Irrigation Application System
8. Improve Recycled Water Quality
9. Groundwater Recharge Using Infiltration Basins
10. Construct Zero-Discharge Basins
11. Construct Storage Facility With Pumping Back to Harvey Place Reservoir
12. Growing Biomass Crops for Pulp Production using Recycled Water
13. Wetland sod and seed production
14. Pipe Recycled Water Systems to Minimize Setbacks and Human Contact
15. Mitigation wetland creation using freshwater
16. Subsurface Recycled Water Irrigation in Public Contact and Buffer Areas
17. Increase Snowshoe Thompson No. 1 Conveyance Capacity
18. Optimize Application Rate on Existing Irrigated Lands
19. Pursue the Permitting of More Land in Alpine County
20. Improve Operation of the Diamond Ditch System to Meet District and User Needs
21. Develop Tailwater Control System
22. Parallel Recycled Water Pipeline Along Existing Diamond Ditch
23. Route Mud Lake Winter Flows through Indian Creek Reservoir
24. Transfer Additional Water Rights to Storage in Indian Creek Reservoir
29. Irrigate the District Pasture Land
30. Irrigate the "Jungle" with Recycled Water
31. Divert Stormwater Flow Away from Harvey Place Reservoir to Indian Creek Reservoir
32. Indian Creek Reservoir Spillway Channel

Alternatives: A total of four alternatives will be analyzed in the EIR and are listed as follows (new alternatives are listed in **bold**): Alternative 1, No Project; Alternative 2 – 32 Component Alternative; Alternative 3 Master Plan Recommended Projects; and Alternative 4 Master Plan Trigger Alternative.

Alternative 1 – No Project
The No Project Alternative will evaluate impacts that will occur if the District does not adopt a new Master plan The No Project Alternative consists of the existing District Recycled Water Facilities in Alpine County, CA as of April 19, 2007.

Alternative 2 – 32 Component Alternative
The 32 Component Alternative includes all the components that are listed in the District's Recycled Water Facilities Master Plan. This alternative enables the Distirct to meet the Project's need though the implementation of fresh and recycled water projects and management of fresh and recycled water. A brief description of the 32 Components are listed later in this document.

Alternative 3 – Master Plan Recommended Projects Alternative
This alternative includes Components 3, 4, 6, 11, 18, 19, 22, 29, and 30. The Master Plan states these projects, at a minimum, should be implemented regardless of the future outcome of contingencies and project triggers that are identified in the Master Plan.

Alternative 4 – Master Plan Trigger Alternative
This alternative includes Components 1, 2, 3, 4, 6, 7, 9, 111, 14, 17, 18, 19, 22, 23, 24, 29, 30, and 31 as listed in . These Components will allow the District to respond to future project triggers and contingencies as discussed in the Master Plan.

Environmental Documentation:

The Project site is currently used for a mix of agricultural and treated effluent uses. Future development of new and revised treated effluent measures could have a significant effect on a range of environmental issues, as identified in the attached Initial Study. Consequently, an Environmental Impact Report (EIR) will be prepared to analyze these effects, as well as to explore alternatives to the Project and possible mitigation measures to avoid or lessen identified effects. The South Tahoe Public Utility District will prepare an EIR for the project under the terms and requirements of the California Environmental Quality Act (CAL. PUB. RES. CODE SS 21000, et seq.) (CEQA) and the implementing CEQA Guidelines (14 CAL. CODES. REGS. SS15000, et seq.) (CEQA Guidelines). The purpose of the EIR is to provide decision-makers, public agencies, the general public and other interested parties with an analysis of potential environmental impacts associated with the proposed project, and the alternatives to the project.

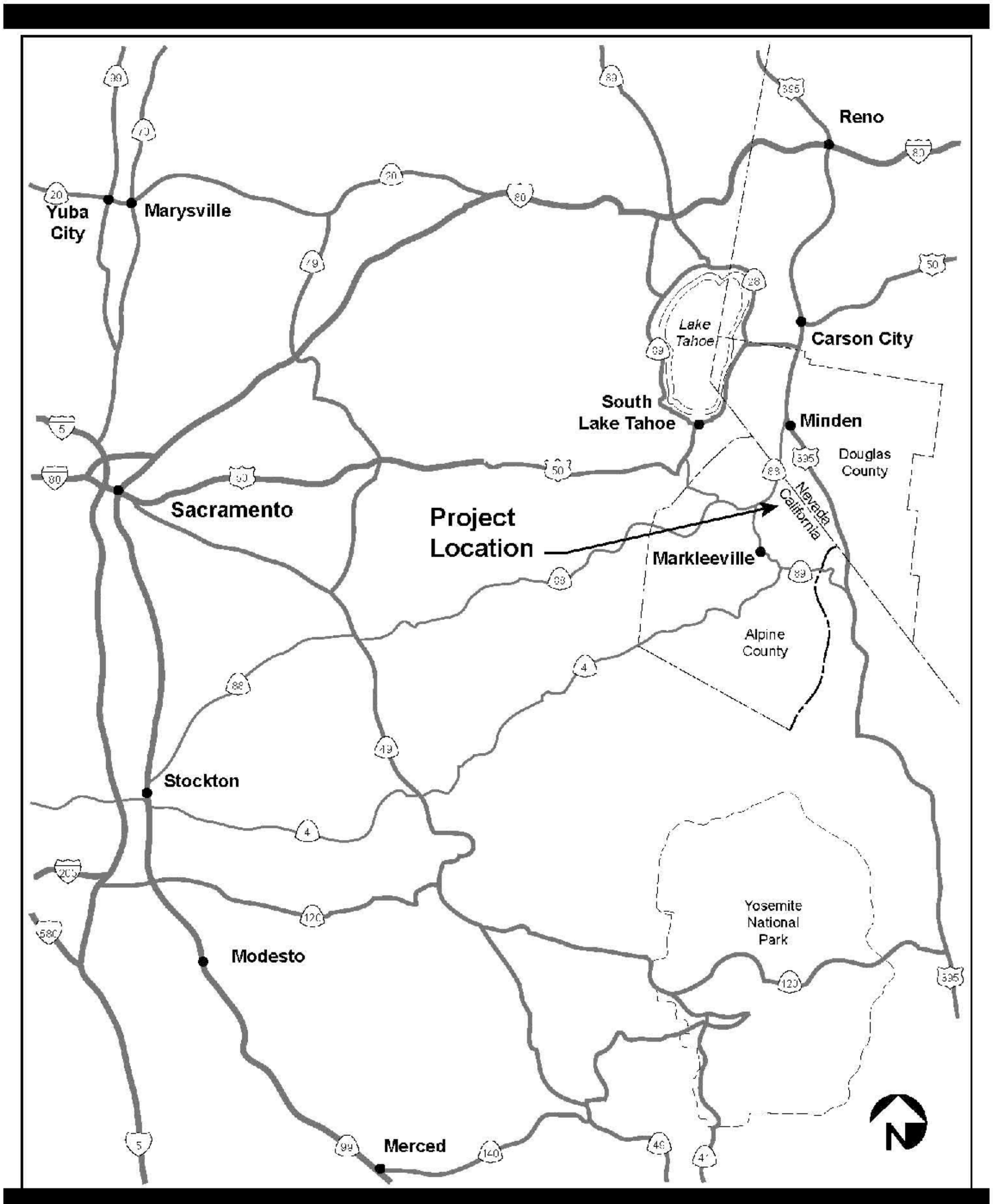
The purpose of this notice is:
(1) to serve as the NOP to potential "Responsible Agencies" as required by Section 15082 of the CEQA Guidelines; and
(2) to advise and solicit comments and suggestions regarding the preparation of the EIR, environmental issues to be addressed in the EIR, and any related issues from interested parties other than potential "Responsible Agencies," including interested or affected members of the public.

STPUD will accept written comments regarding this NOP through the close of business, **Februrary 5, 2009**. All Comments or other responses to this NOP should be submitted in writing to:

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150
Attn: Recycled Water Facilities Master Plan EIR

STPUD will also accept responses to this NOP by e-mail received through the close of business, **February 5, 2009**. If e-mail comments are submitted with attachments, any attachments should be delivered separately, in writing, and in person or by regular mail, to the address specified above. The virus protection measures of STPUD's e-mail system, and the variety of potential formats for attachments, limits the ability for the attachments to be delivered by e-mail. Responses to this notice may be sent to: **dvreir@stpud.dst.ca.us**

Figure 1 – Project Site Location Map



STPUD
Recycled Water Facilities
Master Plan EIR

LOCATION MAP

Figure 1

In accordance with CEQA and the CEQA Guidelines, STPUD will conduct two public scoping meetings on the Environmental Impact Report (EIR) being prepared for the project. STPUD would like to invite you to one or both of these meetings to identify potential environmental issues and alternatives to be addressed in the EIR. A brief presentation on the project and technical analysis to be prepared will be provided at the beginning of each meeting, after which there will be the opportunity to provide comments on the content of the EIR, data to be utilized in the EIR, alternatives to be evaluated, and criteria to be used to evaluate the environmental impacts at the meeting either verbally or in writing.

Public Meetings Time and Location:

Location:	South Tahoe Public Utility District
Address:	1275 Meadow Crest Drive South Lake Tahoe, CA 96150
Date:	Februrary 5, 2009
Time:	2:30 pm

Please call Anders J. Hauge, at (916) 671-5844 if you have any questions regarding the scoping meeting.

Notice Date: January 5, 2009

Attachment – Initial Study and Environmental Checklist Form

SOUTH TAHOE PUBLIC UTILITY DISTRICT

Initial Study and Environmental Checklist Form

<table>
<tr><td>1.</td><td colspan="3">Project Title: South Tahoe Public Utility District Recycled Water Facilities Master Plan</td></tr>
<tr><td>2.</td><td colspan="3">Lead Agency Name and Address:
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150</td></tr>
<tr><td>3.</td><td colspan="3">Contact Person and Phone Number:
Mr. Jim Hoggatt
530.543.6206</td></tr>
<tr><td>4.</td><td colspan="3">Project Location: Alpine County, CA</td></tr>
<tr><td>5.</td><td colspan="3">Project Sponsor's Name and Address:
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150</td></tr>
<tr><td>6.</td><td>General Plan Designation: Alpine County, CA – Open Space, Rural Residential, Agricultural, and a small portion of Residential Medium Density.</td><td>7.</td><td>Zoning: Alpine County, CA – Agricultural with smaller areas of Scenic Highway, Residential Estates-5 acres, Residential Neighborhood, and Land Preserve.</td></tr>
<tr><td>8.</td><td colspan="3">Project Description: The STPUD Recycled Water Facilities Master Plan includes a combination of actions to dispose of treated effluent. The Plan updates provisions of the 1989 Master Plan and includes new and revised information on increases in system demands and disposal opportunities and constraints.

The project area is located in Alpine County, California The project setting is shown on Figure 1 below. The Master Plan consists of a number of specific components that are capable of being grouped into alternative sets of actions for meeting the Plan’s overall objectives. In addition to the No Project alternative that is required by CEQA, the program EIR will evaluate the impacts of the proposed project, components of which are listed below. Alternatives will be generated which will vary in the combination of the listed components.

Each of the Master Plan project components that may be included in the alternatives were described in the May 2007 NOP. The four components that were added to the project description are described briefly below.</td></tr>
</table>

Project Component Descriptions:

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This component will irrigate the District Pasture using recycled water. The total amount of land is approximately 150 acres. Recycled water will be supplied either from a branch off the existing C-Line or from a new pipeline leading from the existing C-Line to the Diamond Valley Ranch. Minor grading will occur to the District Pasture to prevent recycled water from entering the Upper and Lower Harvey Channels. The primary use of the Upper Harvey Channel and the Lower Harvey Channel is to direct Indian Creek flows (exceeding the conveyance capacity of the Upper Dressler Ditch) around the Harvey Place Reservoir. The Upper and Lower Harvey Channels carry freshwater only and enter Indian Creek below the dam of the Harvey Place Reservoir.

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	expenditure and additional operation and maintenance responsibilities. ***32. Indian Creek Reservoir Spillway Channel*** The ICR spillway originally discharged recycled water to Indian Creek in the event the reservoir filled beyond capacity. This was permissible when the District utilized tertiary treatment at its wastewater treatment plant in South Lake Tahoe. With the construction of HPR (to serve as the District's recycled water storage reservoir) ICR was converted to a fresh water reservoir. The construction of HPR resulted in an ICR spillway configuration which discharges to HPR. This component will construct a spillway channel for ICR that conveys reservoir spillage around HPR to Indian Creek. The component has an added benefit of intercepting stormwater flow entering the east side of the HPR, thereby increasing storage capacity in this reservoir for recycled water. This component will reduce the potential of emergency spills from HPR. The implementation of this component is contingent upon the District's desire to reduce their liability of unauthorized releases of recycled water from HPR due to very large flood events. Considerations for this component involve the likelihood of a spill from HPR. The 1997 flood event created operational problems for the District that required approval by the Lahontan Regional Water Quality Control Board (Lahontan) to land apply recycled water from HPR outside of the normal irrigation season. Component implementation is a question of the likelihood of very large flood events and the District's tolerance for risk.
9.	Surrounding Land Uses and Setting: The subject property is located about 1 mile east of Highway 89 and 1 mile south of Highway 88 just to the southeast of the Highway 88/89 Junction at Woodfords, CA. Surrounding land uses include low density residential, agricultural lands, and two reservoirs, Harvey Place Reservoir and Indian Creek Reservoir. Indian Creek Reservoir provides recreational fishing opportunities to the community and tourists.
10.	Other Public Agencies Whose Approval is Required (e.g., permits, financing approval, or participation agreement.): Federal Permits: • U.S. Army Corps of Engineers - A Section 404 Permit may need to be obtained to fill wetlands or waters of the U.S. under the Clean Water Act. Section 303, 401, and 402 permits/certifications may also be required. A Rolling Stock Permit will be required for equipment operating within waters of the U.S. • U.S. Fish and Wildlife Service - Before granting a 404 permit or 401 certification the Corps will ask the USFWS to concur with their decision to issue the permit. If there are endangered species listed under the federal Endangered Species Act, then a consultation and permit under Section 7 of the Endangered Species Act may be required. • Advisory Council on Historic Preservation/State Office of Historic Preservation - Before granting a permit the Corps will ask for this agency to concur with their decision to issue the permit. The District will need to manage any cultural resources at the site in accordance with Section 106 of the National Historic Preservation Act, as implemented by the State Historic Preservation Officer. • Bureau of Land Management - STPUD currently has agreements with the BLM

regarding the use of Harvey Place Reservoir, Indian Creek Reservoir and associated facilities on BLM land. Due to the proposed changes in the use of BLM land, an Environmental Assessment (EA) followed by a Finding of No Significant Impact (FONSI) or an Environmental Impact Statement (EIS) under the National Environmental Protection Act (NEPA) may be required prior to federal approval.

- Federal Energy Regulatory Commission - The facility would likely be exempt from FERC permitting because it would use a dam constructed prior to 1977 and generate less than 5 MW. The Corps of Engineers may need to approve the use of a state waterway to generate power, and because it may affect the fishery in Indian Creek.

- U.S. District Court Watermaster - The proposed water system would be entirely new to the Carson River system. The permitting of the water rights will need approval from the U.S. District Court Watermaster and from the California Department of Water Resources.

State of California Permits:

- Lahontan Regional Water Quality Control Board - The LRWQCB will have permit authority over recycled water application and rapid infiltration basins for their site-specific requirements, and for compliance with Title 22 of the California Code of Regulations. These would include minimum setback, signage and public notification requirements, and regulations regarding tailwater and application rates to protect groundwater and surface water.

- The Board may need to issue a Section 401 water quality certification for fill of any wetlands or waters of the U.S., which requires a 404 permit, a Section 402 NPDES General Construction Stormwater Discharge Permit, and a Temporary Authority to Discharge into waters of the U.S. If a constructed wetland discharges into a water of the U.S. an NPDES Permit will also be needed for that discharge. Activities involving over 5 acres (soon to be reduced to 1 acre) would require preparation of a Storm Water Pollution Prevention Plan.

- State Department of Water Resources - This agency may need to issue approval of plans and specifications for the modification of existing ponds or construction of wetlands. In addition, the CDWR will need to approve new water rights from creation of the proposed water right system within the Carson River system, in coordination with the U.S. District Court Watermaster.

- California Occupational Safety and Health Administration - Cal OSHA may need to issue permits for construction, trench excavation, and demolition.

- California Department of Fish and Game - A Streambed Alteration Agreement (Code Section 1601) will be required for any work in Indian Creek or other streams. In addition, if there are affected endangered species as listed under the California Endangered Species Act, a Section 2081 Management Authorization may be required. The possible introduction of Lahontan Cutthroat Trout into Indian Creek would require approval from CDFG.

- State Historic Preservation Officer - The SHPO will need to provide clearance for any state or federal approvals impacting historic, archaeological or paleontologic resources,

	or traditional cultural properties affected by the project, as specified by Section 106 of the National Historic Preservation Act. • Great Basin Unified Air Pollution Control District - The District will be required to obtain an Authority to Construct from the Great Basin Unified Air Pollution Control District for control of dust emissions during construction. No permits to operate are anticipated since the project would entail no emissions-producing equipment. • County of Alpine, California - The County will need to issue grading and building permits for construction, a Use Permit, a General Plan Consistency Review, and a stream crossing permit. Other permits may include a transportation permit for heavy or oversized loads during construction, a County Public Works permit for construction and operation within county rights-of-way and encroachment permits for work in the streams. •
11.	Alternatives To Be Considered: A total of four alternatives will be analyzed in the EIR and are listed as follows: Alternative 1, No Project; Alternative 2 – 32 Component Alternative; Alternative 3 Master Plan Recommended Projects; and Alternative 4 Master Plan Trigger Alternative. Alternative 1 – No Project The No Project Alternative will evaluate impacts that will occur if the District does not adopt a new Master plan The No Project Alternative consists of the existing District Recycled Water Facilities in Alpine County, CA as of April 19, 2007. Alternative 2 – 32 Component Alternative The 32 Component Alternative includes all the components that are listed in the District's Recycled Water Facilities Master Plan. This alternative enables the Distirct to meet the Project's need though the implementation of fresh and recycled water projects and management of fresh and recycled water. A brief description of the 32 Components are listed later in this document. Alternative 3 – Master Plan Recommended Projects This alternative includes Components 3, 4, 6, 11, 18, 19, 22, 29, and 30. The Master Plan states these projects, at a minimum, should be implemented regardless of the future outcome of contingencies and project triggers that are identified in the Master Plan. Alternative 4 – Master Plan Trigger Alternative This alternative includes Components 1, 2, 3, 4, 6, 7, 9, 111, 14, 17, 18, 19, 22, 23, 24, 29, 30, and 31 as listed in . These Components will allow the District to respond to future project triggers and contingencies as discussed in the Master Plan.

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED:

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

X	Aesthetics		Agriculture Resources		Air Quality
	Biological Resources		Cultural Resources		Geology /Soils
	Hazards & Hazardous Materials	**X**	Hydrology / Water Quality		Land Use / Planning
	Mineral Resources		Noise		Population / Housing
	Public Services	**X**	Recreation		Transportation/Traffic
	Utilities / Service Systems	**X**	Mandatory Findings of Significance		

DETERMINATION: (To be completed by the Lead Agency)

On the basis of this initial evaluation:

	I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
	I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
X	I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
	I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.
	I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, nothing further is required.

Signature	January 5, 2009 Date

EVALUATION OF ENVIRONMENTAL IMPACTS:

The following checklist is used to evaluate the potential of the project for significant environmental impacts. Because the lead agency has decided to prepare an EIR, mitigation is not defined herein, but will be developed and specified in the Mitigation Monitoring Program as part of the EIR process. References used to develop these evaluations are listed at the back of this document and are available for review at the South Tahoe Public Utility District.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant	No Impact
I. Aesthetics				
Would the project:				
a. Have a substantial adverse effect on a scenic vista?	✓			

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant	No Impact
b. Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	✓			
c. Substantially degrade the existing visual character or quality of the site and its surrounding?	✓			
d. Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?				✓

Analysis

a.-c. Construction of, conveyances to the east of Indian Creek Reservoir could alter and substantially damage existing scenic resources in the area. This would affect views by recreational users and potentially travelers along Highway 88, which is a designated Federal Scenic Byway and is designated a Scenic Highway by Alpine County.

d. The project would not create new sources of light and glare.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant	No Impact
II. Agriculture Resources				
In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the project:				
a. Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				✓
b. Conflict with existing zoning for agricultural use, or a Williamson Act?				✓
c. Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?				✓

Analysis

a. The project will not convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. Implementation will enhance and possibly extend agricultural uses in the area.

b. No conflicts with existing zoning of Williamson Act contracts are anticipated. The project will enhance agricultural uses.

c. The project is not expected to encourage the conversion of other lands to non-agricultural use. It will enable enhanced agricultural uses in the area.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
III. Air Quality				
Where available, the significance criteria established by the applicable Air Quality Management or Air Pollution Control District may be relied upon to make the following determinations. Would the proposal:				
a. Conflict with or obstruct implementation of the applicable air quality plan?				✓
b. Violate any air quality standard or contribute substantially to an existing or projected air quality violation?		✓		
c. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?		✓		
d. Expose sensitive receptors to substantial pollutant concentrations?		✓		
e. Create objectionable odors affecting a substantial number of people?				✓

Analysis

a. The proposed project would serve growth that is projected in the Alpine County General Plan, El Dorado County General Plan, and TRPA Transportation/Air Quality Plan, and would thus be expected to be included in growth forecasts used to develop those plans. Alpine County is part of the Great Basin Unified Air Pollution Control District, which is classified as non-attainment of the State standard for suspended particulate matter. Construction of the new effluent recycling facilities would be subject to all current air quality rules and regulations. Project operation will not be a source of particulate emissions, and will thus not interfere with attainment of the ambient air quality standard for particulates in Alpine County.

b-d. Demolition of old facilities and construction of the new facilities would result in generation of dust, as measured by particulate matter less than 10 microns in diameter. Other pollutants, primarily nitrogen oxides, are also generated during construction. Mitigation in the form of dust control and equipment maintenance measures will be required to reduce dust and other emissions to less than significant. Project operations will not be a source of new emissions from equipment or vehicles.

Sensitive receptors located in the vicinity of the project include the Diamond Valley Elementary School and the Washoe Community. With mitigation of construction emissions to insignificance, students at the school would not be exposed to substantial pollutant concentrations.

e. Discharge of reclaimed water does not create objectionable odors or degrade air quality.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
IV. Biological Resources				
Would the project:				
a. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		✓		
b. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?		✓		
c. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?		✓		
d. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors or impede the use of native wildlife nursery site?		✓		
e. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?		✓		
f. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?				✓

Analysis

a. The Lahontan cutthroat trout is included on the Federal List of Endangered Species, and is found in Alpine County. The proposed project will improve water quality in Indian Creek and Indian Creek Reservoir.

The project may increase the volume of freshwater entering Indian Creek Reservoir, improving water quality and fish and wildlife habitat.

b. Project construction has the potential to affect riparian habitat along Indian Creek, which would require mitigation. See item c. for a discussion of potential effects on wetland habitats.

c. Construction of wetlands and related facilities for disposal of recycled water would have the beneficial effect of creating new habitat. Construction activities may temporarily impact existing wetlands and riparian areas, requiring mitigation. These impacts would cease at the end of construction.

d. The project may affect wildlife movement or corridors because of new drainage crossings to be constructed. While the effects would be temporary, mitigation will need to be designed to restrict construction work in active streams.

Siting of constructed wetlands would not be expected to adversely affect wildlife migration. However, the project could impact resting, feeding, and potential breeding habitat for waterfowl. Pond improvements could temporarily disturb areas used by waterfowl.

If migratory or special status bird species nest within the zone of impact, then construction effects would be considered significant if they occur at the same time as avian reproductive efforts. Potential sites for raptor nests may occur within the riparian habitat along Indian Creek. Mitigation measures will be required to protect birds in the construction area.

e. Construction has the potential to affect riparian habitat along Indian Creek. Mitigation may be required to ensure that trees or riparian vegetation along the riparian corridor are preserved.

f. This site is not included in any local, regional, or state habitat conservation plan.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant	No Impact
V. Cultural Resources				
Would the project:				
a. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	✓			
b. Cause a substantial adverse change in the significance of an archeological resource pursuant to §15064.5?		✓		
c. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?			✓	
d. Disturb any human remains, including those interred outside of formal cemeteries?		✓		

Analysis

a. A complete cultural resource survey has not been completed for the entirety of the project area. Therefore the potential exists for significant historical resources to be present within the project area and for impacts to occur. This impact is considered potentially significant.

b. Previous investigations have identified no known archaeological resources in the vicinity of the project site. Mitigation would be incorporated in the project to address the possibility of uncovering previously unidentified buried cultural resources during construction.

c. Part of the project site is already disturbed, and there are no known unique paleontological resources or geologic features.

d. Mitigation would be included in the project to address the possibility of uncovering previously unidentified human remains during project construction. Mitigation would reduce this potential impact to less than significant.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less than Significant Impact	No Impact
VI. Geologic Problems				
Would the project:				
a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.		✓		
ii. Strong seismic ground shaking?		✓		
iii. Seismic-related ground failure, including liquefaction?		✓		
iv. Landslides?		✓		
b. Result in substantial soil erosion or the loss of topsoil?		✓		
c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?		✓		
d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?		✓		
e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems?			✓	

Analysis

a. Geologic reports done for two projects in the Woodfords area indicate that those developments were in a Zone 4 area and that structural design for Zone 4 per the Uniform Building Code was required. In Alpine County the most probable ground failures resulting from seismic activity would be from landslides or liquefaction. The project area is subject to induced ground shaking, landslides in some locations, and liquefaction. Mitigation would be required in the design of facilities to withstand an earthquake.

b. Site grading could cause erosion, resulting in sedimentation of local water bodies. Mitigation would be required to minimize erosion.

c. The project site is subject to liquefaction and would require mitigation. See item a.

d. The soils in the area may be expansive. Mitigation would be required to ensure that facilities are designed to withstand the effects of soil expansion-contraction.

e. The project does not involve use of septic systems or other alternative wastewater disposal systems.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
VII. Hazards/Hazardous Materials				
Would the proposal involve:				
a. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?				✓
b. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			✓	
c. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				✓
d. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				✓
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?				✓

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
f. For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?				✓
g. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.			✓	
h. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?				✓

Analysis

a. No hazardous materials are associated with the proposed project.

b. No hazardous materials are expected to be used in project operation. Minor amounts of hazardous materials would be used during construction of the facilities (*e.g.* fuel for vehicles), but compliance with Federal and State hazardous materials laws and regulations would minimize the risk to the public presented by these potential hazards.

c. No hazardous materials will be used near Diamond Valley School.

d. The Project location is not known to be located on a site which is included on a list of hazardous materials sites compiled pursuant Government Code Section 65962.5. This will be confirmed as part of the EIR analysis.

e. Alpine County Airport is located several miles from the Project site, and the project site is outside the Airport's land use plan. The proposed Recycled Water Facilities Master Plan does not represent an increased risk to human safety associated with airport use.

f. There is no private airstrip in the vicinity of the project site.

g. Some construction will occur alongside and crossing public roads. The Project will propose mitigation measures to minimize interference with adopted emergency response plan or emergency evacuation routes.

h. The project components include new wetlands, irrigation areas, pipelines, changes in operations, etc. None of these components expose more people or structures to existing fire hazard areas.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
VIII. Hydrology and Water Quality				
Would the project:				
a. Cause a violation of any water quality standards or waste discharge requirements, or worsen any existing such violations?	✓			
b. Substantially deplete groundwater supplies or interfere substantial with groundwater recharge such that there would be a net deficit in aquifer volume or lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?				✓
c. Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of stream or river in a manner which would result in substantial erosion or siltation on- or off-site?				✓
d. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?				✓
e. Otherwise substantially degrade water quality?		✓		
f. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?				✓
g. Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	✓			
h. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?		✓		
i. Be subject to inundation by seiche, tsunami, or mudflow?				✓

Analysis

a. Land application of recycled water and the construction of wetlands for disposal of recycled water have the potential to degrade groundwater quality from the nitrogen or other nutrients present in the recycled water. The project will comply with Title 22 of the California Code of Regulations regarding tailwater and application rates will be planned to minimize surface water and groundwater impacts. The replacement of ditches with piping will help prevent groundwater contamination. Groundwater quality will be monitored according to NPDES and other permit requirements to ensure maintenance of quality. Increasing the flow through Indian Creek Reservoir will improve water quality in that impoundment, but may result in an increase in phosphorus and nitrogen concentrations in Indian Creek downstream from the reservoir. These issues will be evaluated further in the EIR and additional mitigation measures proposed if necessary.

b. Infrastructure and irrigation improvements, new wetlands, and new conveyance facilities would not interfere with groundwater recharge and would not use groundwater. The proposed project will enhance groundwater supplies.

c. Most of the proposed facilities would be constructed in sites already used for the District's existing recycled water disposal system and would not substantially alter the drainage pattern of the area. New wetlands and conveyance facilities may be constructed, but these would not change the overall drainage pattern of the area. Improvement of conveyance facilities will reduce erosion or siltation from open ditches.

d. The planned improvements would not create or contribute to runoff water from the project site. Discharge does not create runoff and will not alter existing drainage patterns.

e. The EIR will evaluate overall water quality impacts of the project including the potential for groundwater contamination associated with new facilities. The EIR will evaluate potential impacts to water quality of Indian Creek associated with the recycling and discharge, and determine if mitigation is available to reduce the impacts, if any, to less than significant.

f. The project does not include any housing.

g. A portion of the proposed wetlands and other facilities may be located within the 100-year floodplain. The EIR will determine whether the wetlands would impede or redirect flood flows, or worsen any existing flooding problems.

h. The proposed project does not include any new levees or dams. Failure of Indian Creek Reservoir dam could inflict damage. County regulations require that proposed construction include review of flood potential. The EIR will evaluate whether increased water recycling activity would increase the risk of downstream flooding from dam or irrigation ditch failure.

i. The proposed project area is not subject to seiche, tsunami, or mudflow.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
IX. Land Use and Planning				
Would the project:				
a. Physically divide an established community?				✓
b. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?			✓	
c. Conflict with any applicable habitat conservation plan or natural community conservation plan?				✓

Analysis

a. Proposed project components do not divide any established community.

b. Proposed project components do not appear to conflict with any applicable land use plans or regulations. Because the District's facilities provide recycled water to irrigate agricultural lands, they support the continued agricultural use of lands zoned for land extensive agriculture and would be consistent with policies in the Alpine County general plan. This issue will be evaluated further in the EIR.

c. There are no habitat conservation plans or natural community conservation plans in this area.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
X. Mineral Resources				
Would the project:				
a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?			✓	
b. Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?			✓	

Analysis

a-b. The primary mineral resource in the project area is aggregate. The project site has not been identified as an aggregate resource.

The increased use of recycled water would not affect the availability of mineral resources. Therefore, no impacts on mineral resources are identified.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
XI. Noise				
Would the project result in:				
a. Exposure of persons to or generation of noise levels in excess of standards establishes in the local general plan or noise ordinance, or applicable standards of other agencies?		✓		
b. Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?			✓	

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
c. A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				✓
d. A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?		✓		
e. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				✓
f. For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?				✓

Analysis

a. Construction of facilities would require mitigation to ensure that noise levels comply with Alpine County standards.

b. Although there may be some minor ground-borne noise and vibration during construction this is expected to be temporary, and therefore less than significant.

c. No permanent increase in noise levels are expected to occur as a result of the project implementation.

d. Construction noise would be potentially significant without mitigation. See item a.

e. The proposed project is further than two miles from an airport.

f. The Alpine County Airport is in the project vicinity. The facility is lightly used and the proposed project would not expose people in the area to excessive noise levels.

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
XII. Population and Housing				
Would the project:				
a. Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?			✓	

	Potentially Significant Impact	Less than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b. Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?				✓
c. Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?				✓

Analysis

a. Construction of the new facilities will enable improved water recycling activities and assist growth consistent with TRPA, El Dorado County, and Alpine County general plans. It will not induce or enable substantial new growth either in the Lake Tahoe area or rural Alpine County.

b. Construction of wetlands and conveyance facilities will not displace existing housing.

c. Construction of wetlands and conveyance facilities will not displace people.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
XIII. Public Services				
Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
a. Fire protection?				
b. Police protection?				✓
c. Schools?				✓
d. Parks?				✓
e. Other public facilities?				✓

Analysis

a-e. Construction and operation of the new recycled water disposal facilities will not induce population or employment growth, interfere with delivery of public services, or otherwise impact the need for public services in the area.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less Than Significant	No Impact
XIV. Recreation				
a. Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?			✓	
b. Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?			✓	

Analysis

a. The project would not increase permanent population or employment growth in the area. Improved surface water quality could enhance the potential in the area for recreational use, especially for fishing. See the response to Item b.

b. Increased recreational use of the site is not expected to occur as a result of project implementation.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
XV. Transportation/Traffic				
Would the project:				
a. Cause an increase in traffic, which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicles trips, the volume to capacity ratio on roads, or congestion at intersections)?			✓	
b. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways?			✓	
c. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?				✓
d. Substantially increase hazards due to a design feature (i.e., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			✓	
e. Result in inadequate emergency access?			✓	
f. Result in inadequate parking capacity?			✓	

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
g. Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?				✓

Analysis

a. Construction vehicles would temporarily increase traffic on Highways 88 and 89, and local roadways in the area, but this increase would not be expected to represent a substantial increase over the existing traffic load. Operational traffic increases would be negligible.

b. Level of service standards on designated roads or highways, or on local streets, are not expected to be impacted or exceeded in the area due to its limited population.

c. The project will not result in a change in air traffic patterns.

d. The proposed facilities do not include any roadway design features affecting safety. All project facility roadway crossings will be designed to meet safety standards.

e. The project will not result in inadequate emergency access to the site or access to nearby uses. All construction of pipelines would be done in such a way as to maintain emergency access.

f. Adequate on-site parking for construction workers is expected to be available. Parking at the site will be available for workers operating the facilities.

g. The project will not conflict with adopted policies, plans, or programs supporting alternative transportation.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
XVI. Utilities and Service Systems				
Would the project:				
a. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?				✓
b. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?				✓
c. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities?		✓		

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant Impact	No Impact
d. Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?			✓	
e. Result in a determination by the wastewater treatment provider that serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?				✓
f. Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?			✓	
g. Comply with federal, state, and local statutes and regulations related to solid waste?				✓

Analysis

a. The new facilities will have to meet the treatment requirements of the Lahontan Regional Water Quality Control Board in order to operate.

b. Because the project is the construction and expansion of water recycling facilities, the project in and of itself will not require any additional construction or expansion.

c. Operation of the new facilities may require construction of new stormwater drainage facilities or expansion of existing facilities. A Storm Water Pollution Prevention Plan will be implemented to ensure the reduction of sediment and other pollutants in the stormwater discharge from the construction site.

d. The proposed project will not have any requirements for additional water supplies.

e. The project itself will not create wastewater. It is planned to improve the recycling and disposal of treated effluent from District wastewater treatment facilities to enable the District to meet future increases in treatment and disposal demands.

f. Project construction will generate construction debris that will be disposed in approved solid waste facilities. Project operation is expected to create some demand for solid waste disposal (such as disposal of vegetation and soil from constructed basins), but this is not expected to adversely impact landfill capacities.

g. The project will comply with federal, state, and local statutes and regulations related to solid waste.

	Potentially Significant Impact	Less than significant with Mitigation Incorporation	Less than Significant	No Impact
XVI. Mandatory Findings of Significance				
a. Does the project have the **potential** to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	✓			
b. Does the project have impacts which are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	✓			
c. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?		✓		

Appendix B - NOP Comment Summaries

STPUD Recycled Water Facilities Master Plan EIR

Scoping Summary Report

June 5, 2007

The STPUD Recycled Water Facilities Master Plan Notice of Preparation began circulation on April 20, 2007 and ended on May 21, 2007. Two scoping meetings were held, the first on May 16, 2007 at Turtle Rock Park in Alpine County and the second on May 17, 2007 at the South Tahoe PUD Board Room in South Lake Tahoe. Five individuals spoke at the Alpine County scoping meeting. One individual and one Board member spoke at the South Lake Tahoe scoping meeting. Eight comment letters were received prior to the close of circulation and one comment letter was received after the close of circulation.

COMMENT LETTER 1:
California Regional Water Quality Control Board
Lahontan Region
Robert Dodds
May 16, 2007

1) **Waste Discharge Requirements (WDRs)**: Use of the Groundwater Recharge Using Infiltration Basins component would require an application for WDRs. This application will need to include a degradation analysis on the affects of percolated water on groundwater quality. The DEIR must evaluate these impacts from percolated recycled water on groundwater quality.
2) **Impoundment Basins with Pumping Back to Harvey Place Reservoir:** WDRs may be required for installation of these basins as impacts to groundwater may occur though the percolation of recycled water.

COMMENT LETTER 2:
Chris and Faye Gansberg

There is no mention of preferred Alpine County water users. Commenter is willing to sign a long term contract for the water. Mention of a wholesale program is alarming. Pumping of recycled water for reuse is not out of the question.

COMMENT LETTER 3:
Alpine Watershed Group
Hannah Schembri
May 18, 2007

1) **Optimize Application Rate on Existing Irrigated Lands:** Are there previous calculations based on soil permeability and nutrient requirements for the irrigation crops? Have studies been performed to determine if these rates would prevent

groundwater degradation. How are these rates measured to ensure protection of surface and groundwater and to minimize tailwater?

2) **Provide Recycled Water to New Non-irrigated, Permitted Land:** A map showing the acreage and locations of these lands would be helpful. Concerns with zoning of non-irrigated, permitted lands are evident. What is the zoning of these lands? Would it be safe for human health to use recycled water on these lands?
3) **Pursue the Permitting of More Land in Alpine County:** What is the quantity of recycled water that is being used? What is the excess that is stored in Harvey Place Reservoir? How much additional land will be needed for use in the future for recycled water application?
4) **Make Recycled Water Available to Irrigators in Nevada:** This option is not favored by the county residents. Is there enough excess to include Nevada Lands? A bidding war may start in Nevada if STPUD decides to charge for their water. This option should only be used if it is determined that more storage space is necessary in Harvey Place Reservoir to prevent an emergency situation.
5) **Improve Operation of the Diamond Ditch System to Meet the District and User Needs:** How would the Diamond Ditch System be managed if STPUD had ownership. Would this create a hardship on the current and historical users of the ditch system. How would this change in operation help to manage the Harvey Place Reservoir.
6) **Capacity Conveyance Improvements in the Diamond Ditch System:** Improvements to the Diamond Ditch System would increase the capacity, prevent erosion and flooding and would be a benefit to the system.
7) **Provide Recycled Water Under Pressure through Wade Valley, the Fredericksburg System and the Ranchettes:** The benefits of the pressurized system would allow for the use of sprinklers which are safer and would ensure protection of surface and groundwater and would allow for a more efficient application. The piping of the delivery system would minimize spills as well.
8) **Develop Tailwater Control System:** This option should be explored in more detail. The proposed ponds may require a clay liner to prevent percolation. The irrigators should comply with tailwater regulations and STPUD should provide assistance to those irrigators.
9) **Non-Flood Irrigation Application Systems:** Concerns with sub-surface application systems exist. How is groundwater protected with this system? The sprinkler system is recommended. What is the amount of water that will be used under this system vs. flood flow application. By using more conservation approaches such as these, would this result in increased levels in Harvey Place Reservoir?
10) **Improve Recycled Water Quality in the Diamond Ditch System:** The quality of the recycled water should be improved. Should aeration methods be used in the ditch or in Harvey Place Reservoir where a larger beneficial affect may be achieved.
11) **Develop a Recycled Water Wholesale Program:** This option is not recommended.

12) **Route Mud Lake Winter Flows Through Indian Creek Reservoir:** This option is recommended. Additional water that can be diverted through Indian Creek Reservoir would benefit the system.
13) **Groundwater Recharge Using Infiltration Basins:** If this would eliminate the use of recycled water for irrigation, the public would not approve. Only the water that is not being utilized should be used for groundwater recharge. Groundwater resources should be protected and calculations shall be provided.
14) **Increase Snowshoe Thompson No. 1 Conveyance Capacity:** This alternative should occur through the installation of a pipeline or making improvements to the existing ditch system. This increase in conveyance would also benefit the water quality in Indian Creek Reservoir.
15) **Transfer Additional Water Rights to Storage in Indian Creek Reservoir:** Additional water would benefit the water quality of the Indian Creek Reservoir.
16) **Construct Zero Discharge Basins or Wetlands:** This alternative should be further investigated. Constructed wetlands could help treat wastewater before it enters Harvey Place Reservoir.
17) **Piping Recycled Water Systems to Minimize Setbacks and Human Contact:** This alternative would protect human health from unnecessary contact with recycled water.

COMMENT LETTER 4:
Timothy Pemberton
May 17, 2007

1) The Snowshoe Thomson No. 1 ditch easement is based on historic use and not a written grant of unconditional easement. Future use would be limited to the historic uses as defined by United States v. Alpine Land & Reservoir Co. A substantial change in use would require landowner consent.
2) The right to convey water in an open ditch is not included in the right to convey water through a pipe. Attempting to do so extinguishes the easements. The same rule applies to an attempt to gunnite or otherwise line the ditch.
3) Transferring of water rights to route flows through Indian Creek Reservoir is vague and unintelligible. This would be a substantial change in the nature of the use of the ditch system and would therefore raise the issues as described in items 1 and 2 above.
4) Subsurface irrigation near the school and residences raises issues of impacts to groundwater due to the nature of the soils in the area and the soil hazard rating as outlined by the USDA Soil Conservation Service. These issues also apply to the rapid infiltration basins for the disposal of effluent. The EIR must address these issues.
5) The District's objective of becoming a water rights broker is misplaced. The district should limit its water brokering activities to its own service area.

<u>COMMENT LETTER 5:</u>
Alpine County Board of Supervisors
May 16, 2007

1) The county supports optimizing the application rate for recycled water used for irrigation purposes on existing permitted lands in Alpine County.
2) Alpine County has concerns with providing water to irrigators in Nevada. Rather the County urges STPUD to persue improvements to the infrastructure that would allow for application to existing permitted lands that are not receiving recycled water.
3) Tailwater detention systems should be included in all alternatives.
4) The County supports transferring water rights to ICR to improve water quality and habitat.
5) The County supports using piped irrigation technologies for the application of recycled water.
6) Pressurized water systems are highly desirable in providing efficient delivery of recycled water to permitted areas.
7) The County urges the district to consider expansion of the existing hydrant system to provide additional access points closer to residential development in the Mesa Vista and River Ranch locations.
8) The County supports the recycled water wholesale program for new permitted users only. Maintaining historical relationships with existing permitted irrigators is critical.
9) The County encourages STPUD to work with NDEP regarding any diversion of recycled water to Nevada.
10) The County supports the transfer of water rights to storage in Indian Creek. Increased flows would improve water quality.
11) The County supports transferring water from other locations in the County including red lake to improve water quality and habitat.
12) The County supports the development of biomass and/or wetland sod and seed production, native plant nursery and other economic development opportunities.

<u>COMMENT LETTER 6:</u>
Scott Brooke
May 2007

1) The irrigation contracts in place should be extended on a long term basis with willing contracting parties.
2) The recycled water should first be used to fulfill the current contracts in Alpine County, the next should be for contiguous ground of these contractors in Alpine County or Nevada.
3) As agreed with the County and the Contractors, no charge should be made for the disposal of recycled water on the affected properties for the life of the contracts.
4) A pipeline to the on-farm property should be added.
5) The comments at the workshop of the 16th of May should be included.

COMMENT LETTER 7:
Jacqui Granfield
May 21, 2007

- Commenter is interested in biomass project plans in Alpine County.

COMMENT LETTER 8:
Nancy Thornberg
May 21, 2007

- Commenter requested to be placed on project contact list.

COMMENT LETTER 9:
Lynda Shoshone
May 23, 2007 **Note: Letter was received after the close of the public scoping period.*

1) Commenter has concerns regarding the proposed project and was not aware of the public meetings
2) The project has potential to damage cultural materials within the project area.
3) Where is the funding coming from to make sure the project does not fall under "106".
4) Who is performing the cultural resource surveys.

COMMENT LETTER 10:
Carson Water Subconservancy District
Edwin James, General Manager
May 17, 2007

1) Storing water at the Indian Creek Reservoir is very important.
2) Storage of surface water is limited in the Carson River Watershed. Storing water in Indian Creek Reservoir is important to the health and benefit of the watershed.
3) The ability to divert, store and release additional water that may become available in the future is vital.

STPUD Public Scoping Meeting
Turtle Rock Park, Alpine County, CA
May 16, 2007
Public Comments:

- Shirley Taylor - Are you going to re-do a draft of the Master Plan? Is this new plan and meetings going to be noticed? How is the noticing going to be performed in the future? What is the procedure? *A - Notify by mail and e-mail. Notification procedures will be the same as was used for this meeting.*
- Shirley Taylor- Will the documents be available online? *A – the master plan will be available online.*

- Philip Bennett - Has the Washoe Tribe been notified? – *A – Yes. Washoe Tribe was on the list and the NOP was sent. All names received here today will be added to the list.*
- Shirley Taylor- What is an impoundment basin and how does it work? – *A – Additional storage that is used for recycled water usually on an emergency basis.*
- Shirley Taylor- Is that the main reason STPUD purchased Diamond Valley? – *A – Yes, that was one of the main drivers.*
- Shirley Taylor- On page 8 of the NOP – Provide recycled water under pressure to Ranchettes. This talks about Fredricksburg system. Fredricksburg is privately owned. Will the Ranchers be amendable to placing the water in a pipe vs. in an open trench? Fredricksburg is of great interest to many of the people here today and we are very interested in this! I live in the area between Riverview Meadows to Chambers Lane – all these owners have a vested interest in obtaining irrigation water.
- Scott Brooke - There should be priority given to the contractors that have been committed to the project and have been involved for 40 years on this project.
- Scott Brooke – before the 2001 master plan was developed – there was a series of meetings with District, Alpine County and Irrigators to go over issues – assumptions were developed: Is priority given to existing contractors? Non-fee basis? Now there has been a delay due to updating the Master Plan, then litigation. How do these fit into the components? How do these components relate to the past alternatives? How are these modified? How do these components relate to the past alternatives that were generated in the last EIR?
- Scott Brooke – Please add a pipe from Wade Valley to on-farm facilities.
- Herman Zellmer- First bullet on bottom of page one – explain optimize – optimize application rate on irrigation lands. Are you going back to revisit science to look at rates of application? Is there regulation involved? Those who made this possible in the past should be allowed to do so at the same rate and at no fee as was assumed to in the past. Talking about many changes with no new water – so what is going to happen to the existing water? Are there new changes with the existing? We not want to see existing water being taken away from those who made it all happen. Alpine county should come first!
- Hal – Management plan for each of the ranches – what is the proper amount of water to apply to lands – not too much, not too little. Within the bounds of the law.
- Shirley Taylor– Ranchers who carry load should keep what they have. If the Ranchettes need some only the extra will be given and not taken away from the existing supply? What possibility of this going over into NV? Alpine county should come first!
- Herman Zellmer– Really appreciate the amount of water that is being placed in ICR – this is good! Understand that irrigation that is planned is good.
- Don Jardine– existing contractors that receive water should be given the water on a no fee basis. These contractors should be first consideration.

STPUD Board Meeting Room
South Lake Tahoe, CA
May 17, 2007
Public Comments:

- Jim Jones – Landscape Architect might be a good addition to the team to improve the aesthetics of the Diamond Valley Area.
- Scott Brooke – I attended presentation yesterday and it was well received by the members of Alpine County. I am contracted party and am looking forward to continuing the relationship. I also look forward to working through the details and am interested in the Board's comments. A pipe to wade valley should be studied due to more land on the east side of the Carson River.

Appendix C - Glossary of Terms

Appendix C - Glossary of Terms

Table C-1	
Glossary of Terms	
AADT	Annual Average Daily Traffic counts
AB 32	California Global Warming Solutions Act of 2006
ACGMP	Alpine County Groundwater Monitoring Program
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
AF	Acre-Feet
AF/yr	Acre-Feet per Year
ANSI	American National Standards Institute
APCDs	Air Pollution Control Districts
AQMDs	Air Quality Management Districts
ARMR	Archaeological Resources Management Reports
BAQP	Nevada Division of Environmental Protection - Bureau of Air Quality Planning
Basin Plan	Water Quality Control Plan Report for the North Lahontan Basin
bgs	Below Ground Surface
BLM	United States Bureau of Land Management
BMP	Best Management Practice
BOD	Biological Oxygen Demand
BP	Before Present
BWPC	Nevada State Bureau of Water Pollution
BWQP	Nevada State Bureau of Water Quality Planning
CAA	Federal Clean Air Act of 1970
CAAA	1990 Clean Air Act Amendments
CalEPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCIC	Central California Information Center
CDF	California Department of Forestry
CDFG	California Department of Fish and Game
CDMG	California Department of Mines and Geology
CDMGB	California State Mining and Geology Board
CEQA	California Environmental Quality Act

Table C-1

Glossary of Terms

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cfs	Cubic Feet per Second
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO_2	Carbon Dioxide
Cortese List	California's Hazardous Waste and Substance Sites List
CSAA	Central Sierra Agency on Aging
CSWGPP	State of Nevada Comprehensive State Groundwater Protection Program
CWA	Clean Water Act of 1972
CWC	California Water Code
dB	Decibel
dBA	A-weighted decibel
dbh	Diameter at Breast Height
DEIR	Draft Environmental Impact Report
District	South Tahoe Public Utility District
Division	Nevada Division of Fish and Wildlife
DRI	Desert Research Institute
DSOD	California Department of Water Resources, Division of Safety of Dams
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FEMA	Flood Emergency Management Agency
FESA	Federal Endangered Species Act
Forest Service	United States Department of Agriculture Forest Service
Fossils	Paleontological Resources
GBUAPCD	Great Basin Unified Air Pollution Control District
GHG	Greenhouse Gases
H_2S	Hydrogen Sulfide
HABS	Historic American Buildings Survey
HAER	Historic American Engineering Record
HAP	Hazardous Air Pollutants
HAZWOPER	Hazardous Waste Operations and Emergency Response

Table C-1

Glossary of Terms

HPR	Harvey Place Reservoir
ICR	Indian Creek Reservoir
in/yr	Inches per Year
Lahontan	Regional Water Quality Control Board-Lahontan Region
L_{dn}	Day-night Average Sound Level
L_{eq}	Energy Equivalent Sound Level
LOS	Level of Service
LP	Land Preserve
MBTA	Migratory Bird Treaty Act
Mgal/yr.	Million Gallons per Year
mgd	Million Gallons per Day
mg/L	Milligrams per Liter
*m*g/L^3	Microgram per Cubic Liter
MGSD	Minden Garnerville Sanitation District
Mmax	Maximum Moment Magnitude
MMI	Modified Mercalli Intensity
$\mu g/m^3$	Microgram per Cubic Meter
MMP	Mitigation and Monitoring Program
MOA	Memorandum of Agreement
MPN	Most Probable Number
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NAHC	Native American Heritage Commission
NDEP	Nevada Department of Environmental Protection
NDF	Nevada Division of Forestry
NDOW	Nevada Division of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NMP	Nutrient Management Plan
NNPS	Nevada Native Plant Society
NO_2	Nitrogen Dioxide
NOAA	National Oceanic and Atmospheric Administration
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination Program
NRHP	National Register of Historic Places
NRS	State of Nevada Revised Statutes
NSM	Nevada State Museum

Table C-1

Glossary of Terms

NWP	Nationwide Permit
O_3	Ozone
OES	Office of Emergency Services
OPR	California Governor's Office of Planning and Research
OS	Open Space
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
Pb	Lead
PD	Planned Development
PGA	Peak Ground Acceleration
PM_{10}	Particulate Matter Less than 10 Microns in Diameter
$PM_{2.5}$	Particulate Matter Less than 2.5 Microns in Diameter
PPM	Parts per Million
PRC	Public Resource Code
Project	Recycled Water Facilities Master Plan
PSD	Prevention of Significant Deterioration Program
psi	Pounds per square inch
RCRA	Resource Conservation and Recovery Act
RIB	Rapid Infiltration Basin
RL	Rural Low
ROW	Right-of-Way
RR	Rural Residential
RWQCB	Regional Water Quality Control Boards
SH	Scenic Highway
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SMARA	Surface Mining Reclamation Act of 1975
SO_2	Sulfur Dioxide
State Board	California State Water Resources Control Board
STPUD	South Tahoe Public Utility District
Superfund	Superfund Amendment and Reauthorization Act of 1986
SWANCC decision	Solid Waste Agency of Northwestern Cook County versus United States Army Corps of Engineers et al.
SWPPP	Storm Water Pollution Prevention Plan
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TRPA	Tahoe Regional Planning Agency

Table C-1

Glossary of Terms

TSS	Total Suspended Solids
UAPCDs	Unified Air Pollution Control Districts
UBC	Uniform Building Code 1997
UIC	Underground Injection Control
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VMT	Vehicle Miles Traveled
WDR	Waste Discharge Requirements
WMA	Wildlife Management Areas
WWTP	Wastewater Treatment Plant
yds^3	Cubic Yards

Appendix D - Mitigation and Monitoring Plan

Appendix D - Mitigation and Monitoring Program

D.1 Mitigation Program Approach

This appendix presents the Mitigation and Monitoring Program (MMP) for the District Recycled Water Facilities Master Plan (Project). The purpose of this detailed MMP is to make clear to the reader the responsibilities of the District in implementing the Project.

Included in the MMP are measures required by law or regulation, standard engineering and design practices adopted and implemented by the District as part of planning, construction, operation and maintenance of the Project, or mitigation measures recommended by the District's consultant team to mitigate specific impacts identified in Chapters 4 through 18 of this EIR. These recommended mitigation measures are identified in Chapter 4 through 18 resource sections under the subheading Environmental Consequences (Impacts) and Recommended Mitigation, as feasible and effective in mitigating project-related environmental impacts. The District will adopt mitigation measures at the time of approval of the Master Plan. At that time, the District has the option of approving alternate mitigation measures, if they are shown to be equally effective and feasible.

Mitigation measures must be designed to minimize significant environmental impacts, not necessarily to eliminate them (Pub Res C§21100(b)(3); 14 Cal Code Regs §15126.4(a)(1))**.** Any action that is designed to minimize, reduce, or avoid an environmental impact or to rectify or compensate for the impact qualifies as a mitigation measure under 14 Cal Code Regs §15370. The following specific requirements for mitigation measures are set forth in 14 Cal Code Regs §15126.4:

- Mitigation measures should be identified for each significant effect described in the EIR;
- Mitigation measures are not required for impacts that are less than significant;
- If several measures are available to mitigate a significant adverse impact, the EIR should discuss each measure and identify the reason for selecting a particular measure;
- If a mitigation measure would itself create significant environmental impacts, those effects must be discussed in the EIR but in less detail than the significant effects of the proposed project;
- Although formulation of mitigation measures ordinarily should not be deferred, measures may identify performance standards for mitigation that can be accomplished in more than one way;
- When relevant, an EIR must discuss measures that could minimize inefficient and unnecessary consumption of energy;
- The description must distinguish between mitigation measures that are included in the Project as proposed and other measures that the lead agency determines could reasonably be expected to reduce significant impacts as conditions of the project approval;
- Mitigation measures must either be incorporated into the design of the project (Standard Practices) or be fully enforceable through conditions, agreements, or other means; and
- Mitigation measures imposed by the lead agency must be consistent with applicable constitutional standards limiting actions by public agencies, including "nexus" and "rough proportionality."

The legal basis for the development and implementation of a MMP lies within CEQA. CEQA Sections 21002 and 21002.1 state that:

- Public agencies are not to approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects;

- Each public agency shall mitigate or avoid the significant effects on the environment of projects that it carries out or approves whenever it is feasible to do so;

- CEQA Section 21081.6 further requires that: the public agency shall adopt a reporting or monitoring program for the changes made to the project or conditions of project approval, adopted in order to mitigate or avoid significant effects on the environment. The reporting or monitoring program shall be designed to ensure compliance during project implementation; and

- The monitoring program must be adopted when a public agency makes its findings under CEQA so that the program can be made a condition of project approval in order to mitigate significant effects on the environment. The program must be designed to ensure compliance with mitigation measures during project implementation to mitigate or avoid significant environmental effects.

D.2 Mitigation Program Format

D.2.1 Compliance with Existing Laws, Policies and Regulations/Compliance Measures

This section presents the applicable federal, State, regional, and county laws, policies and regulations with which the Project must comply and must be included as part of the Project Description. Compliance with these policies and regulations will result in avoidance and/or minimization of adverse environmental impacts and are referred to as Compliance Measures.

D.2.2 Standard Practices Included in the Project

This section presents a listing and descriptions of standard practices that the District is either currently implementing as standard engineering and design practices or that are incorporated into the Project Description for the Master Plan. The District adopted these practices and incorporated them as part of the Project in order to avoid or minimize potential environmental impacts identified during Project planning and design. These practices represent standard engineering, design, construction, operation and maintenance practices.

These practices are part of the Project and do not fit under the normal definition of mitigation. These standard practices are included in this chapter to provide a mechanism to ensure that they are implemented and monitored, and to assist the reader in understanding the commitments made by the District.

D.2.2.1 Planning Measures

This section contains standard practices to be implemented during the final planning and detailed design of projects implemented under the Project. These measures require that a project be designed to accommodate particular environmental constraints. Compliance with these standard practices during planning and design of Project Components will result in avoidance and/or minimization of adverse environmental impacts.

D.2.2.2 Construction Measures

This section contains standard practices to be implemented prior to, during, and immediately following project construction. These measures generally require the District to follow certain constraints during construction and to repair and rehabilitate impacts resulting from construction of the Project. Compliance with these standard practices during construction will result in avoiding, minimizing, or reducing adverse environmental impacts.

D.2.2.3 Operation and Maintenance Measures

This section contains standard practices to be implemented during operation of the Project. These measures generally require monitoring of system operations over time and the modification of those operations to reduce adverse environmental impacts. Compliance with these standard practices results in the reduction of adverse environmental impacts.

D.2.3 Mitigation Measures

This section presents the mitigation measures proposed to avoid, reduce and further mitigate significant environmental impacts identified during environmental impact analysis in the resource sections for land use, agriculture, geology, soils and seismicity, groundwater, surface water, hydrology, public health and safety, biological resources, traffic and circulation, air quality, noise, cultural resources, visual resources, public utilities and services, and population and housing.

D.3 Measure Format

Figure D-1 presents the format for each compliance measure, standard practice or mitigation measure and the information and requirements that each contains.

Figure D-1. Mitigation Measure Format

Title: Title of Measure

Description: Description of the requirements of the compliance measure, standard practice or mitigation measure.

Impacts Mitigated and Mitigation Level (for Recommended Mitigation Measures)

Impacts Mitigated	Level of Significance After Mitigation
A list of impacts, by number and text, to which the mitigation measure applies. *This list directly corresponds to the impact numbers and impact statements presented in Chapters 4 through 18.*	The level to which the impact is anticipated to be mitigated.

Component: The component(s) for which this measure is recommended.

Lead Agency: The agency or individual that has the responsibility for insuring that the measure is carried out.

Implementing Agency: The agency or individual that has the responsibility for implementing or performing the measure.

Timing: **Start:** The appropriate time at which the measure is to be implemented.

Complete: The appropriate time at which the measure is to be complete.

Monitoring Agency: The public agency that has the responsibility for monitoring to insure that the mitigation measure is effective in mitigating the impact.

Validation: The means by which the monitoring agency will verify that the measure has been carried out.

D.4 Compliance with Existing Laws, Policies and Regulations/ Compliance Measures

This section presents the applicable federal, State, regional, county, and local agreements, policies and regulations and laws with which the Project Components are required to comply. Compliance with these laws, policies and regulations, and future modifications thereof, is required and results in avoidance and/ or minimization of adverse environmental impacts.

D.4.1 County

- Alpine County General Plan
- Alpine County Zoning Ordinance
- Alpine County Building Codes
- Agreement Between South Tahoe Public Utility District (District) and the County of Alpine and Alpine County Water Agency, 1967, as amended and consolidated on November 5, 2002
- Douglas County Master Plan
- Douglas County Zoning Ordinance
- Douglas County Building Codes

D.4.2 Regional

- Carson Water Subconservancy District Rules and Regulations
- Great Basin Unified Air Pollution Control District Rules and Regulations

D.4.3 State

- California Environmental Quality Act (CEQA)
- California Endangered Species Act (CESA)
- California Clean Air Act (CCAA)
- California Occupational Safety and Health Administration (Cal-OSHA)
- California Department of Fish and Game Stream Bed Alteration Agreement (Fish and Game Code Section 1601-1603)
- California Department of Fish and Game (CDFG)Hardwood Management Guidelines (Revised 1994)
- California Health and Safety Code, Section 25500 et seq. - Hazardous Materials Release Response Plans and Inventory
- California Regional Water Quality Board, Lahontan Region/ Water Quality Control Plan for the Lahontan Basin Plan and Wastewater Discharge Requirements

- Native Plant Protection Act (Fish and Game Code Section 1900-1913)
- Nevada Department of Environmental Protection Regulations, Regulations for Water Recycling (Nevada Administrative Code, §445A.275 through 445A.280)
- Public Resources Code, Sections 5097.5 and 30244
- Public Resources Code, Sections 5020-5024 (California Register of Historic Places)
- Public Resources Code, Section 6301 et seq.
- Public Resources Code, Section 6501 et seq.
- Title 8, California Code of Regulations, Section 1539 - 1541.1 - Excavations
- Title 8, California Code of Regulations, Sections 1539 - 1541.1 - Excavations
- Title 8, California Code of Regulations, Sections 1509 & 3203 - Injury and Illness Prevention Program
- Title 8, California Code of Regulations, Sections 1597 - 1599 - Vehicles, Traffic Control, Flaggers, Barricades, and Warning Signs
- Title 8, California Code of Regulations, Section 5194 - Hazard Communication
- Title 22, California Code of Regulations, Section 60301 et seq. - Reclaimed Water
- Title 22, California Code of Regulations, Section 66260.1 et seq. - California Hazardous Waste Regulations

D.4.4 Federal

- Archaeological and Historic Data Preservation Act of 1974
- Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977; Section 404
- Code of Federal Regulations, Title 40 Parts 6, 51, and 93
- Federal Antiquities Act of 1906
- Clean Air Act (CAA), amended 1977 and 1990
- Federal Endangered Species Act (FESA) of 1973, as amended
- Mining Law of 1872, amended 1988
- National Environmental Policy Act (NEPA) of 1969
- National Historic Preservation Act of 1966, amended 1976 and 1980 Sections 106 and 110
- National Natural Landmarks Program, Historic Sites Act of 1935
- Rivers and Harbors Act of 1899, Section 10

- Surface Mining Control and Reclamation Act of 1977

Table D-1 summarizes the permits and approvals that are necessary for compliance with federal, State, regional, county laws, policies and regulations. Table D-1 discloses the permit or approval type, the activity regulated and the anticipated review period.

Table D-1

Potentially Applicable Federal, State, Regional, and County Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Federal Agency Permits and Approvals					
U.S. Army Corps of Engineers	Department of the Army Permit (Section 404)	2, 3, 4	Discharge of dredged or fill material into waters of the U.S. (including wetlands)	Six to eight months	Section 404 Clean Water Act (33 USC 1344)
U.S. Army Corps of Engineers	Department of the Army Permit (Section 10)	2, 3, 4	Structures or work in or affecting navigable waters of the U.S.	Up to seven months	Section 10 of Rivers and Harbors Act of 1899 (33 USC 403)
Advisory Council on Historic Preservation/State Office of Historic Preservation	Section 106 Review and Compliance	2, 3, 4	Consideration of a Section 404/10 permit by USACE.	Up to six months	National Historic Preservation Act 36 CFR 800
U.S. Fish and Wildlife Service/ National Marine Fisheries Service	Section 7 Consultation	2, 3, 4	Consideration of a Section 404/10 permit by USACE.	Four to six months	16 USCA 1531 et seq.: 50 CFR Part 17, Sections 17.94-17.96 Endangered Species
State Agency Permits and Approvals					
California Department of Transportation (Caltrans)	Encroachment Permits	2, 3, 4	Use of State rights-of-way for installation of pipelines along state freeways and roads	Two months	21 CCR14.11.1-14.11.6
California Department of Transportation (Caltrans)	Transportation Permit	2, 3, 4	Transport of heavy or oversized loads on state roads during construction	Same day as applied for	California Vehicle Code Section 35780; California Streets and Highway Code 117, 660-711
State Lands Commission	Land Use Lease	2, 3, 4	Placement of fill or structures in navigable waterways or Section 16 or 36 lands	Six months	California Public Resources Code Section 6000 et seq.

Table D-1

Potentially Applicable Federal, State, Regional, and County Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
California Department of Water Resources, Division of Safety of Dams (DSOD)	Approval of plans and specifications for the construction or enlargement of a dam or reservoir	2, 3, 4	Construction of impoundments with greater than 50 acre/feet capacity or with dam heights greater than 6 to 25 feet	Six months	California Water Code Division 3, Dams and Reservoirs Parts 1 and 2
State Water Resources Control Board	Water Rights Permit	2, 3, 4	Transfer or modifications of existing water rights	Six to twelve months	
California Occupational Safety and Health Administration (CalOSHA)	Permits for construction, trench excavations, and demolition	2, 3, 4	Construction of trenches or excavations five feet or deeper and into which a person is required to descend; Construction or demolition of any building, structure, scaffolding or falsework more than three stories high; The underground use of diesel engines in working mines and tunnels	One week	California Labor Code Section 6500
California Department of Fish and Game	Streambed Alteration Agreement	2, 3, 4	Crossing of streams, rivers, or lakes (also for reservoirs which interrupt streams)	One month	Sections 1601-1603 of the California Fish and Game Code
California Department of Fish and Game	Section 2081 Management Agreement	2, 3, 4	Potential adverse effects to state endangered or threatened species or species proposed for state listing; Incidental “take” of state protected species by a non-state entity	Seven months	Section 2081 California Fish and Game Code

Table D-1					
Potentially Applicable Federal, State, Regional, and County Permits and Approvals					
Agency	**Type of Permit or Approval**	**Alternative No.**	**Regulated Activity**	**Review Period**	**Authority**
State Office of Historic Preservation	See Advisory Council on Historic Preservation under U.S. Army Corps of Engineers	2, 3, 4			
Regional Agency Permits and Approvals					
Lahontan Regional Water Quality Control Board	General Construction Stormwater National Pollution Discharge Elimination System (NPDES) Permit	2, 3, 4	Stormwater discharges when clearing, grading, and excavation result in a land disturbance of five or more acres	Prior to construction	Clean Water Act
Lahontan Regional Water Quality Control Board	Waste Discharge Requirements	2, 3, 4	Discharge of recycled water on land and to groundwater	Six months to one year	Porter-Cologne Water Quality Act
Lahontan Regional Water Quality Control Board	Section 401 Water Quality Certification	2, 3, 4	Discharge of fill materials to waters of the U.S.	Two months	Clean Water Act
Great Basin Unified Air Pollution Control District (GBUAPCD)	Authority to Construct and Permit to Operate	2, 3, 4	Any project that emits criteria pollutants; Project also subject to reporting under Toxic Hot Spots legislation (AB 2588); District oversees criteria pollutant emissions and odor control	One year or longer	New Source Review regulations; Clean Air Act; BAAQMD Regulation 2, Rule 2, Sections 301.2 and 302
County Permits and Approvals					
Alpine County Planning Department	Use Permit	2, 3, 4	Development of proposed facilities	Three to four months	County Codes
Alpine County	Construction and dust control permits	2, 3, 4	Required prior to construction	One month	County Codes
Alpine County Public Works Department	Road Encroachment Permit	2, 3, 4	Encroachment onto roads and county drainages	One to two months	County Codes

Table D-1

Potentially Applicable Federal, State, Regional, and County Permits and Approvals

Agency	Type of Permit or Approval	Alternative No.	Regulated Activity	Review Period	Authority
Alpine County Public Works Department	Grading Permit	2, 3, 4	Certain grading activities	One months	County Codes (Uniform Building Code)
Alpine County Public Works Department	Oversize Load Encroachment Permit	2, 3, 4	Transport of heavy or oversized loads on county roads	One day	County Codes

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D.5 Standard Practices Included in the Project

This section presents a listing and description of standard practices that are incorporated into the description of the Project for compliance with District Standard Practices for Engineering, Design, Construction, Operation and Maintenance. The District is either currently implementing these standard practices or has adopted and incorporated these standard practices as part of the Master Plan in order to avoid or minimize potential environmental impacts. Because these standard practices are part of the Project and are at times required by law, they do not fit under the normal definition of mitigation**.** These standard practices are included in the MMP to provide a mechanism to ensure implementation and monitoring responsibilities are met and to disclose to the Public the commitments the District has made.

The following standard practices will be implemented during the course of the Project, including planning and design, construction, and system operation and maintenance. Compliance with these standard practices will result in avoidance and/or minimization of adverse environmental impacts.

SP-1 Dam Safety

Description:

Indian Creek Dam, No. 1062 and Harvey Place Dam, No. 1062-3, are currently under the jurisdiction of Division of Safety of Dams. If any alteration to the Dams or their appurtenances is anticipated, an alteration application, together with plans and specifications, shall be filed with the Division of Safety of Dams. All dam safety-related issues shall be resolved prior to approval of the application and the work shall be performed under the direction of a civil engineer registered in California.

The State of California requires that an inundation map be prepared for any dam that is either 6 to 25 feet or more in height or impounds 50 acre-feet or more of water (California Water Code, §6002 and California Government Code §8589.5). The District shall prepare an inundation map for any site that is subject to these requirements. The map for proposed temporary containment locations shall be submitted to the Office of Emergency Services (OES) for review and approval. Following approval, OES shall transmit the map back to District who shall then produce evacuation plans within six months. These plans, which are subject to OES review, may be required to include:

- Traffic control measures;
- Shelters for evacuees;

- Movement of people without their own transportation;
- Perimeter security for the evacuation area; and
- Reentry of evacuation area.

Component: Components 11, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Upon approval of temporary containment sites requiring inundation maps.

Complete: District shall develop and submit an inundation map to the OES within two months of selecting a Project Component that include temporary containment sites requiring such mapping. An evacuation plan shall be developed and submitted to OES within six months of receiving the approved inundation map.

Monitoring Agency: OES

Validation: District shall maintain a copy of the OES approved inundation map and evacuation plan.

SP-2 Standard Traffic Control Procedures

Description: Prior to construction of a Project Component, the District shall implement standard traffic control measures to avoid potential impacts to roads and traffic congestion. The District shall obtain necessary Encroachment and Transportation Permits from the appropriate agencies. At a minimum, the procedures to be implemented by the District shall contain Measures SP-3 through SP-10, discussed below.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During construction of each Project Component.

Complete: Implementation shall continue throughout construction.

Monitoring Agency: Caltrans/Alpine County

Validation: The District shall comply with this measure prior to starting construction of a Project Component.

SP-3 Emergency Response Vehicles Shall Not be Impeded

Description: The District shall ensure that construction of the Project does not impede emergency response vehicles. For each Project Component, the District shall inventory the locations of emergency response providers (hospitals, police, fire, and ambulance) and their primary response routes.

Where project facilities are to be constructed along emergency response routes, the District shall recommend and obtain approval of alternate emergency response routes from the affected service, at a minimum of one week prior to construction.

During construction, the District shall notify the emergency services on a weekly basis of the timing, location, and duration of construction activities throughout the project area for that week and a schedule of construction activities by area and date.

A copy of the construction activity schedule shall be maintained at selected public libraries and District Offices.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** The inventory shall be started during component design. Notification of construction activities shall occur on a weekly basis.

Complete: At the completion of the construction period.

Monitoring Agency: District

Validation: The District shall comply with this measure prior to starting construction of a Project Component.

SP-4 Maintain Maximum Number of Open Lanes on Roadways

Description: Where project construction occurs in or along roadways, the maximum number of through traffic lanes shall be kept open. A minimum of one lane of through traffic shall be maintained at all times.

Where single-lane, one-way operation is required, the construction manager shall mark construction zones and provide traffic control in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990). This shall include, but not be limited to, appropriate signage marking construction zones and flag persons or electronic signal control at each end of the restricted lanes.

Prior to construction of a Project Component, the District shall implement standard traffic control measures to avoid potential impacts to roads and resultant traffic congestion. The District shall consult with the Alpine County Department of Public Works staff and other affected agencies regarding site-specific details of the project prior to the preliminary design stage. Construction drawings shall be provided to affected agencies before the start of construction.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Prior to preliminary design stage.

Complete: At the completion of construction.

Monitoring Agency: Caltrans/Alpine County

Validation: The District shall comply with this measure prior to starting construction of a Project Component.

SP-5 Avoid Traffic Disruption on Major Highways

Description: The District shall design pipelines crossing State Route 88 in accordance with Caltrans requirements so as not to disrupt the flow of traffic and commerce.

Component: Components 4, 6

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Design phase of each Project Component.

Complete: Upon certification of Final Engineering Drawings.

Monitoring Agency: Caltrans

Validation: The District shall comply with this measure prior to certifying the Final Engineering Drawings.

SP-6 Fence or Cover Trenches

Description: During construction, the District shall require trenches to be backfilled on the same day of completion of component installation.

While under construction, the District shall cover open trenches with steel plating where the trench crosses roadways or prevents access to businesses or residences, if feasible.

When possible, the District shall not leave trenches uncovered overnight. Trenches left uncovered shall be fenced and marked with appropriate signage in accordance with Caltrans “Manual of Traffic Controls for Construction and Maintenance of Work Zones” (Caltrans 1990).

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of component construction. The District shall monitor compliance on a daily basis at the end of each workday.

Complete: At the completion of construction.

Monitoring Agency: District

Validation: The District shall check compliance with this measure daily, throughout construction.

SP-7 Access to Businesses and Residences

Description: Ninety days prior to construction of a Project Component, the District shall provide public facilities, businesses, and residences within 500 feet of the construction zone with a notification packet that describes scheduled Project construction activities. Notification shall be provided in local newspapers.

The notification packet shall include:

(1) Notice to residences and businesses if parking and access shall be disrupted.

(2) Name of the project sponsor, project purpose, and a brief project description.

(3) Affected roadway segments in area, construction schedule in affected area, affected travel lanes, and reference to the traffic control plan.

(4) Alternate access and/or parking for affected land uses.

(5) Name and phone number of a project manager the public can contact with questions or comments regarding any aspect of the Project.

During construction, the District shall maintain pedestrian and vehicular access to public facilities, businesses, and residences along the route.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District and Construction Manager

Timing: **Start:** Ninety days prior to construction.

Complete: At the completion of construction.

Monitoring Agency: District

Validation: The District shall perform daily checks to ensure access is maintained to private and public uses. The District shall respond to complaints from private citizens regarding restricted access within 24 hours.

SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites

Description: Roads. Prior to construction, the District shall consult with the Alpine County Department of Public Works staff and other affected agencies regarding site-specific details of the Project Component prior to the preliminary design stage including construction drawings. Prior to construction, the District shall survey and videotape the condition of roads scheduled to have construction on or adjacent to them. The survey shall identify road name, length, and width; surface type and condition; and shoulder surface type and condition.

Wherever pavement is removed, roads shall be repaved as soon as possible. Within one year of completion of construction, roads damaged by construction traffic or pipeline construction shall be repaired to a condition equal to or better than existing prior to the construction activity.

Temporarily Disturbed Sites. Prior to construction, a site-specific revegetation plan shall be prepared. Upon Project Component completion, sites disturbed during construction shall be revegetated in accordance with revegetation standards as outlined below. Topsoil removed during construction activities shall be stockpiled and returned to the site and used for revegetation activities. Topsoil contains the seed stock for native and representative plant communities. Mulch application and additional seeding and planting may be necessary depending on site conditions.

Revegetation plans shall be in accordance with the Alpine County Scenic Highway Ordinance and Guidelines for Project Components that are visible SR 88. Revegetation Plans shall include at a minimum:

(1) A description of the site, including the soil type and existing vegetation;

(2) A list of appropriate plant species to be used at the site and a plan showing where they shall be planted;

(3) The number and size of shrubs and trees to be used, if any;

(4) A description of the extent and methods of irrigation, if any;

(5) Specifications for site preparation and installation of plant materials;

(6) Specifications and schedule for onsite care, including amount and method of application of fertilizers if necessary;

(7) Specifications for long term plant care and protection, including the amount and method of application of fertilizers, if necessary; and

(8) A description of mulches or tackifiers to be used.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Prior to construction of a Project Component. The District shall review the road survey prior to authorizing construction along roads.

Complete: Within one year after completion of construction of a Project Component.

Monitoring Agency: Caltrans/Alpine County

Validation: The District shall complete road repairs within one year of completion of construction of a Project Component. The District shall demonstrate compliance with this measure by videotaping the conditions of roads where construction activities occurred.

SP-9 Park Within Construction Easements

Description: The District shall establish construction easements for staging areas. Construction worker vehicles, construction equipment, and materials shall be kept within the staging area. Construction easements shall be expanded if necessary to accommodate construction related activity.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Prior to the start of construction.

Complete: At completion of construction.

Monitoring Agency: District

Validation: The District shall check compliance with this measure daily, throughout construction.

SP-10 Limit Ingress/Egress of Construction Equipment

Description: During construction, the District shall ensure that ingress and egress of construction equipment onto highways from construction parking areas and access roads is conducted in accordance with Caltrans "Manual of

Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990).

Adequate traffic controls shall be provided at access road intersections in accordance with Caltrans "Manual of Traffic Controls for Construction and Maintenance of Work Zones" (Caltrans 1990).

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of construction. The District shall monitor compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: District

Validation: The District shall check compliance with this measure daily, throughout construction.

SP-11 Erosion Control/Storm Water Pollution Prevention Plan

Description: The District shall implement appropriate temporary and permanent erosion control measures for construction and operation of Project Component, including preparation of a project-level SWPPP. The SWPPP is required by the State Board NPDES General Construction Activity Storm Water Permit. Erosion control measures shall follow the Lahontan Region Project Guidelines for Erosion Control. These guidelines are typically attached to construction permits. At a minimum, the SWPPP shall include the following elements:

Temporary Construction BMPs

1. Surplus or waste materials shall not be placed in drainage ways or within the 100-year flood plain of surface waters.

2. All loose piles of soil, silt, clay, sand, debris, or earthen materials shall be protected in a reasonable manner to prevent discharge of pollutants to waters of the State. Material stockpiles should be placed on the upgradient side of excavation whenever possible. Stockpiles may also be protected by covering to prevent contact with precipitation and by placing sediment barriers around the stockpiles.

3. Dewatering shall be done in a manner so as to prevent the discharge of pollutants, including earthen materials, from the site. The first option is to discharge dewatering waste to land. A separate permit may be required if, due to site constraints, dewatering waste must be discharged to surface waters. Contact the Regional Board for information on discharging to surface waters.

4. All disturbed areas shall be stabilized by appropriate erosion and/or sediment control measures by October 15 of each year.

5. All work performed between October 15th and May 1st of each year shall be conducted in such a manner that the project can be winterized within 48 hours. Winterized means implementing erosion and/or sediment controls that will prevent the discharge of earthen materials from the site and the controls will remain effective throughout the rainy/snow season without requiring maintenance. In general, this requires stabilizing bare disturbed soils with mulch, erosion protection blankets, or other suitable materials, and installing perimeter sediment controls such as fiber logs or other similar materials that will remain effective during significant rain and snow events.

6. After completion of a construction project, all surplus or waste earthen material shall be removed from the site and deposited at a legal point of disposal.

7. All non-construction areas (areas outside of the construction zone that will remain undisturbed) shall be protected by fencing or other means to prevent unnecessary encroachment outside the active construction zone.

8. During construction, temporary erosion control facilities (e.g., impermeable dikes, filter fences, hay bales, etc.) shall be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.

9. Control of run-on water from offsite areas shall be managed (protected, diverted, treated, etc.) to prevent such water from degrading before it discharges from the site.

10. Where construction activities involve the crossing and/or alteration of a stream channel, such activities require a prior written agreement with the California Department of Fish and Game and shall be timed whenever possible to occur during the period in which streamflow is expected to be lowest for the year. Other control measures may be used as necessary to prevent adverse effects from work in surface waters.

Permanent Construction BMPs

1. Impervious surfaces should be constructed with infiltration trenches or comparable infiltration structures along downgradient sides to infiltrate the increase in runoff resulting from the new impervious surfaces. Infiltration structures should also be constructed to accept runoff from structural (roof top) drip lines. Other control measures may be considered if design and/or site constraints are such that construction of infiltration devices is infeasible. Additional specific design specifications are required for the Truckee, Little Truckee and Long Hydrologic Units/Areas (see specific requirements below).

2. Where possible, existing drainage patterns shall not be significantly modified.

3. Drainage swales disturbed by construction activities shall be stabilized by the addition of crushed rock or riprap, as necessary, or other appropriate stabilization methods.

4. Revegetated areas shall be regularly and continually maintained in order to assure adequate growth and root development. Physical erosion control measures (controls other than live vegetation) shall be placed on a routine maintenance and inspection program to provide continued erosion control integrity.

A site-specific SWPPP shall be prepared for each construction area greater than one (1) acre, and if special measures are necessary for a site, these measures shall be incorporated into the plan.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During the project design phase.

Complete: At the completion of construction.

Monitoring Agency: State Board and Lahontan must approve the SWPPP.

Validation: The State Board and Lahontan shall review the adequacy of the SWPPP prior to the issuance of the NPDES General Construction Activity Storm Water Permit.

The District shall check compliance with this measure throughout construction.

SP-12 Standard Noise Control Practices - Construction Phase

Description: During construction, the District and its contractors shall utilize the following standard noise control practices, which are included as part of the Project to minimize noise disturbances at sensitive receptors during construction activities:

- Newer construction equipment with improved noise muffling shall be used and all construction equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational;

- All construction equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.);

- Wherever possible, hydraulic tools shall be used instead of pneumatic impact tools;

- Construction activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals or convalescent homes. Noise generating construction shall be restricted within 1,600 feet of these facilities on Saturdays, Sundays, or holidays;

- Heavy construction truck trips shall be routed over streets that shall cause the least noise disturbance to residences or businesses in the vicinity of the project area;

- Construction staging areas, maintenance yards, and other construction-oriented operations shall not be located within 1,600 feet of a sensitive receptor; and

- Blasting shall be keep to a minimum to reduce ground-borne vibrations

- Where construction occurs within 1,600 feet of a school, the construction manager shall implement measures to insure that construction noise does not interfere with the learning activity of the students. The following noise control practices may be implemented:

- Limit construction to non-school hours or weekends; or

- Utilize temporary noise barriers, as needed, to protect schools from excessive noise levels from construction activities. Noise barriers may be made of heavy plywood, vinyl curtain material, or natural or temporary earth berms.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of construction. The District shall monitor compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: District

Validation: The District shall check compliance with this measure daily, throughout construction.

SP-13 Standard Noise Control Practices - Operation Phase

Description: During the operation of the pressurized recycled water conveyance and distribution pipelines, the potential for noise exists due to pressurized water flow in the pipelines. Generally, noise is caused by high velocity water turbulence, water surge or thrust, and water hammering. The pipeline systems will be buried below the ground surface along their routes, which provide a natural noise barrier. The operation of pipelines will not produce significant noise impacts.

Some Project Components shall require the use of pumps in their operations. The following standard noise control practices shall be used to reduce pump noise.

- The District shall retain a qualified noise engineer to determine if there would be noise impacts from pumps. If noise modeling shows that there would be potentially significant noise impacts, a noise engineer would assist in the final design of the pump stations. The noise engineer shall be responsible for ensuring that the following noise reduction measures are incorporated into the design of the pump stations.

- Outdoor pump stations that exceed the noise criteria shall be designed to include noise barriers to reduce the noise at nearby sensitive receptors to a level that is within the noise criteria. Noise barriers reduce noise by approximately 20-30 dBA.

- The design of pump stations shall be such that all openings, such as for ventilation and doors, shall face away from sensitive receptors. This provides for approximately a 10-15 dBA noise reduction.

- All exterior doors for the pump stations shall be constructed of metal assemblies and weather-stripped. This will provide for approximately a 3-5 dBA noise reduction.

- Acoustical louvers or an air intake/exhaust plenum shall be used for pump station housing air ventilation openings. This will provide for approximately a 7-10 dBA noise reduction.

- During operation of the biomass production activities (including planting, growing, harvesting, and transportation phases), noise will be generated by mobile equipment such as trucks and other motor vehicles, and agricultural and related equipment.

To minimize impacts from these activities, the following measures will be used to reduce motor vehicle, biomass production, and related equipment noise.

- Newer motor vehicle and agricultural equipment with improved noise muffling shall be used and all equipment items shall have the manufacturers' recommended noise abatement measures, such as mufflers, engine covers, and engine vibration isolators intact and operational.

- All operational equipment shall be inspected weekly to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).

- Biomass production and harvesting activities after 7:00 p.m. or before 7:00 a.m. shall not be allowed within 2,000 feet of residential units, hotels, hospitals or convalescent homes. Noise generating equipment use shall be restricted within 1,600 feet of these facilities on Saturdays, Sundays, or holidays.

- Heavy operational-phase truck trips shall be routed over streets that will cause the least noise disturbance to residences or businesses in the vicinity of the project area.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of operations of a Project Component.

Complete: On-going.

Monitoring Agency: District

Validation: The District shall check compliance weekly during operations.

SP-14 Standard Air Quality Control Practices - Construction Phase

Description: Project Components shall involve the construction of infrastructure and operation of facilities. For purposes of air quality impact analysis, a "worst case day" for construction activity is assumed as the basis for developing construction equipment usage and resulting equipment exhaust and fugitive dust emissions. This worst-case day involves the construction of a buried pipeline with equipment used for trenching, pipe laying, backfilling, pipe and debris hauling, and construction worker vehicles.

There are a number of measures available to control construction equipment and vehicle exhaust emissions. The District shall require that contractors implement the following vehicle and equipment exhaust control program during the construction of recycled water facilities:

- Construction vehicles and equipment shall be maintained and tuned at the intervals recommended by the manufacturers to minimize exhaust emissions.

- Equipment idling shall be kept to a minimum when equipment is not in use. No piece of unused equipment shall idle in one place for more than 5 minutes, as mandated by the California Air Resources Board and under California Health and Safety Code section 39674. The District adopted an Idling Policy on March 7, 2009.

- Construction truck work trips for trucks using nearby roadways shall be scheduled during non-peak hours to reduce the amount of additional emissions that may be generated due to slower traffic on the affected roadways.

- The distance of a trip to and from the construction site shall be kept to the shortest distance possible.

- The GBUAPCD, in its Rule 401 - Fugitive Dust, requires control of visible particulate matter from activities under normal wind conditions. Rule 401 does not apply to agricultural activities. The rule lists the following control measures for the control of fugitive dust:

  - Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

  - Application of asphalt, oil, water or suitable chemicals on dirt roads, material stockpiles, and other surfaces which can give rise to airborne dusts;

  - Installation and use of hoods, fans, and fabric filters, to enclose and vent the handling of dusty material. Adequate contaminant methods shall be employed during such handling operations;

  - Use of water, chemicals, chuting, venting, or other precautions to prevent particulate matter from becoming airborne in handling dusty materials to open stockpiles and mobile equipment; and

  - Maintenance of roadways in a clean condition.

- Construction of recycled water facilities by the District or its contractors shall utilize the above emission control measures or their equivalents to reduce the amount of fugitive particulate matter escaping the construction site. Water spraying to reduce dust for example, shall reduce fugitive particulate emissions from this source by approximately 50 percent. For analytical purposes, the emissions calculations in the following section do not take emissions controls into account in order to estimate a maximum worst case day emissions case for comparison with the evaluation criteria. With the planned implementation of construction emissions controls as part of the Project, actual PM10 emissions would be approximately one-half the estimated amounts.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of construction. The District shall monitor compliance on a daily basis during construction.

Complete: At the completion of construction.

Monitoring Agency: District

Validation: The District shall check compliance with this measure daily, throughout construction.

SP-15 Standard Air Quality Control Practices - Operations Phase

Operation of facilities that utilize electric-powered pumps and equipment shall not generate air contaminant emissions. Operation of fossil-fueled equipment such as motor vehicles and agricultural equipment used in biomass production, and in educational and conservation activities, shall generate air contaminant emissions. The District shall require that the following motor vehicle and equipment exhaust emission control actions be implemented during the operational phase.

- Motor vehicles and agricultural equipment shall be maintained and tuned at the intervals recommended by the manufacturers to minimize exhaust emissions.
- Equipment idling shall be kept to a minimum when equipment is not in use. No piece of unused equipment shall idle in one place for more than 5 minutes, as mandated by the California Air Resources Board and under California Health and Safety Code section 39674. The District adopted an Idling Policy on March 7, 2009.
- Operational phase truck trips for trucks using nearby roadways shall be scheduled during non-peak hours to reduce the amount of additional emissions that may be generated due to slower traffic on the affected roadways.
- The distance of a trip to and from an operational phase activity site shall be kept to the shortest distance possible.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** At the beginning of operations.

Complete: On-going.

Monitoring Agency: District

Validation: The District shall check compliance with this measure weekly during operation activities.

D.5.1 Planning Measures

This section contains standard practices to be implemented during the final planning and detailed design of the Project. These measures often require the refinement of the final project design to accommodate particular environmental constraints. Compliance with these standard practices during planning ands design phases of the Project will result in avoidance and/or minimization of adverse environmental impacts.

SP-16 Slope Stabilization Design

Description: The District shall retain a licensed geotechnical engineer to conduct a construction level geotechnical investigation for physical facilities such as pipeline routes, irrigation systems, embankment locations, and hydroelectric facilities. The investigation shall identify slope stability risk areas, liquification, and fault zone identification and provide engineering design and construction recommendations to stabilize slopes where needed. Slope stability recommendations could include, but are not limited to:

- Removal and replacement of unstable materials in an existing landslide with a stronger material;
- Grading to an acceptably stable topographic configuration by terracing, reducing slope angles, and reducing the height of cut and fill slopes;
- Drainage facilities, such as subdrains and dewatering wells to reduce pore water pressure and reduce the risk of slope failure;
- Buttressing the toe of slopes to provide additional support to the slope;
- Where buttressing is not feasible, internal reinforcement such as a pinning system or lattice grid incorporated in the slope design to strengthen the slope;
- Retaining walls or other external applications to strengthen slopes; and
- In addition, pipeline alignments and electrical lines can be adjusted to avoid areas with slope stability problems.

Component: Components 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During Final Design.

Complete: Prior to issuance of a grading permit.

Monitoring Agency: District

Validation: District shall comply with this measure prior to certifying the Final Engineering Drawings or issuance of a grading permit.

SP-17 Pipeline Design Features in Active Fault Zones

Description: The District shall design pipelines crossing active fault zones with isolation valves. During final design, the engineers shall consider both automatic and manually operated isolation valves. Automatic valves are recommended if they are determined to be feasible, as they shall cut off water more quickly in the event of a pipeline break. The isolation valves shall be on both sides of the pipeline crossing, located at a distance of one thousand feet from the fault zone. Where pipelines run parallel to an active fault zone, final design shall be include a detailed geotechnical evaluation of pipeline siting, and the pipeline route shall be designed to remain outside of the fault zone.

Component: Components NP-1, NP-2, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During design.

Complete: Prior to certification of the final Engineering Drawings.

Monitoring Agency: District

Validation: District shall comply with this measure prior to certifying the Final Engineering Drawings.

SP-18 Liquefaction Stabilization Design

Description: The District shall be responsible for performing a site-specific evaluation of liquefaction potential at proposed facility locations and shall retain a registered geotechnical engineer to conduct a detailed, facility specific, soil analysis in areas mapped as having a “high” liquefaction potential. The analysis shall determine locations where facilities could be damaged by liquefaction and shall include:

- Identification of density profiles;
- Determination of maximum shallow groundwater levels; or
- Characterization of the vertical and lateral extent of saturated sand/ silt layers that could undergo liquefaction during strong ground shaking.

Where facility specific testing indicates that conditions are present that could result in liquefaction and damage to project facilities, appropriate feasible measures shall be included in the site-specific soils analysis and shall be incorporated into project design. These measures shall include the following, unless the site-specific soils analysis dictates otherwise:

- Densification or dewatering of surface and subsurface soils;

- Construction of concrete foundations to support pipelines or pile foundations to support buildings; and
- Removal of material that could undergo liquefaction in the event of an earthquake and replacement with stable material.

Project facilities shall be designed in accordance with requirements based on Seismic Zone 3. In areas that are especially prone to liquefaction, such as the pipeline crossing of the West Fork of the Carson River, additional design features shall be considered to avoid or minimize ruptures and spills during a seismic event. Such features may include:

- Use of restrained joint pipe in the area prone to liquefaction;
- Installation of shut-off valves at key locations;
- Provision of sensors to detect pipe ruptures (these could include use of pressure sensors or flow meters); and
- Use of manual or automated control valves to limit water release in the event of a pipe rupture.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During Final Design.

Complete: Upon completion of construction.

Monitoring Agency: District

Validation: District shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

SP-19 Standard Engineering Methods for Expansive Soils

Description: Prior to Project Component design, the District shall hire a Certified Professional Soil Scientist or licensed geotechnical engineer to conduct a pre-design soil analysis along each pipeline alignment. The survey shall record soil type and soil properties (including shrink-swell potential, pH, salinity, and active sulfides).

Where the analysis has identified the presence of expansive soils, the following standard engineering methods shall be used to reduce or eliminate potential impacts from expansive soils:

- Removal of native soil and replacement with an engineered fill material that is not prone to shrinking and swelling;

- Soil stabilization, such as lime treatment to alter soil properties to reduce shrink-swell potential to an acceptable level; and
- Deepening footings or other support structures in the expansive soil to a depth where soil moisture fluctuation is minimized.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During design.

Complete: Upon completion of construction.

Monitoring Agency: District

Validation: District shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

SP-20 Standard Engineering Methods for Corrosive Soils

Description: As part of the pre-design soil analysis (SP-18), the Certified Professional Soil Scientist or licensed geotechnical engineer shall conduct an analysis of soil properties and the chemical interaction between soil, groundwater, and pipe materials. The analysis shall include a determination of pipeline alignments requiring corrosion prevention measures.

The District shall design pipelines that traverse highly corrosive soils to utilize non-corrodible materials such as PVC or have an active cathodic protection system (one that applies a current to the pipe and protects metals from the effects of low pH).

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During design.

Complete: Prior to certification of the final Engineering Drawings.

Monitoring Agency: District

Validation: The District shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

SP-21 Temporary Containment and Impoundment Siting and Design

Description: Final siting of temporary containment sites shall avoid locations within Alquist-Priolo Earthquake Fault Zones (as identified in Figure 4-3-1), if possible. Embankment and berm design shall meet the requirements of the Division of Safety of Dams (if applicable). If temporary containment sites are located within active fault zones, embankments shall be designed with additional freeboard to reduce the risk of overtopping during a seismic event. Embankments and berms shall be inspected seasonally for structural integrity and maintained as needed to avoid slope failures and subsequent flooding.

Component: Component 11

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During design.

Complete: Prior to certification of the final Engineering Drawings.

Monitoring Agency: District

Validation: The District shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

SP-22 Mosquito Prevention

Description: District shall consult with Alpine County in designing and developing temporary containment sites, impoundments or wetlands. The District shall comply with requirements for mosquito prevention. Measures shall include proper grading of shallow water areas to facilitate drainage, with ditches to provide habitat for mosquitofish or other biological controls. Sites should not have small coves or irregularities, side slopes should be as steep as possible, and dead algae, vegetation, and debris should be routinely removed to minimize mosquito habitat. Biological control agents include mosquitofish, and other predators such as backswimmers, beetles, and flatworms. District shall consult with the CDFG to determine which mosquito larvae predators are appropriate for the project area. Mosquito larvae may be controlled with microbial insecticides such as Bacillus thuringensis. Performance criteria shall conform to the Mosquito and Vector Control Association of California standards and incorporate the California Mosquito-borne Disease/Virus Surveillance and Response Plan (found at http://www.mvcac.org).

Component: Components 9, 10, 11, 13, 15

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During Final Design.

Complete: Prior to the beginning of construction.

Monitoring Agency: Alpine County Health Department

Validation: Design features to reduce mosquito habitat shall be incorporated in design of temporary containment sites. Mosquito prevention measures shall be developed prior to operation of new temporary containment facilities.

SP-23 Delineate Wetlands, Waters of the United States, and Riparian Habitat

Description: Formal delineations of potential wetlands and waters of the United States and Waters of the State within defined project areas, using CAD-based topographic maps, shall be conducted six (6) months to one (1) year prior to Project construction. Delineations shall be suitable for Clean Water Act Section 401 and 404 permitting purposes. A riparian census of palustrine scrub-shrub and forested wetlands, including stem counts and identification of stems to species, and top-of-bank surveys (against horizontal and vertical survey control) shall be conducted. Coordination with agencies to determine mitigation ratios shall be implemented prior to Project construction. <u>If impacts are unavoidable, then mitigation shall be provided which reduces the impacts below a level that is significant.</u>

Delineate Wetlands and/or Waters of the United States. The District shall hire a qualified consultant to conduct a wetland delineation of each project site and/or ROW according to the USACE 1987 Manual. If private lands are involved, the District shall obtain written permission from individual landowners to obtain access to the property, to conduct the investigation, and to report the results to federal and state agencies.

Each wetland delineation shall clearly show topography against horizontal and vertical survey control, property lines, and the project boundary and/or ROW. The consultant shall stake and flag wetland edges in the field for later survey by District. Jurisdictional edges shall be plotted on the topographic base sheets as a separate CAD layer for later sandwiching with the project footprint. Standard USACE data forms and supplementary text shall accompany the preliminary and final wetland delineation maps.

The wetland delineation shall be submitted to the USACE at least six (6) months prior to construction. The submittal shall be at a level of detail suitable for USACE permitting purposes. At the same time the wetland delineation is submitted, the District or a qualified consultant shall prepare a Department of the Army application to include a Conceptual Wetland Mitigation Plan (see Mitigation 2.3.15), and an application to Lahontan for Section 401 Certification.

Prepare a Riparian Census and Top-of-bank Survey. If applicable, a qualified biologist shall conduct a census of riparian woody vegetation from the top-of-bank and/or drip-line of the tree or shrub canopy within the project area or ROW. The census shall include identification of riparian tree and shrub species, counts of stems, and diameter at breast height for those stems greater than 24-inches in diameter within the construction footprint. Top-of-bank shall be determined against vertical and horizontal survey control. The riparian census shall be performed in sufficient detail for a CDFG 1601 Lake or Streambed Alteration Agreement.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: USACE

Implementing Agency: District

Timing: **Start:** Prior to Project Design

Complete: One year prior to the beginning of construction.

Monitoring Agency: USACE, CDFG

Validation: The wetland delineation shall be submitted to USACE six (6) months prior to construction concurrently with an application for a Department of the Army Permit and request to Lahontan for Section 401 Certification. The riparian and top-of-bank determination shall be submitted to the CDFG together with a 1601 Streambed Alteration Agreement application.

SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan

Description: Prepare a wetland and riparian mitigation and monitoring plan. The plan shall include a proposed planting palette, provisions for the establishment of permanent conservation easements, and a maintenance and monitoring plan to include performance criteria. Replace wetlands and waters of the United States at a ratio negotiated with the state and federal regulatory agencies.

Wetland Mitigation and Monitoring Plan. The District shall prepare a Wetland Mitigation and Monitoring Plan to accompany a Department of the Army Application and Wetland Delineation for submittal to USACE. In addition, the plan shall be tendered to Lahontan together with CEQA documentation, and a fee, for Section 401 Certification. The plan shall be written to conform to the recommendations set forth, for example, by the Sacramento District of USACE or Lahontan. The plan shall include a statement of the wetland functions and values to be replaced, a planting palette, a conceptual planting plan, a plan to preserve created wetlands through a conservation easement, performance criteria, and a five-year maintenance and monitoring plan. Replacement of wetlands shall be on site, if possible, or by off-site mitigation, possibly payments into a mitigation bank. If payment into a mitigation bank is chosen, the banking entity shall provide the Wetland Mitigation and Monitoring Plan as part of the fee.

Riparian Mitigation and Monitoring Plan. The District shall prepare a Riparian Mitigation and Monitoring Plan to accompany a CDFG 1601

Streambed Alteration Agreement Application and Wetland Delineation for submittal to CDFG.

The plan shall include a planting palette, a conceptual planting plan, and a plan to preserve created riparian habitat through a conservation easement, performance criteria, and five-year maintenance and monitoring plan. Replacement of riparian habitat shall be on site on the Heise Ranch along Indian Creek.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: USACE

Implementing Agency: District

Timing: **Start:** During final design.

Complete: One (1) year prior to the beginning of construction.

Monitoring Agency: USACE, CDFG

Validation: The wetland and riparian mitigation and monitoring plans shall be submitted to USACE six (6) months prior to construction concurrently with an application for a Department of the Army Permit, request to Lahontan for Section 401 Certification, and 1601 Streambed Alteration Agreement application.

SP-25 Sensitive Resource Program

Description: Develop a Sensitive Resource Program for unavoidable impacts to <u>Winter Range for the Carson River Deer Heard</u>, Threatened and/or Endangered Species and their Critical Habitat to include compliance with FESA and CESA. Conduct a Biological Assessment; identify, select, and purchase mitigation sites; obtain an Incidental Take 2081 Agreement with CDFG; and prepare a mitigation and monitoring plan (see Measures SP-31, BIO-5A and BIO-5B). <u>If impacts are unavoidable, then mitigation shall be provided which reduces the impacts below a level that is significant.</u>

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: CDFG, NDOW, USFWS

Implementing Agency: District

Timing: **Start:** During preliminary planning.

Complete: Prior to application for permits.

Monitoring Agency: District

Validation: The Plan shall be developed prior to certification of the Final Engineering Drawings.

SP-26 Sensitive Plant Protection Program

Description: Develop a Sensitive Plant Protection Program for unavoidable impacts to Bureau of Land Management (BLM)-Sensitive, California Native Plant Society (CNPS) and Nevada Natural Heritage Program Special Status Plant Species. Conduct rare plant surveys to follow CNPS 2001 survey guidelines; avoid and fence rare plant populations identified from the surveys; identify, select, and purchase mitigation sites or negotiate conservation easements or restore off-site, degraded rare plant populations to compensate for unavoidable impacts; prepare a mitigation and monitoring plan (see Measures BIO-5A, SP-25, SP-31, and BIO-5B). <u>If impacts are unavoidable, then mitigation shall be provided which reduces the impacts below a level that is significant.</u>

Floristically-based Rare Plant Surveys. District shall contract with botanists to prepare a rare plant survey for each project that potentially impacts unplowed rangeland, scrubland, and woodlands. The format and scope for these rare plant surveys shall follow the CNPS 2001 guidelines.

Avoidance. Impacts to rare plant populations identified from the rare plant surveys shall be avoided by reconfiguring project design, fencing rare plant populations to prevent encroachment, and purchase of open space and conservation easements to protect the fenced rare plant populations.

Identify, Select, and Purchase Mitigation Sites. The District, together with input from the BLM, USFWS, CDFG, and NDF, shall identify opportunities for mitigation in the area. Mitigation may include a single, or combination of the following items: purchase of mitigation sites, negotiation of conservation easements, or habitat restoration in offsite, degraded rare plant populations to compensate for unavoidable impacts. If agreed on by the stakeholders, land and/or mitigation credits may be purchased in advance of construction.

Prepare a Special Status Plant Species Mitigation & Monitoring Plan. The District shall produce a mitigation and monitoring plan to follow the CNPS and CDFG guidelines to comply with Chapter 10 of CDFG Native Plant Protection Policy. This standard practice parallels measures BIO-, 5A, SP-31, and BIO-5B.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: CDFG, NDF, USFWS

Implementing Agency: District

Timing: **Start:** During preliminary planning.

Complete: Prior to construction.

Monitoring Agency: District

Validation: The program shall be developed prior to certification of the Final Engineering Drawings.

SP-27 Avoid Impacts to Wetland and Riparian Areas

Description: The District shall avoid impacts to wetlands and riparian areas in the design, construction, operation and maintenance of Project Components. Final siting of components shall consider the locations of wetlands and riparian areas and shall avoid such features to the extent feasible. Avoidance shall occur through use of appropriate setbacks and buffers. Where wetlands or riparian areas cannot be avoided, construction shall take place in a manner to minimize impacts. This shall include the use of cutoff walls to ensure that wetlands would not be drained as a result of pipelines diverting groundwater. <u>If impacts are unavoidable, then mitigation shall be provided which reduces the impacts below a level that is significant.</u>

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: USACE

Implementing Agency: District

Timing: **Start:** Design measures shall be implemented during final design. Construction measures shall begin at the start of construction.

Complete: At the completion of construction.

Monitoring Agency: USACE, CDFG

Validation: The District shall review final engineering drawings to verify that appropriate setbacks and buffers have been established to protect wetlands and riparian areas.

D.5.2 Construction Measures

This section contains mitigation measures to be implemented prior to, during, and immediately following Project construction. These measures generally require the construction manager to follow certain constraints during construction and to repair and rehabilitate impacts resulting from construction of the Project. Compliance with these mitigation measures will result in avoiding, minimizing, or reducing adverse environmental impacts.

SP-28 Remove Weak Surficial Deposits from Basin Footprints

Description: During construction, the construction manager shall ensure that weak surficial deposits, including landslide deposits, unconsolidated alluvium and colluvium and soil shall be excavated and removed from the borrow excavation area. Slope stabilization measures identified in standard practice SP-16 shall be incorporated into the borrow excavation plan for the basin sites to stabilize the basin to the extent feasible.

Component: Component 9, 10, 11

Lead Agency: District

Implementing Agency: District

Timing: **Start:** During construction of temporary containment sites.

Complete: Upon completion of construction.

Monitoring Agency: District

Validation: The District shall retain a Registered Geotechnical Engineer to verify compliance with this measure.

SP-29 Management of Hazardous Materials/Waste During Construction

Description: Prior to construction and during design, the District shall retain a Registered Geologist or Registered Environmental Assessor to survey each pipeline alignment for contaminated soil, recording the location, extent and type of contamination.

Construction activities related to the project that require excavation or exposure of soil in areas suspected of containing soil or groundwater contamination (i.e. areas in the vicinity of hazardous materials/waste release sites) shall include monitoring by the contractor for subsurface contamination in compliance with the appropriate state's (California or Nevada) occupational safety and health regulations. This monitoring would, at a minimum, include visual observation by personnel with appropriate hazardous materials training, including 40 hours of Hazardous Waste Operations and Emergency Response (HAZWOPER) training as required for workers engaged in hazardous waste operations.

In areas where contamination of soil and groundwater is suspected or known, groundwater brought to the surface as a result of dewatering shall be contained in Baker tanks or similar containment devices. At a minimum, this would allow the suspended solids associated with dewatering to settle out before discharge, if discharge is allowable. Depending on the proximity to known contaminated plumes, and the probability of groundwater being contaminated based on visual or other evidence; samples would be collected and analyzed. A State of California (or State of Nevada) certified hazardous waste laboratory using EPA-approved analytical methods should perform the laboratory analyses. The types of analyses should be based on the likely contaminant(s) and on local permitting requirements. Discharges of dewatered groundwater would be subject to permitting by Lahontan or NDEP. The origin of the contaminated materials shall dictate the applicable State OSHA regulations and remediation process to follow.

District shall obtain required permits and incorporate permit requirements in the demolition/construction documents so that permit restrictions can be included in contractor's scope of work.

Potentially contaminated materials encountered during project demolition/construction activities shall be evaluated in the context of applicable local, state and federal regulations and/or guidelines governing hazardous waste. Materials deemed to be hazardous shall be remediated and/or disposed of following applicable regulatory agency regulations and/or guidelines. Evaluations, remediation, treatment and/or disposal of hazardous waste shall be supervised and documented by qualified hazardous waste personnel (having received a minimum of 40 hours HAZWOPER training).

Component: Component 16

Lead Agency: District

Implementing Agency: District

Timing: **Start:** The program shall be developed at the conclusion of the design phase of the proposed project. Monitoring to ensure implementation of the program shall begin during the construction mobilization phase.

Complete: Monitoring shall continue throughout construction and cease at the completion of the construction phase.

Monitoring Agency: District and California or Nevada OSHA

Validation: The program shall be developed prior to construction. State agencies do not provide regular monitoring services, but may conduct periodic inspections.

SP-30 Pre-construction Surveys for <u>Migratory Birds</u>, Nesting Raptors and Wildlife Nurseries

Description: Potential active nest sites and wildlife nurseries within 0.25 mile of the construction zone shall be identified during pre-construction surveys. Construction activities within 0.25 mile of active nests shall be scheduled to occur outside of the nesting season, or exclusion zones shall be established and monitored during construction.

District shall retain a wildlife biologist to conduct a pre-construction survey to determine if raptor nests, <u>migratory bird nests,</u> and pygmy rabbit nursery sites occur in or within 0.25 mile of the project site. If construction takes place outside the breeding season there shall be no need to conduct surveys for active nests and nurseries. If no active nests or nurseries are found in the study area, no mitigation shall be required.

If nests or nurseries are found in the project area, construction exclusion zones shall be established in consultation with the CDFG around each active nest or nursery. No disturbance shall occur within the exclusion zone around a nest site or nursery during the breeding season. A biological monitor shall be present during construction that takes place during the breeding season within 0.25 mile of a nest site or nursery.

During construction, a biological monitor shall evaluate potential nesting and nursery disturbances caused by the construction activities. The biological monitor shall have the authority to stop construction if it appears to be having a negative impact on the nesting raptors or breeding pygmy rabbits.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 21, 22, 29, 30, 31, 32

Lead Agency: CDFG, NDOW, USFWS

Implementing Agency: District

Timing: **Start:** Two weeks prior to start of construction for final flagging/fencing.

Complete: Following completion of construction.

Monitoring Agency: District

Validation: State Game Wardens

SP-31 Pre-Construction Marking and Fencing of Sensitive Native Plant Communities

Description: Mark and fence sensitive native plant communities prior to construction. Pre-construction marking and fencing of sensitive native plant communities is required to protect these resources during construction, and to avoid additional costly mitigation.

This mitigation measure parallels standard practice SP-31, Pre-construction Marking and Fencing of Wetlands and Riparian Habitat, but differs from the latter in that marking and fencing focus on the protection of native rangeland from construction disturbance. A revegetation specialist shall mark the boundaries of native rangeland using temporary signs, protected from damage by the weather, to alert construction crews that they have reached the boundaries of their construction site, and may be encroaching on native rangeland.

Native rangeland shall be fenced from the permanent District easement and/or property with temporary rope and flagged fencing visible from the cab of heavy equipment, to keep operators from encroaching on native rangeland outside of the construction easement.

The revegetation contractor shall remove the markings and fencing during the habitat restoration and revegetation of disturbed sites. Through its land agents, the District shall work with private landowners and public agencies to replace or repair range fences disturbed by construction.

Component: Components 1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22

Lead Agency: CDFG, NDF

Implementing Agency: District

Timing: **Start:** Two weeks before construction for final flagging/fencing.

Complete: After construction.

Monitoring Agency: District

Validation: California State Game Warden, Nevada State Forester Fire Warden

SP-32 Pre-Construction Marking and Fencing of Wetlands and Riparian Habitat

Description: Mark and fence delineated wetlands and waters of the United States, and riparian habitat prior to construction. Pre-construction marking and fencing of sensitive wetlands and waters of the United States is required to protect these resources during construction, and to prevent illegal fills.

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: USACE

Implementing Agency: District

Timing: **Start:** Two weeks prior to construction for final flagging/fencing.

Complete: When construction is complete.

Monitoring Agency: District

Validation: USACE and CDFG

D.5.3 Operation and Maintenance Measures

This section contains standard practices to be implemented during operation of the Project. These measures generally require monitoring of system operations over time and the modification of those operations to reduce adverse environmental impacts. Compliance with these measures will result in the avoidance and/or reduction of adverse environmental impacts.

SP-33 Surface and Ground Water Protection Plan

Description: Install additional groundwater monitoring wells and monitor groundwater levels. Develop a Nutrient Management Plan (NMP) in accordance with the final draft of the State Board's Recycled Water Policy. Implement tailwater management and containment practices. Practice release prevention and public protection measures. Develop a monitoring response plan specifying appropriate actions to be taken at each site in the event of groundwater contamination or impending degradation of groundwater quality.

Alpine County Groundwater Monitoring Program

The District shall modify the Alpine County Groundwater Monitoring Program (ACGMP) to the satisfaction of Lahontan to offer concrete responses when baseline nitrate or other nutrient levels from groundwater monitoring wells show degradation of groundwater quality attributable to the recycled water reuse. The proposed modifications to the existing monitoring program are outlined in Appendix J of this EIR.

<u>Nutrient Balance Comparison.</u> Groundwater samples shall be collected from existing and new monitoring wells that shall be located at various distances down gradient from the portions of the project area that shall be irrigated with recycled water. The nitrate concentration in the groundwater shall be monitored quarterly, and compared to the previous year's data, and the threshold of 7 mg/l for nitrate. The drinking water standard (threshold) is 10 mg/l. The District shall commit to monitor for a "trigger threshold" of 7 mg/l allowing for alternative management opportunities prior to reaching the regulatory threshold. The plan shall include measures to curtail recycled water flows on to the project area either temporarily or permanently, should groundwater degradation result.

<u>In order to determine the hydraulic loading based on nitrogen, Wood Rodgers consulted "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). Wood Rodgers set a conservative "red-flag" threshold level of 7 mg/l for Cp, as is common practice in developing a Nevada Effluent Management Plan (EMP). This was done to insure that the receiving groundwater resource will not be excessively degraded to a point where it is no longer useable (please also refer to the Assimilation Capacity Technical Report, Appendix 4). The District understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired.</u>

Tailwater Management and Containment Practices

<u>Tracking.</u> The District shall be required to track the quantity of recycled irrigation water applied to each irrigation area. The District shall be required to record total volume released for irrigation. The District shall create a log to track the irrigation within each irrigation area. The log shall indicate the date, area irrigated, irrigated acreage, start time, stop time, and comments.

<u>Tailwater Management.</u> The District shall apply recycled water for agricultural irrigation purposes inclusive of tailwater management. The following procedures shall be used to manage tailwater when irrigating with recycled water. Attend irrigation of fields and stop flow as water advances toward the end of the field to manage tailwater. In the event that tailwater is generated, containment can be accomplished by two methods, depending on the location of the field. Water can be conveyed by ditch and released for irrigation on a downstream field, or water can be contained by closing check gates and impounding the water in the containment area. A tailwater containment area shall be located on the property (size and location to be determined).

Tailwater Return. The District shall use the recycled water for agricultural purposes with tailwater management to ensure no discharge to surface water systems. The following procedures shall be used to contain tailwater, if generated from the project area when irrigating with recycled water: Irrigation shall be managed to optimize irrigation efficiency. Personnel shall attend irrigation of the fields to ensure that flows are stopped when irrigation demands have been met to avoid tailwater generation from the fields. Fields may be designed so that tailwater from upper fields flows onto lower fields as irrigation. All tailwater reaching the low end of the project area shall flow into a tailwater recovery area with a capacity to be determined to prevent surface discharge from the site when irrigating with recycled water.

Winter Operation. Recycled water shall be stored in Harvey Place Reservoir until it is needed at the beginning of the irrigation season. As such, winter irrigation shall not be authorized. Temporarycontainment of recycled water from HPR to the Diamond Valley Ranch may be authorized if approved by Lahontan.

Surface Water Quality Protection

To prevent contamination of freshwater sources from the aerial application of recycled water, the following buffers shall be applied when delineated irrigable acreage within the Project Area:

- A 25-foot setback from District property lines along Diamond Valley Road. Currently, irrigation occurs up to the property line along Diamond Valley Road. An overestimation of the buffer, which considers a 25-foot setback, allows the District discretion on irrigation methods.

- A 25-foot setback from the center line of irrigation ditches. In the areas currently under consideration for irrigation by the District, piping or rerouting of freshwater away from the recycled irrigation areas is proposed. A 25-foot setback from the center of primary ditches will protect freshwater supplies.

- A 25-foot buffer from the edge of streams. A 25-foot buffer from the edge of the IC Flood Control Channel and Indian Creek is necessary to protect beneficial uses and preserve water quality of freshwater sources.

Release Prevention and Public Protection Plan

These guidelines are applicable to an aerial irrigation system.

Release Prevention. Recycled water shall be applied in a manner to minimize potential impacts to groundwater quality incorporating the following specific measures to minimize the potential for surface release from the reuse site and preserve groundwater quality.

Standing Water. Unnecessary ponding of recycled water shall be avoided. In order to prevent unnecessary standing water, it is imperative that the irrigation system and tailwater recovery be operated properly. Standing water shall be minimized through the following means:

- Control of irrigation to prevent excessive tailwater;
- Use of laser leveled border strips irrigation;
- Manual control of pasture valves;
- Presence of an on-site irrigator monitoring surface irrigation progress; and
- Maintenance of perimeter ditches and tailwater containment area.

Tailwater Recovery. A tailwater recovery and return area may need to be constructed on the property. This area shall contain excess recycled water

Unstable Ground Conditions. The irrigation system shall be operated to minimize potential surface runoff by considering ground conditions before irrigating. Unsuitable conditions include frozen, saturated, or flooded soils. Fields shall not be irrigated during or immediately following significant precipitation events.

Irrigation System Malfunction. DVR personnel will inspect the irrigated areas to make sure the irrigation system is operational. Problems identified will be addressed and all necessary repairs will be completed promptly.

Spill Response. Spill response shall be required in the event of bypass or failure of check gate structures, breach of irrigation ditches, or breach of containment berms. Spill response shall entail the following:

- Shut down irrigation;
- Close check gates to retain irrigation on upstream or downstream fields; and
- Contain runoff and minimize off-site discharge by diverting water with temporary ditches, impounding water at topographic low spots, and/or constructing containment berms.

Public Protection. The following protection measures shall be implemented to assure public safety.

Controlled Access. The Diamond Valley Ranch has a perimeter fence defining the property boundary and locked gates shall restrict access to the reuse area.

Public Notification. The existing perimeter fence shall be posted with "No Trespassing" and "Warning Recycled water Do Not Drink" signs. Notification signs shall be placed at the access points and at minimum 500-foot intervals along the exterior fence line of application areas.

Worker Notification. Diamond Valley Ranch personnel directly involved with irrigating shall receive training and notification regarding possible hazards and appropriate personal hygiene for working with recycled water.

Personal hygiene practices include:

- Do not drink the irrigation water;
- Do not use the irrigation water for washing;
- Always wash hands and face with clean water and soap before eating or drinking;
- Wear rubber gloves when working on the irrigation system;
- Minimize skin contact with recycled water;
- Treat cuts immediately before continuing to work on the irrigation system; and
- Report problems that might pose a risk.

Nutrient Management Plan

The District ~~shall~~ may require the development of ~~a~~ NMPs for the Carson Valley and Wade Valley portions of the project area to the satisfaction of the State Board's Recycled Water Policy. Nutrient management is the act of managing the amount, source, placement, form and timing of the application of plant nutrient and soil amendments. In the context of recycled water irrigation, the plan shall consider nutrient and salt concentrations present in recycled water when calculating fertilizer and irrigation application rates.

The plan must include a description of the best practicable treatment or control measures necessary to prevent nutrient or salt-related pollution or nuisance. The plan shall outline an approach towards education of contract irrigators regarding application of recycled water in an amount not exceeding the rate of uptake by planted crops. During the interim period prior to approval of NMPs, the District can reasonably control discharges of salts to groundwater by implementing nutrient management practices. Crop types and grazing management shall be determined according to site-specific conditions.

An NMP is primarily developed for use by the reuser as a current reporting mechanism and a future planning document. It is secondarily intended as a reporting mechanism for regulators. The purpose of the NMP is to provide guidance for irrigating with recycled water as follows:

- Provide a description of the recycled water delivery system and ancillary system components to inform responsible personnel of the system operation and capabilities;

- Identify responsibilities of the permittee/operator in the operation, maintenance and management of the recycled water reuse on the permitted site;

- Instruct system operators in the purpose and intended operation of components within the irrigation system under normal operating conditions and during emergency conditions. This report includes procedures for emergency response and notification; and

- Annual monitoring and reporting requirements.

Application rates shall be determined in accordance with site-specific hydraulic loading levels for the avoidance of degradation of groundwater quality and of groundwater mounding or increases in groundwater levels that cause surface water discharge in a non-stream environment.

To adequately convey, apply and manage average daily flows projected for 2028, the Carson and Wade Valley portions of the project area must be able to assimilate approximately 1.0 million gallons per day (MGD) of recycled waters exported from the District's WWTP. This is the difference between the 5.8 MGD projected for daily flows in 2028 and the 4.8 MGD total flow (71.89 in/yr or 5.99 acre-feet/acre) that can be applied effectively on the 904 irrigable acres in Diamond Valley Ranch with no calculated risk to groundwater quality. This application rate exceeds the current 2008 discharge from the District's WWTP, but does not adequately address projected discharge through 2028.

Effluent Management Plan

For Component 2 recycled water will be made available to irrigators in Nevada. The District ~~shall~~ may assist irrigators in Nevada with the preparation of Effluent Management Plans following guidance in WTS-1B: General Criteria for Preparing An Effluent Management Plan, the NDEP white paper.

Diamond Valley Ranch Nutrient Management Plan

The District shall implement the NMP for the Diamond Valley Ranch (Wood Rodgers 2009).

Application Rates. The initially calculated maximum recycled water application rate is 71.89 in/yr, which equates to 5.99 ac-ft/ac for 904 irrigable acres, or a total flow of 1,765 Mgal/yr (4.8 MGD). This is the maximum allowable application rate that will meet the crop requirements as well as meet the District's objective to use the maximum recycled water for irrigation purposes. This application rate exceeds the current average daily discharge from the District's WWTP.

Below is a summary of calculated application rates to meet the crop requirements for alfalfa and pasture grass, the recommended crops for the Diamond Valley Ranch portion of the project area.

Crop	Irrigation	Maximum Application Rate (ac-ft/ac)
Alfalfa	Surface	5.99
Alfalfa	Spray	5.57
Pasture grass	Surface	3.03
Pasture grass	Spray	3.18

Livestock Grazing. Currently the Diamond Valley Ranch is irrigated with freshwater and grazed in the late spring through early fall by approximately 1000 head of cattle under a grazing permit with the District. Although the District Pasture (see Figure 1 in NMP) has not been subject to consistent grazing over the last seven years, chemical properties are not significantly different as compared to the areas of the Ranch that have been consistently grazed. Wood Rodgers professional opinion is that the level of grazing that is occurring on the DVR is moderate, dispersed, and managed based on availability of feed. Thus, under this freshwater management regime no one area or field will be impacted by the production of manure and associated input of nutrients under a freshwater irrigation regime. Under a recycled water regime there will be a small excess of nitrogen available (NMP Table 5, Appendix 1, Grazing Options tech Memo).

~~If cattle grazing shall continue within the irrigation fields/temporary containment basins (Component 11), it is recommended that the carrying capacity of the crop be determined and livestock use be limited to a moderate level on a rotation system. Carrying capacity is defined as the maximum stocking rate possible that is consistent with maintaining or improving vegetation or related resources. It may vary from year to year on the same area due to fluctuating forage production.~~

In lieu of amending the grazing timeframes, crop type, and manure management necessary for a nutrient neutral grazing regime, the District shall commit to removing cattle from portions of the Diamond Valley Ranch when irrigating with recycled water. The removal of cattle during a recycled water irrigation regime is determined to result in deficiencies in the "whole ranch nutrient balance" for Phosphorus, Potassium, and Nitrogen, which assures the protection of groundwater resources.

Crop Management. Existing vegetation on the Diamond Valley Ranch consists of pasture grass species. The wetter portions of the ranch support grass-likes such as Baltic rush and sedges. When reviewing soil physical and chemical characteristics with the vegetation the Ranch is currently supporting, there are no unique vegetation species or communities. In other words, the species that occur are what is expected for mountain meadow community types, and are closely tied to soil moisture conditions rather than soil texture and soil chemical properties. An important consideration in developing an NMP is to maximize nutrient uptake by the vegetation. Alfalfa and pasture grass ~~shall be the~~ were the crop types studied for the Diamond Valley Ranch reuse area specifically for nutrient uptake calculations. Other crop types may be considered, but similar studies must first be completed.

Recommendations for alternative crops are as follows:

- The District shall consider a mix of crop uses (hay, crop, and wetlands mitigation plant materials). This will allow the DVR a variety of revenue opportunities as well as opportunity to maximize nutrient uptake and effluent disposal.

- Another viable option is to practice hay production for harvest or grazing, or both. One cutting shall be harvested due to short growing season from pasture hay fields, followed by grazing on irrigated stubble of that crop.

- The Diamond Valley Ranch NMP shall consider crop/plant alternative opportunities for nutrient uptake for the crops as determined by the District. Nutrient uptake is considered as a nutrient loss in the nutrient balance of the ranch under the effluent irrigation scenario. This analysis shall provide the District with information to be able to determine the crops they want to consider for production and maximize nutrient uptake and effluent disposal.

- Wetland sod shall be an alternative. Citations for the nutrient uptake of species that would grow in a non-open water situation are not available. If this shall be considered as an alternative, tissue samples will need to be collected on a current wastewater wetland site and compared to tissue samples of a natural site.

Nutrient Uptake. Final crop selection shall be dependent on growing season in the study area, availability of supplemental irrigation, the quality of the domestic wastewater with respect to the salinity tolerance of the crop, and market if the District determines that it is beneficial to produce a cash crop. In turn, the crop(s) selected shall be used to determine the hydraulic loading limit and water balance calculations. The hydraulic loading limit can be largely influenced by the potential of the crop to uptake nutrients, primarily nitrate. The water balance is primarily based on the need of the crop or the evapotranspiration rates and soil permeability rates. Nutrient uptake is considered as a nutrient loss in the nutrient balance of the ranch under the recycled water irrigation scenario.

A primary concern with recycled water application for agricultural irrigation purposes is maintaining ground water quality. In order to prevent nitrogen from leaching to groundwater, nitrogen uptake by plant species shall be used as a factor in computing hydraulic loading based on nitrogen as the limiting factor. Plants will uptake nitrate, the soluble form of nitrogen that is present in recycled water. Nitrogen uptake by alfalfa is well documented, and a value of 200 lb/ac/day is commonly used in hydraulic loading limit calculations (Metcalf and Eddy 1991). The value for nitrogen uptake by pasture grass, 80 lb/ac/day, is obtained from California Plant Health Association (2002).

Hydraulic Loading. The following is a summary of calculated hydraulic loading rates and irrigation application rate.

		Hydraulic Loading (in/yr)			**Irrigation Application Rate ac-ft/Ac**
Crop	**Irrigation**	**Consumptive Use**	**Nitrogen Loading**	**Soil Permeabi-lity**	
Alfalfa	Surface	***71.89***	86.05	274.72	5.99
Alfalfa	Spray	**66.75**	86.05	274.72	5.57

Pasture grass	Surface	70.49	**36.33**	274.72	3.03
Pasture grass	Spray	65.45	**38.20**	274.72	3.18

For the combination of alfalfa/ surface irrigation, the maximum annual nitrogen hydraulic loading rate will be:

71.89 in/yr
5,416 ac-ft/904 irrigable ac (5.99 ac-ft/ac)
1.95 Mgal/ac

The above calculations are based on the assumption that there are no additional inputs of nitrogen being added to the crop as fertilizer or as manure. The following are the necessary steps for calculation of the hydraulic loading for nitrogen.

1. Calculate "actual nitrogen loading" applied on a monthly basis from volume of recycled water applied, concentration of total nitrogen in recycled water used for irrigation, and factors accounting for nitrogen available for plant uptake. Nitrogen available from recycled water is based on a 20% loss to volatilization/denitrification and a 5% loss to leaching (ref hydraulic loading spreadsheets in the appendix) for a total loss of 25%.
2. Include any nitrogen added as commercial fertilizer to determine the "actual nitrogen loading." (Wood Rodgers recommends against application of nitrogen-containing commercial fertilizer since doing so would reduce the amount or recycled water that can be applied for irrigation).
3. Calculate "cumulative annual nitrogen loading" each month as the sum of the monthly "actual nitrogen loading" from the beginning of the year through each quarter.
4. The "allowable nitrogen loading" is the annual nitrogen uptake rate for the crop grown on the irrigated fields. Compare available nitrogen applied to the annual uptake rate by calculating the percentage on a monthly basis: monthly "cumulative annual nitrogen loading" divided by "allowable nitrogen loading."

Assimilative Capacity. Lahontan requested an Assimilative Capacity Model be completed as an element of the NMP. Wood Rodgers substantiates that nitrogen loading (as described above) accomplishes the same goal. No cumulative effect from nitrogen loading was observed (NDEP data for NMP) and conclusions are that the assimilative capacity of receiving waters will not be impacted when irrigating with recycled water from the WWTP.

Recycled Water Irrigation Planning. Wood Rodgers evaluated typical surface and aerial irrigation methods to determine hydraulic loading rates under a recycled water irrigation regime with the primary intent of maximization of nutrient uptake on the 904 irrigable acres on the Diamond Valley Ranch.

Irrigation shall typically occur between April 1 and October 15. Wood Rodgers' opinion is that the type of irrigation method chosen shall be dependent on the type of crop to be grown, capital budget for initial materials costs, operating budget for pumping if required, and labor if needed by the system. Surface irrigation and spray irrigation were examined as potential alternatives. Surface irrigation provides the highest benefit based upon maximizing recycled water use, and aerial irrigation provides similar benefits with less potential for tailwater.

Monitoring and Reporting Requirements

The District shall supply monitoring and reporting data to Lahontan in compliance with the Waste Discharge Permit.

Monitoring. Monitoring associated with the Diamond Valley Ranch and other reuse areas of the project area shall be performed as required by the Waste Discharge Permit (Revised Board Order R6T-2004-0010):

- Monitoring of irrigation volume and rate of application shall be performed through an automated metering devise. DVR personnel will collect readings in order to determine the 30-day average flow;
- Harvey Place Reservoir recycled water quality shall continue to be monitored;
- Groundwater quality shall continue to be monitored at the existing monitoring wells. New monitoring wells shall added in the vicinities of the reuse areas proposed for recycled water irrigation; and
- A nitrogen balance shall be calculated on an annual basis. The annual balance shall be compared to the initial calculation and the results of the previous year's balance, as well as the Diamond Valley Ranch receiving water thresholds of 7 mg/l.

In order to determine the hydraulic loading based on nitrogen, Wood Rodgers consulted "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). Wood Rodgers set a conservative "red-flag" threshold level of 7 mg/l for Cp, as is common practice in developing a Nevada Effluent Management Plan (EMP). This was done to insure that the receiving groundwater resource will not be excessively degraded to a point where it is no longer useable (please also refer to the Assimilation Capacity Technical Report, Appendix 4). The District understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired.

Reporting. Monitoring data shall be provided monthly, quarterly, or annually as required by Lahontan and others. Should an unauthorized discharge of recycled water occur, Lahontan shall be notified as soon as the release is identified and controlled (within 2 hours). A written report on the release/discharge and the methods used for mitigation shall be submitted to Lahontan . The report shall list:

- Date and time of discharge;
- Exact location and estimated amount of discharge;
- Flow path and bodies of water which the discharge reached;
- Specific causes of the discharge; and

- Preventive and/or corrective actions taken.

Sampling Protocol. Sampling of the monitoring wells by the District shall follow the procedure outlined below:

- Document sampling on field data sheet;
- Measure depth to groundwater from the top of casing;
- Remove approximately three well volumes with bailer or pump (Do not contaminate the well or samples if using a bailer) and if a particular well is known to recharge slowly, pump well till casing is empty, allow well to refill then collect sample;
- Obtain sample bottles with preservatives from the laboratory; and
- Collect samples and immediately place them in a cooler with ice.

The following sampling for monitoring shall be completed:

Recycled Water Sampling. Samples shall be collected from Harvey Place Reservoir using containers, preservatives, and procedures recommended by the laboratory.

Flow Monitoring. Flow monitoring shall be done with a flow meter. Daily and monthly totalizer readings shall be recorded during irrigation. Readings shall be collected manually or electronically. Location of daily irrigation applications shall also be recorded to demonstrate appropriate distribution throughout the irrigation areas.

Soils. Soil samples in irrigated areas shall be collected and shall be analyzed as required by Lahontan. Given the high quality of recycled water discharged from theWWTP, it is recommended that soils be sampled every 3 to 5 years during recycled wastewater irrigation application.

Vegetation. If the District determines that it will be beneficial to produce a crop other than alfalfa or pasture grass, it is recommended that tissue samples be collected and analyzed annually to determine plant nutrient uptake specific to the reuse area. A plant sample protocol needs to be developed in coordination with Lahontan.

Component: Components 1, 2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21, 22, 29, 30, 31, 32

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** During final design.

Complete: Prior to the beginning of construction.

Monitoring Agency: Alpine County

Validation: The Plans shall be developed prior to application of recycled water to new irrigation areas or operation of new temporary containment and water management components.

SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring

Description: The District shall prepare and implement a maintenance plan to monitor application and temporary containment infrastructure using water meters, coupled with quarterly visual inspection of pipelines and levees, and inspection during and immediately after high runoff events. Public works projects must be subject to periodic maintenance to prevent degradation of surface water quality from slope and levee failure, or impoundment spills.

Component: Components 1, 2, 4, 6, 7, 8, 11, 18, 21, 22, 23, 24

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** During final design.

Complete: Prior to the beginning of construction.

Monitoring Agency: District

Validation: The Plan shall be developed prior to certification of the Final Engineering Drawings.

SP-35 Conveyance Infrastructure Maintenance Plan

Description: The District shall prepare and implement a maintenance plan to monitor conveyance infrastructure using water meters, coupled with annual visual inspection of pipelines. Public works projects shall be subject to periodic maintenance to prevent degradation of surface water quality from pipeline failure.

Component: Components 2, 3, 4, 5, 6, 14, 17, 20, 22, 31, 32

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** After construction.

Complete: Ongoing.

Monitoring Agency: District

Validation: The Plan shall be developed during the final phases of construction of the conveyance infrastructure.

D.6 Recommended Mitigation Measures

This section outlines the mitigation measures recommended in response to potential significant impacts identified in impact analyses for environmental resources. These mitigations are additive to those standard practices the District is already implemented or has formally committed to implementing. Compliance with these mitigation measures will result in the avoidance and/or reduction of adverse environmental impacts.

GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch~~ <u>Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water</u>

Description: The District shall amend the grazing regime to reduce Nitrogen loading if recycled water is used for irrigation on the Diamond Valley Ranch.

~~Grazing timeframe, crop type, and manure management shall be determined.~~ To continue cattle grazing in the Diamond Valley Ranch in conjunction with application of recycled water, the carrying capacity of the crop ~~shall~~ <u>must</u> be determined and livestock use be limited to a moderate level on a rotation system. Carrying capacity is defined in the Diamond Valley Ranch NMP as the maximum stocking rate possible that is consistent with maintaining or improving vegetation or related resources. The assimilative capacity of pasture grass and/or alfalfa under a central pivot, recycled water regime with consideration to grazing impacts and manure inputs ~~shall~~ <u>must</u> be determined to assure that nutrient inputs are balanced with nutrient uptake and that ground water quality is protected. ~~The Grazing Options Technical Memo of the Diamond Valley Ranch NMP recommends that manure be analyzed at a statistically accurate level to provide more precise nutrient inputs.~~

<u>In lieu of amending the grazing timeframes, crop type, and manure management necessary for a nutrient neutral grazing regime, the District shall commit to removing cattle from portions of the Diamond Valley Ranch when irrigating with recycled water. The removal of cattle during a recycled water irrigation regime is determined to result in deficiencies in the "whole ranch nutrient balance" for Phosphorus, Potassium, and Nitrogen which assures the protection of groundwater resources.</u>

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
GW-1. Will the Project degrade groundwater quality in the Carson, Wade and Diamond Valleys?	<u>Less than</u> Significant

Component: Components 9, 10, 11, 12, 13, 15, 16, 19, 29

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** Prior to construction.

Complete: Ongoing.

Monitoring Agency: District

Validation: Calculations shall be reviewed and approved by Lahontan prior to project-level permitting.

GW-1B ~~Determine Maximum Duration for Temporary Containment~~ Do Not Exceed a Maximum Duration of Temporary Containment (100 Days)

Description: ~~The District shall determine the maximum duration of containment of recycled waters that will meet the needs of temporary containment situations without causing impacts to groundwater quality. Wood Rodgers recommends additional investigations be undertaken in the areas of the proposed temporary containment fields to determine the depth to groundwater during the spring, as well as during drier months. An adequate depth to groundwater separating the unlined bottoms of the containment fields from the unsaturated zone will assures that groundwater quality is protected during times of temporary containment and that potential impacts are reduced to a level of less than significant.~~

The one-dimensional mass flux equation calculated by Farr West Engineering predicts that Nitrate-Nitrogen concentrations in water bearing zones will not be significantly impacted under a worst case scenario (100 days of containment during periods of saturated soil conditions, typically from late May to late July).

The District shall not temporarily contain recycled water on the Diamond Valley Ranch for more than 100 days. Findings from the project-level Nitrate-Nitrogen investigations (Appendix I-c) show that potential groundwater impacts resulting from the containment of recycled water for a period of 100 days could cause Nitrate-Nitrogen concentrations to increase by less than 2.0 mg/L in the underlying groundwater. The potential impact is dependent on the Nitrate-Nitrogen concentration in the temporarily contained recycled water and the permeability of the the soil materials underlying the containment field and is independent of the separation depth between the floor of the temporary containment fields and the groundwater table.

The District shall continue groundwater monitoring as outlined in SP-33. Should the temporary containment fields be put into use, the District shall complete project-level monitoring at the site to calibrate the one-dimensional mass flux equation.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
GW-1. Will the Project degrade groundwater quality in the Carson, Wade and Diamond Valleys?	Less than Significant

Component: Component 11

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** Prior to construction.

Complete: Ongoing.

Monitoring Agency: District

Validation: Calculations shall be reviewed and approved by Lahontan prior to project-level permitting.

SW-3 Develop Project-specific Nutrient Management Plan for the Jungle

Description: The District shall prepare and implement a nutrient management plan, as outlined in SP-33, for the portion of the project area referred to as the Jungle. Irrigation rates shall be balanced with the hydraulic loading levels determined for the site for the protection of surface water quality in the West Fork of the Carson River. The NMP shall include surface and groundwater protection and tailwater controls specific for the site conditions.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
SW-3. Will the Project cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?	Significant

Component: Component 30

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** During or After construction, as appropriate.

Complete: Ongoing.

Monitoring Agency: District

Validation: The NMP shall be developed during the planning and design stages of the Project Component.

SW-4 Develop Erosion Control Methods for ICR

Description: The District shall develop erosion control methods for Component 31, which will divert stormwaters that typically flow into HPR to ICR. Implementation of erosion control methods in the drainage upslope of ICR shall stabilize slopes and capture sediment that may be mobilized, keeping sediment from entering ICR and potentially degrading water quality in the reservoir.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
SW-4. Will the Project cause TMDLs to be exceeded at ICR?	Less than Significant

Component: Component 31

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** During construction.

Complete: Ongoing.

Monitoring Agency: District

Validation: The erosion control methods for ICR shall be developed during the planning and design stages of the Project Component.

SW-5 Implement Component 15 Prior to Component 32

Description: Component 32 will construct a spillway channel for ICR that conveys reservoir spillage of freshwater around HPR to Indian Creek. These spills have the potential to cause bank erosion in Indian Creek and increase TSS. The District shall create and properly manage the riparian water treatment wetlands that shall be located downstream of ICR as part of Component 15. In order to reduce the impacts from phosphates and nitrates potentially flushed from ICR, Component 15 shall be constructed prior to component 32**.**

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
SW-5. Will the Project cause narrative-based criteria to be exceeded in Indian Creek below HPR?	Less than Significant

Component: Component 32

Lead Agency: Lahontan

Implementing Agency: District

Timing: **Start:** Prior to construction of Component 32.

Complete: Completion of Component 32.

Monitoring Agency: District

Validation: Component 15 shall be constructed prior to or concurrent to Component 32.

BIO-1 Conduct Biological Resource Assessments

Description: A qualified biologist and botanist shall conduct planning level surveys at the proper time of year to identify special-status species that might occur within the Project area. If sensitive fish or wildlife resources or habitat is found, project redesign shall avoid these resources whenever possible. <u>If it is not possible to avoid impacting special status species then the impacts shall be mitigated to a level that is less than significant.</u>

Biological Resource Assessments are to accompany tiered CEQA and NEPA documents for individual projects. They shall be conducted up to one full year before significant planning and design occurs on any given project. The assessments shall be conducted by qualified biologists who shall assist environmental planners in preparing the sections on Biology for CEQA and NEPA documents. Each assessment shall be written in a letter style report to District well in advance of the NOP.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-1. Will the Project cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?	Less than significant

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, ~~11,~~ 12, 13, 14, 15, 16, 17, 19, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: CDFG, NDOW, USFWS

Implementing Agency: District

Timing: **Start:** During Preliminary Planning.

Complete: Prior to Final Selection of Sites.

Monitoring Agency: District

Validation: The biological resource assessments are needed to supplement the results of the present programmatic EIR level surveys once sites have been selected for tiered projects. The assessments would be part of Initial Studies tiered from the present CEQA document and Environmental Assessments pursuant to NEPA.

BIO-4A Fish Passage Structures and Deer Migration Corridors

Description: Design in-stream structures to allow the passage of fish and provide unfenced corridors and bridges to facilitate deer migration.

Fish. Project engineers shall consult with a fisheries biologist to design non-pipeline conveyance infrastructure to facilitate the passage of fish and aquatic invertebrates. Pipelines shall be designed and maintained to meet requirements of the USFWS and CDFG.

Deer. Project engineers and ROW agents shall work with private landowners and public agencies to design conveyance and temporary containment infrastructure and fencing required around recycled water application areas to allow the passage of migrating deer. The precise determination of bona fide deer migration routes shall be made by a project wildlife biologist, federal and State wildlife biologists, and ~~State Game Wardens~~ CDFG North Central Habitat Conservation Branch.

Upon determination that a conveyance or temporary containment component shall impact a deer migration route, the Project Engineer shall design facilities to meet requirements of the USFWS and the CDFG to allow the passage of deer. These structures shall be maintained or redesigned at the discretion of federal and state agencies in consultation with the District.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-4. Will the Project substantially block or disrupt major fish or wildlife migration or travel corridors?	Less than significant

Component: Components 2, ~~3~~, 4, 5, 6, 11, 14, 17, ~~22~~

Lead Agency: CDFG, NDOW, USFWS

Implementing Agency: District

Timing: **Start:** During preliminary design.

Complete: Following completion of construction.

Monitoring Agency: CDFG, NDOW, USFWS

Validation: ~~State Game Wardens~~ CDFG North Central Habitat Conservation Branch

BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife

Description: Construction activities shall be limited to periods when fish are not spawning or migrating or when deer are not migrating if such activities would affect fish spawning or deer migration.

A District wildlife biologist in consultation with federal and state agencies shall determine the construction windows that shall minimize the disturbance to breeding and migrating wildlife including Lahontan cutthroat trout and birds. Construction windows shall be established and written into construction contracts.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-4. Will the Project substantially block or disrupt major fish or wildlife migration or travel corridors?	Less than significant

Component: Components 2, ~~3~~, 4, 5, 6, 11, 14, 17, ~~22~~

Lead Agency: CDFG, NDOW, USFWS

Implementing Agency: District

Timing: **Start:** Before construction.

Complete: After construction.

Monitoring Agency: District

Validation: ~~State Game Wardens~~ CDFG North Central Habitat Conservation Branch.

BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan

Description: A qualified botanist shall conduct surveys to identify and map sensitive native plant communities that might occur within the project area. If a sensitive plant resource or habitat is found, a Habitat Restoration Plan shall be put together and submitted to the responsible regulatory and planning agencies for approval.

Mapping of sensitive plant communities (native rangeland, including piñon pine woodland) shall be conducted by a botanist on color aerial photographs at a scale suitable for planning level purposes. Polygons mapped in this way shall be field checked. Aerial photo-based vegetation maps shall become part of the preliminary design package for each project.

The first step in project design shall be to redesign or relocate elements to avoid native rangeland and piñon pine woodland. If redesign or relocation is not possible, the project engineer shall minimize impacts to native rangeland and piñon pine woodland to the greatest extent possible. If impacts are unavoidable then mitigation shall be provided which reduces the impacts below a level that is significant.

Habitat Restoration Plan. A qualified habitat restoration or revegetation specialist shall prepare a Habitat Restoration Plan at a level of detail sufficient for interagency review and public input. The plan shall contain a description of the sensitive resources to be impacted, including discussion of what species were present before construction takes place, and the regulatory framework for protecting the sensitive resource.

The Habitat Restoration Plan shall contain a planting palette, soil analysis (including a laboratory assessment of soil nutrients, particle size, nutrient sufficiency, and recipes for amendments); a conceptual planting plan, statement of performance criteria, and maintenance and monitoring plan.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-5. Will the Project have a substantial adverse effect on or result in the permanent loss of any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?	Less than significant

Component: Components 1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22

Lead Agency: CDFG, NDF

Implementing Agency: District

Timing: **Start:** Before construction.

Complete: After construction.

Monitoring Agency: District

Validation: California State Game Warden, Nevada State Forester Fire Warden

BIO-5B Monitor Habitat Restoration and Revegetation Sites

Description: Monitor habitat restoration sites for five (5) years to include annual reporting and remedial measures if the performance criteria outlined in BIO-5A are not met.

This mitigation measure parallels BIO-7 Monitor Wetland and Riparian Mitigation Sites, but differs from the latter by focusing on revegetation of native rangeland that may be disturbed by the project footprint. It differs from wetland and riparian mitigation in having less stringent performance criteria and 1:1 mitigation ratio (one [1] acre of native rangeland restored, replaced, or revegetated, for every acre disturbed or destroyed). Finally, this mitigation measure only restores or revegetates native rangeland but does not guarantee its preservation in perpetuity.

A revegetation specialist shall visit each construction site to photo-document the construction contractor's compliance with Best Management Practices and Erosion Control Measures. In addition, the revegetation specialist shall document hydroseeding, and in the case of piñon pine replacement, the survival of container stock, each year for a total of five (5) years. The monitoring shall bring to the attention of the District project manager, any deviations from the performance criteria set forth in BIO-5A.

For each project, the revegetation specialist shall prepare a preliminary revegetation report to be submitted to the District project manager, one (1) year after completion of construction. A final revegetation report shall be submitted at the end of five (5) years in the case of piñon pine replacement.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-5. Will the Project have a substantial adverse effect on or result in the permanent loss of any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS?	Less than significant

Component: Components 1, 3, 4, 5, 6, 9, 11, 14, 16, 17, 22

Lead Agency: CDFG, NDF

Implementing Agency: District

Timing: **Start:** Two weeks before construction.

Complete: After construction.

Monitoring Agency: District

Validation: California State Game Warden, Nevada State Forester Fire Warden

BIO-7 Monitor Wetland and Riparian Mitigation Sites

Description:

Monitor wetland and riparian mitigation sites for five (5) years to include annual reporting and remedial measures if the performance criteria outlined in SP-24 are not met.

Maintenance and Monitoring. Regulatory compliance would be achieved by execution of a mitigation monitoring and maintenance plan developed by a botanist or habitat restoration specialist. Monitoring of restoration success would employ techniques of vegetation and groundwater analysis using fixed photo-documentation points, semi-permanent vegetation monitoring transects using the line-intercept plant ecological method, and shallow groundwater monitoring wells. Monitoring would take place for a period of five (5) years. The main elements of mitigation area monitoring and maintenance would be:

- Retain a qualified biologist to monitor restoration success;
- Install shallow groundwater monitoring wells and survey against horizontal and vertical control;
- Monitor groundwater levels three (3) times annually in the shallow groundwater monitoring wells;
- Survey restored landscape against horizontal control;
- Produce as-built drawings;
- Install semi-permanent vegetation monitoring transects and collect baseline data;
- Establish permanent photo-documentation points;
- Carry out repair of faulty drip irrigation lines and replacement of failed nursery stock;
- Prepare annual, written monitoring reports to be submitted to the permitting agencies;
- Delineate the newly created wetland after four (4) years; and
- Recommend remedial steps, if needed, to the responsible party.

Maintenance of the created habitat would entail semi-annual pick-up of refuse, mending of drip irrigation lines, control of unplanned erosion, repair of infrastructure (fencing and interpretive signs), and re-planting of failed landscape plantings. A qualified biologist would prepare annual monitoring reports. These reports would be reviewed by District and forwarded to the USACE, Lahontan, and CDFG.

Success Criteria. The success of mitigation shall be ascertained from review of monitoring data and comparison of the data against criteria to be agreed upon, in advance, by the regulatory agencies and District. The recommended criteria are:

- In the case of riparian woodland plantings, survival of three (3) out of every five (5) container tree and shrub stock planted at the beginning of the five-year period (= target survival criterion).
- In the case of wetlands to be created, documented presence of all three mandatory criteria (hydrophytic vegetation, wetland hydrology, and hydric soil characteristics) after five (5) years according to methodology in the 1987 Corps Manual.

Failure to meet the above criteria shall necessitate replacement plantings and could trigger another three (3) years of monitoring if required by the permitting agencies.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
BIO-7. Will the Project have an effect on wetlands or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?	Less than significant

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 19, 20, 21, 22, 23, 24, 29, 30, 31, 32

Lead Agency: USACE

Implementing Agency: District

Timing: **Start:** First growing season after planting of mitigation sites.

Complete: Five (5) years after planting of mitigation sites.

Monitoring Agency: USACE, CDFG

Validation: USACE and CDFG shall sign-off on the mitigation following five (5) years of monitoring and submission of the Final Wetland and Riparian Mitigation and Monitoring Plan.

ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources

Description: (a) Upon selection of Project Components, the treatment of cultural resources to be affected by the Project shall continue to be addressed under the Section 106 process of the National Historic Preservation Act.

(b) As part of the Section 106 process, consultation to address potential adverse effects shall involve, at a minimum, District, Alpine and Douglas counties, the Washoe Tribe of Nevada and California and the Nevada and California SHPO. If necessary, the ACHP and other parties, if appropriate, may be a part of this consultation process.

(c) A PA between these parties, executed pursuant to 36 CFR 800.14 (b). The PA shall govern the implementation of a program to avoid adverse impacts to cultural resources formally determined eligible to the NHRP. The PA may provide for a phased resource identification, evaluation, and data recovery program.

(d) Phase I - Field surveys and cultural resource identifications must be directed by qualified archaeologists/historians/architectural historians who fulfill the Secretary of the Interior standards, as set forth in 36 CFR Part 1210, Appendix C. These identification studies must be conducted in a manner consistent with 36 CFR Part 1210, Appendix B, and with the recommendations of the SHPOs.

(e) Phase II - Prehistoric and historic resources that may be affected by implementation of the preferred alternative shall be evaluated for National Register significance. A phased resource identification, evaluation, and data recovery approach shall be implemented, allowing for construction to proceed at those locations where there are no cultural resources that may be affected by the project as allowed by the SHPOs. Evaluation for National Register significance shall be based on criteria A, B, C, and D, as presented in the Section 106 Guidelines, and the resources' overall integrity of location, setting, use, design, materials, workmanship, feeling, and association must be addressed.

(f) Subsurface testing of a resource is often needed in order to answer questions about an archaeological site's eligibility for the National Register or to obtain data needed to make decisions about how to mitigate Project impacts on a site already determined eligible or placed on the Register. Testing is directed toward determining the site's boundaries, the depth of its deposits, and/or its basic nature and condition. Testing is completed when sufficient information has been gathered to make a determination of eligibility or a management decision (ACHP 1980). The PA shall set forth guidelines for the testing and the subsequent development of a detailed data recovery work plan (research design).

(g) Phase III - The PA shall call for the development of a treatment plan (considerations for assessment of significance of cultural resources and impacts to NRHP eligible properties). This plan shall be developed according to the ACHP's "Recommended Approach for Consultation on Recovery of Significant Information from Archaeological Sites" (ACHP, 1999). This plan shall include the following (ACHP 1980):

(1) Specification of cultural resources to be studied within the impact area of the preferred alternative;

(2) Development of pertinent research questions;

(3) Establishment of study topics, springing from the research questions;

(4) Establishment of study priorities;

(5) Definition of data needs for each topic for study;

(6) Description of methods to be employed in fieldwork and analysis for determination of historic significance. Architectural characteristics should be recorded consistent with the standards of the Historic American Buildings Survey (HABS) or the Historic American Engineering Record (HAER), as appropriate; and

(7) Development of a policy for the treatment of NRHP eligible properties.

The PA shall provide for archaeological monitoring to guard against the discovery of unknown and/or buried resources. A qualified archaeologist, who meets standards of the Secretary of the Interior, shall conduct in-field monitoring during construction activities in areas of high archaeological sensitivity. Native American monitors may be present as determined by the Washoe Tribe of California and Nevada. In-field monitoring of unknown archaeological resources is discussed under Construction Mitigation Measure 2.4.7, Protect Undiscovered Cultural Resource Sites.

(h) The PA shall provide an opportunity for appropriate technical review of the data recovery work plan, usually by the SHPOs, and, where needed, by the ACHP and peer review by outside parties.

(i) Phase IV – Cultural resources and historic properties studies shall be carried out by or under the direct supervision of a person or persons meeting at a minimum the Secretary of the Interior's Professional Qualifications Standards (48 FR 44738-39) in the appropriate disciplines. Cultural resources and historic properties studies shall meet the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 FR 44716-44740). Reports prepared shall meet the published standards of the Office of Historic Preservation specifically, Preservation Planning Bulletin Number 4(a), "Archaeological Resources Management Reports (ARMR): Recommended Contents and Format" (December 1989).

(j) The District shall ensure that curation of archaeological materials and data attempts to conform to the Secretary's Standards and Guidelines, and the requirements of the Archaeological Resources Protection Act (PL 96-95), if applicable.

If mitigation is the responsibility of an out of state agency, a reciprocal agency agreement shall be made between California and Nevada SHPOs to assure monitoring and reporting responsibilities are agreed upon.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
ARCH-1. Will the Project disturb known, potentially eligible National, Nevada or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Less than Significant 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
ARCH-1. Will the Project disturb known, potentially eligible National, Nevada or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Significant - ~~Components~~ 29, 30, 31, 32
ARCH-2. Will the Project disturb unknown archaeological resources or human remains?	Less than Significant 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
ARCH-2. Will the Project disturb unknown archaeological resources or human remains?	Significant - ~~Components~~ 29, 30, 31, 32

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Prior to Project Design.

Complete: Before commencement of Project construction.

Monitoring Agency: Alpine County, Douglas County, California SHPO, and Nevada SHPO.

Validation: District shall not begin construction without concluding Section 106 Consultation with the California and Nevada SHPOs.

ARCH-2 Protect Undiscovered Cultural Resource Sites

Description: The District shall retain an archaeological monitor to be present during certain phases of Project construction. The monitor shall be a qualified archaeologist who meets Secretary of the Interior standards and who shall conduct in-field monitoring during construction activities in areas of known resources and areas of high archaeological sensitivity. When the in-field monitor is not present, construction personnel shall be made aware of indicators of cultural resources and shall report encounters to the in-field monitor. In the event of late discoveries, work at the location should cease until the in-field monitor has evaluated the finds and situation and provided recommendations for further procedures.

If human remains are discovered, the county coroner must be notified as soon as is reasonably possible (CEQA Section 15064.5). There shall be no further disturbance to the site where the remains were found. If the remains are Native American, the coroner is responsible for contacting the Native American Heritage Commission within 24 hours. The commission, pursuant to Section 5097.98 of the Public Resource Code (PRC), shall immediately notify those persons it believes to be the most likely descendants of the deceased Native American. Treatment of the remains shall be dependent on the views of the most likely descendent.

Impacts Mitigated and Mitigation Level

Impacts Mitigated	Level of Significance After Mitigation
ARCH-1. Will the Project disturb known, potentially eligible National, Nevada or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Less than Significant 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
ARCH-1. Will the Project disturb known, potentially eligible National, Nevada or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?	Significant - ~~Components~~ 29, 30, 31, 32
ARCH-2. Will the Project disturb unknown archaeological resources or human remains?	Less than Significant 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22
ARCH-2. Will the Project disturb unknown archaeological resources or human remains?	Significant - ~~Components~~ 29, 30, 31, 32

Component: Components 1, 2, 3, 4, 5, 6, 7, 9, 10, 11,12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 29, 30, 31, 32

Lead Agency: District

Implementing Agency: District

Timing: **Start:** Upon selection of a preferred alternative.

Complete: Before commencement of Project construction.

Monitoring Agency: Alpine County, Douglas County, California SHPO, and Nevada SHPO.

Validation: The District shall not begin construction without concluding Section 106 Consultation with the California and Nevada SHPOs.

D.7 Program Implementation and Monitoring

D.7.1 Implementation

The District shall be responsible for the implementation and administration of the MMP for the Project. Where necessary to ensure compliance with mitigation measures, the District shall include the performance of mitigation in its contracts with irrigators, recycled water wholesalers and contractors. The District shall designate a staff person to serve as coordinator of mitigation monitoring among the various government agencies, construction contractors, and other parties. This person (Coordinator) shall oversee implementation and monitoring of compliance measures, standard practices, and mitigation measures to ensure that they are completed to the standards specified in the EIR.

Duties of the Coordinator include the following:

- Coordinate with applicable agencies that have mitigation monitoring and reporting responsibility;
- Coordinate activities with the construction manager;
- Coordinate activities of in-field monitors;
- Develop work plan and schedule for monitoring activities;
- Coordinate activities of consultants hired by the District when such expertise and qualifications are necessary;
- Routine inspections and reporting activities;
- Plan checks;
- Assure follow-up and response to citizen inquiries and complaints;
- Develop, maintain, and compile Verification Report form(s);
- Maintain the Mitigation Monitoring Checklist or other suitable mitigation compliance summary; and
- Coordinate and assure implementation of corrective actions or enforcement measures, as needed.

D.7.2 Mitigations Outlined By Project Component and Master Plan Project Number

Table D-2 below outlines the mitigations that are required to be implemented for each component when constructed.

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
1	8 – West Fork Pipeline 9 – On-Farm Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
2	13 – make Recycled Water Available to Irrigators in Nevada	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
3	5 – Diamond Ditch Conveyance Improvements 6 – Waterfall Pipeline Forebay and Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments ~~BIO-4A Fish Passage Structures and Deer Migration Corridors~~ ~~BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife~~ BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
4	6 – Waterfall Pipeline Forebay and Pipeline 8 – West Fork Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-5 Avoid Traffic Disruption on Major Highways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-17 Pipeline Design Features in Active Fault Zones SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
5	10 – Wade Valley Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-17 Pipeline Design Features in Active Fault Zones SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
6	6 – Waterfall Pipeline Forebay and Pipeline 9 – On-Farm Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-5 Avoid Traffic Disruption on Major Highways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
7	7 – District Pasture Subsurface Irrigation Pilot Project 8 – West Fork Pipeline 9 – On-Farm Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
8	26 – Injection Well Program	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
9		SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-22 Mosquito Prevention SP-23 Delineate Wetlands, Waters of the United States and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-28 Remove Weak Surficial Deposits from Basin Footprints SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
10	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-22 Mosquito Prevention SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-28 Remove Weak Surficial Deposits from Basin Footprints SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
11	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch 2 – Harvey Place Reservoir Bypass System Pipelines and Ditches 3 – Diamond Valley Ranch Irrigation Fields Pump Back System	SP-1 Dam Safety SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-21 Temporary Containment and Impoundment Siting and Design SP-22 Mosquito Prevention SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-28 Remove Weak Surficial Deposits from Basin Footprints SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water GW-1B ~~Determine Maximum Duration for Temporary Containment~~ Do Not Exceed a Maximum Duration of Temporary Containment (100 Days) ~~BIO-1 Conduct Biological Resource Assessments~~ BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
12	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
13	1 – Recycled Water Irrigation Fields on Diamond Valley Ranch	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-22 Mosquito Prevention SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitats SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
14	7 – District Pasture Subsurface Irrigation Pilot Project 8 – West Fork Pipeline 9 – On-Farm Pipeline 10 – Wade Valley Pipeline	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-35 Conveyance Infrastructure Maintenance Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
15	Future Projects	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-22 Mosquito Prevention SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
16	7 – District Pasture Subsurface Irrigation Pilot Project	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-29 Management of Hazardous Materials/Wastes During Construction SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan BIO-7 Monitor Wetland and Riparian Mitigation Sites GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch –~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
17	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments BIO-4A Fish Passage Structures and Deer Migration Corridors BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
18	11 – Prepare Nutrient Management Plan	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-17 Pipeline Design Features in Active Fault Zones SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites
19	12 – Permitting for Recycled Water Use in Diamond Valley	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-17 Pipeline Design Features in Active Fault Zones SP-23 Delineate Wetlands, Waters of the United States and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
20	13 – Make Recycled Water Available to irrigators in Nevada	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-27 Avoid Impacts to Wetland and Riparian Areas SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-35 Conveyance Infrastructure Maintenance Plan BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
21	Future Projects	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
22	6 – Waterfall Pipeline Forebay and Pipeline 10 – Wade Valley Pipeline	SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-31 Pre-construction Marking and Fencing of Sensitive Native Plant Communities SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring SP-35 Conveyance Infrastructure Maintenance Plan BIO-1 Conduct Biological Resource Assessments ~~BIO-4A Fish Passage Structures and Deer Migration Corridors~~ ~~BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife~~ BIO-5A Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan BIO-5B Monitor Habitat Restoration and Revegetation Sites BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
23	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements 15 – Upper Dressler Ditch Conveyance Improvements 16 – Indian Creek Treatment Wetlands 19 – use Mud Lake Winter Flows for Indian Creek Reservoir Flushing	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites
24	14 – Snowshoe Thompson No. 1 Conveyance Capacity Improvements 15 – Upper Dressler Ditch Conveyance Improvements 16 – Indian Creek Treatment Wetlands 20 – Storage of Water for Downstream Users	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
25	21- Develop Recycled Water Wholesale Program	Future Project/Components
26	22 – Biosolids Composting	Future Project/Components
27	23 – Become a Water Rights Buyer/Broker to Maintain the Value of Recycled Water	Future Project/Components
28	24 – Power Generation	Future Project/Components
29	4 – Diamond Valley Freshwater/Recycled Water Irrigation System	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan GW-1A ~~Determine a Nutrient Neutral Grazing Regime for Diamond Valley Ranch~~ Remove Cattle Grazing from Portions of Diamond Valley Ranch Irrigated with Recycled Water BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
30	4 – Diamond Valley Freshwater/Recycled Water Irrigation System	SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SW-3 Develop Project Specific Nutrient Management Plan for the Jungle BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2		
Mitigation Required for Projects and Components		
Component Number	**Project Number(s) and Name (s)**	**Mitigation Required**
31	17 – Diversion Ditch for Stormwater Flow Away from Harvey Place Reservoir and to Indian Creek Reservoir	SP-1 Dam Safety SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-35 Conveyance Infrastructure Maintenance Plan SW-4 Develop Erosion Control Methods for ICR SW-5 Implement Component 15 Prior to Component 32 BIO-1 Conduct Biological Resource Assessment BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites

Table D-2

Mitigation Required for Projects and Components

Component Number	Project Number(s) and Name (s)	Mitigation Required
32	18 – Indian Creek Reservoir Spillway Channel	SP-1 Dam Safety SP-2 Standard Traffic Control Procedures SP-3 Emergency Response Vehicles Shall Not be Impeded SP-4 Maintain Maximum Number of Open Lanes on Roadways SP-6 Fence or Cover Trenches SP-7 Access to Businesses and Residences SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites SP-9 Park within Construction Easements SP-10 Limit Ingress/Egress of Construction Equipment SP-11 Erosion Control/Storm Water Pollution Prevention Plan SP-12 Standard Noise Control Practices - Construction Phase SP-13 Standard Noise Control Practices - Operation Phase SP-14 Standard Air Quality Control Practices - Construction Phase SP-15 Standard Air Quality Control Practices - Operation Phase SP-16 Slope Stabilization Design SP-17 Pipeline Design Features in Active Fault Zones SP-18 Liquefaction Stabilization Design SP-19 Standard Engineering Methods for Expansive Soils SP-20 Standard Engineering Methods for Corrosive Soils SP-23 Delineate Wetlands, Waters of the United States, and Riparian SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan SP-25 Sensitive Resource Program SP-26 Sensitive Plant Protection Program SP-27 Avoid Impacts to Wetland and Riparian Areas SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat SP-33 Surface and Ground Water Protection Plan SP-35 Conveyance Infrastructure Maintenance Plan SW-5 Implement Component 15 Prior to Component 32 BIO-1 Conduct Biological Resource Assessments BIO-7 Monitor Wetland and Riparian Mitigation Sites ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources ARCH-2 Protect Undiscovered Cultural Resource Sites
33	25 – Extend the C-Line to the State Line	Future Project/Components
34	26 – Injection Well Program	Future Project/Components

D.7.3 Mitigation Monitoring

The implementation of compliance measures, standard practices and recommended mitigation measures shall be monitored at two levels. The first level of monitoring is done through the use of a Verification Report. A sample Verification Report is shown as Table 2-4. This report is to be completed by the District for each mitigation measure. Frequency of report completion shall vary based on the type of mitigation measure. For example, measures that require modification of final design drawings shall require that the Verification Report be completed at the time the final drawings are completed and again when they are approved. In-field monitoring for activities such as pipeline construction through a stream may require that a Verification Report be completed daily.

Once a mitigation measure is completed and the measure needs no further monitoring or follow-up, the District shall complete a final Verification Report that includes evidence of completion, such as a final engineering drawing or a photograph of field activities. The District shall be responsible for maintaining completed Verification Reports. Copies of these reports shall be maintained at the District Offices.

If the Coordinator determines that non-compliance has occurred, the Coordinator shall deliver a written notice describing the non-compliance and requiring compliance within a specified period of time. If non-compliance still exists at the expiration of the specified period of time, construction may be halted and fines may be imposed upon the party responsible for implementation, at the discretion of the District.

The second level of monitoring shall be done through the completion of the Mitigation Monitoring Checklist, Table 2-5. The purpose of the checklist is to provide a summary for the District, other public officials, and concerned citizens of the status of the adopted mitigation measures. The Coordinator shall update the checklist quarterly (four times a year) by reviewing the Verification Reports and status of the mitigation measures. A copy of the most current Mitigation Monitoring Checklist shall be maintained at the District Offices.

Table D-3

Verification Report

Date:	Compliance: ☒ Acceptable ☒ Unacceptable	
Location:	Mitigation Measure:	
	Discipline:	
	☒ Land Use/ Agriculture	☒ Public Health/ Services
	☒ Geology	☒ Noise/Air
	☒ Water	☒ Transportation
Construction Sheet No:	☒ Biology	☒ Cultural/Arch.
Activity:		
Observations:		
Recommendations:		
By:	Approved By:	
Copies to:		
Anticipated Completion Date:		
Method of Compliance:		
Date Closed:	Authorized By:	

Table D-4					
Mitigation Monitoring Checklist					
Mitigation Measure	**Lead Agency**	**Implementing Agency**	**Monitoring Agency**	**Validation/ Status**	**Comments**
2.2 Measures Included in the Project					
SP-1 Dam Safety	District	District	OES		
SP-2 Standard Traffic Control Procedures	District	District	Caltrans/Alpine County		
SP-3 Emergency Response Vehicles Will Not be Impeded	District	District	District		
SP-4 Maintain Maximum Number of Open Lanes on Roadways	District	District	Caltrans/Alpine County		
SP-5 Avoid Traffic Disruption on Major Highways	District	District	Caltrans		
SP-6 Fence or Cover Trenches	District	District	District		
SP-7 Access to Businesses and Residences	District	District	District		
SP-8 Repair Road Damage and Revegetate Temporarily Disturbed Sites	District	District	Caltrans/Alpine County		
SP-9 Park Within Construction Easements	District	District	District		
SP-10 Limit Ingress/Egress of Construction Equipment	District	District	District		
SP-11 Erosion Control/Storm Water Pollution Prevention Plan	District	District	District		
2.3 Planning Measures <u>Included in the Project</u>					
SP-16 Slope Stabilization Design	District	District	District		
SP-17 Pipeline Design Features in Active Fault Zones	District	District	District		
SP-18 Liquefaction Stabilization Design	District	District	District		
SP-19 Standard Engineering Methods for Expansive Soils	District	District	District		
SP-20 Standard Engineering Methods for Corrosive Soils	District	District	District		
SP-21 Temporary Containment and Impoundment Siting and Design	District	District	District		
~~ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources~~	~~District~~	~~District~~	~~Alpine County, Douglas County, California SHPO, and Nevada SHPO~~		
SP-22 Mosquito Prevention	District	District	Alpine County Health Department		

Table D-4

~~BIO-1 Conduct Biological Resource Assessments~~	~~CDFG, NDOW, USFWS~~	~~District~~	~~District~~		
~~BIO-4A Fish Passage Structures and Deer Migration Corridors~~	~~CDFG, NDOW, USFWS~~	~~District~~	~~CDFG, NDOW, USFWS~~		
~~BIO-5A Map Sensitive Native Plant Communities and Habitat Restoration Plan~~	~~CDFG, NDF~~	~~District~~	~~District~~		
SP-23 Delineate Wetlands, Waters of the United States and Riparian	USACE	District	USACE, CDFG		
SP-24 Prepare Wetland and Riparian Mitigation and Monitoring Plan	USACE	District	USACE, CDFG		
SP-25 Sensitive Resource Program	CDFG, NDOW, USFWS	District	District		
SP-26 Sensitive Plant Protection Program	CDFG, NDF, USFWS	District	District		
SP-27 Avoid Impacts to Wetland and Riparian Areas	USACE	District	USACE		
2.4 Construction Measures Included in the Project					
SP-12 Standard Noise Control Practices - Construction Phase	District	District	District		
SP-14 Standard Air Quality Control Practices - Construction Phase	District	District	District		
SP-28 Remove Weak Surficial Deposits from Basin Footprints	District	District	District		
SP-29 Management of Hazardous Materials/Wastes During Construction	District	District	District and California or Nevada OSHA		
SP-30 Pre-construction Surveys for Migratory Birds, Nesting Raptors and Wildlife Nurseries	CDFG, NDOW, USFWS	District	District		
~~BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife~~	~~CDFG, NDOW, USFWS~~	~~District~~	~~District~~		
SP-31 Pre-construction Marking and Fencing Native Plant Communities	CDFG, NDF	District	District		
SP-32 Pre-construction Marking and Fencing of Wetlands and Riparian	USACE	District	District		
~~ARCH-2 Protect Undiscovered Cultural Resource Sites~~	~~District~~	~~District~~	~~Alpine County, Douglas County, California SHPO, and Nevada SHPO~~		
2.5 Operation and Maintenance Measures					

Table D-4

SP-13 Standard Noise Control Practices - Operations Phase	District	District	District		
SP-15 Standard Air Quality Control Practices - Operations Phase	District	District	District		
SP-33 Surface and Ground Water Protection Plan	Lahontan and NDEP	District	Alpine County		
SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring	Lahontan and NDEP	District	District		
SP-35 Conveyance Infrastructure Maintenance Plan	Lahontan and NDEP	District	District		
2.6 Recommended Mitigation Measures					
GW-1A Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water	Lahontan	District	District		
GW-1B Do Not Exceed a Maximum Duration of Temporary Containment (100 Days)	Lahontan	District	District		
SW-3 Develop Project-Specific Nutrient Management Plan for Jungle	Lahontan	District	District		
SW-4 Develop Erosion Control Methods for ICR	Lahontan	District	District		
SW-5 Implement Component 15 Prior to Component 32	Lahontan	District	District		
BIO-1 Conduct Biological Resource Assessments	CDFG, NDOW, USFWS	District	District		
BIO-4A Fish Passage Structures and Deer Migration Corridors	CDFG, NDOW, USFWS	District	CDFG, NDOW, USFWS		
BIO-4B Schedule Construction to Avoid Breeding and Migrating Wildlife	CDFG, NDOW, USFWS	District	District		
BIO-5A Map Sensitive Native Plant Communities and Habitat Restoration Plan	CDFG, NDF	District	District		
BIO-5B Monitor Habitat Restoration and Revegetation Sites	CDFG, NDF	District	District		
BIO-7 Monitor Wetland and Riparian Mitigation Sites	USACE	District	USACE, CDFG		
ARCH-1 Identification, Evaluation and Avoidance of Cultural Resources	District	District	Alpine County, Douglas County, California SHPO, and Nevada SHPO		

Table D-4

ARCH-2 Protect Undiscovered Cultural Resource Sites	District	District	Alpine County, Douglas County, California SHPO, and Nevada SHPO		

Source: Hauge Brueck Assoc. 2009

D.7.4 Mitigation Monitoring Status Reporting

The District shall compile a Mitigation Monitoring Status Report on an annual basis. The report shall be prepared by the Coordinator and contain the following:

- Mitigation Monitoring Checklist to provide the status of every mitigation measure;
- List of completed mitigation measures;
- List of non-compliance incidences, with action taken or required;
- Evaluation of the effectiveness of the mitigation measures;
- Recommendations for modifications to the MMP to improve effectiveness; and
- Required modifications to the MMP to comply with legislation and policies adopted in the previous year (e.g. newly listed threatened species).

The report shall be presented and reviewed at a meeting of the District's Board of Directors. The meeting shall be noticed in local newspapers and shall be open for the public to speak and present written evidence as to the effectiveness of mitigation measures.

Appendix E - Comparison of Components

Appendix E - Comparison of Components

This Appendix provides a summary of total impacts for: Project Components 1-32 (Tables E-1 through E-32); No Project Components (Table E-33 and E-34); and Alternatives 1, 2, 3 and 4 (Tables E-35 through E-39).

Table E-1				
Summary of Resource Impacts for Component 1 (Provide recycled water to new non-irrigated, permitted land)				
	Resource Impact by Level of Significance			
1 - Provide recycled water to new non-irrigated, permitted land	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 1	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-2, SW-3, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**3**	**25**	**30**

Table E-2

Summary of Resource Impacts for Component 2
(Make recycled water available to irrigators in Nevada)

	Resource Impact by Level of Significance			
2 - Make recycled water available to irrigators in Nevada	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 2	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-2, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-3, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**3**	**22**	**34**

Table E-3				
Summary of Resource Impacts for Component 3 (Capacity and conveyance improvements in the Diamond Ditch system)				
	Resource Impact by Level of Significance			
3 - Capacity and conveyance improvements in the Diamond Ditch system	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 3	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	~~BIO-4~~, BIO-5, ARCH-1, ARCH-2	BIO-4, GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**23**	**33**

Table E-4				
Summary of Resource Impacts for Component 4 (Provide pressurized recycled water to Fredericksburg system)				
	Resource Impact by Level of Significance			
4 - Provide pressurized recycled water to Fredericksburg system	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 4	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-2, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**24**	**32**

Table E-5

Summary of Resource Impacts for Component 5
(Provide pressurized recycled water through Wade Valley)

	Resource Impact by Level of Significance			
5 - Provide pressurized recycled water through Wade Valley	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 5	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**23**	**33**

Table E-6				
Summary of Resource Impacts for Component 6 (Provide pressurized recycled water to the Ranchettes)				
	Resource Impact by Level of Significance			
6 - Provide pressurized recycled water to the Ranchettes	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 6	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-2, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**24**	**32**

Table E-7				
Summary of Resource Impacts for Component 7 (Non-flood Irrigation application system)				
	Resource Impact by Level of Significance			
7 - Non-flood Irrigation application system	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 7	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-1, GW-2, SW-2, SW-3, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**2**	**26**	**33**

Table E-8

Summary of Resource Impacts for Component 8
(Improve recycled water quality)

	Resource Impact by Level of Significance			
8 - Improve recycled water quality	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 8			GW-1, HYDRO-2, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, BIO-1, BIO-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-2, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, GW-3, SW-1, SW-2, SW-3, SW-4, SW-5, HYDRO-1, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-3, BIO-4, BIO-6, BIO-7, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-1, ARCH-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**0**	**0**	**17**	**49**

Table E-9				
Summary of Resource Impacts for Component 9 Groundwater recharge using infiltration basins				
	Resource Impact by Level of Significance			
9 - Groundwater recharge using infiltration basins	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 9	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, SW-3, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-5, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, BIO-4, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**4**	**26**	**31**

Table E-10				
Summary of Resource Impacts for Component 10 (Construct zero-discharge basins)				
	Resource Impact by Level of Significance			
10 - Construct zero-discharge basins	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 10	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, SW-5, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-5, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**3**	**26**	**32**

Table E-11				
Summary of Resource Impacts for Component 11 (Construct irrigation fields with pumping back to Harvey Place Reservoir)				
	Resource Impact by Level of Significance			
11 - Construct irrigation fields with pumping back to Harvey Place Reservoir	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 11	GEO-2, BIO-1, BIO-2, BIO-3	GW-1, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, SW-5, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-5, PHS-6, BIO-4, BIO-7, TRAFFIC-1, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-2, PU-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, BIO-6, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-1, VISUAL-3, VISUAL-4, PU-1, PU-2, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**4**	**4**	**28**	**30**

Table E-12				
Summary of Resource Impacts for Component 12 (Grow biomass crops for pulp production using recycled water)				
	Resource Impact by Level of Significance			
12 - Grow biomass crops for pulp production using recycled water	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 12	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, SW-5, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**3**	**25**	**33**

Table E-13				
Summary of Resource Impacts for Component 13 (Wetland sod and seed production)				
	Resource Impact by Level of Significance			
13 - Wetland sod and seed production	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 13	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, SW-5, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-5, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**3**	**26**	**32**

Table E-14

Summary of Resource Impacts for Component 14
(Piping recycled water systems to minimize setbacks and human contact)

	Resource Impact by Level of Significance			
14 - Piping recycled water systems to minimize setbacks and human contact	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 14	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**23**	**34**

Table E-15				
Summary of Resource Impacts for Component 15 (Mitigation wetland creation using freshwater)				
	Resource Impact by Level of Significance			
15 - Mitigation wetland creation using freshwater	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 15	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-5, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-5, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-3, SW-4, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, BIO-4, BIO-5, BIO-6, BIO-7, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**3**	**25**	**33**

Table E-16				
Summary of Resource Impacts for Component 16 (Subsurface recycled water irrigation in public contact or buffer areas)				
	Resource Impact by Level of Significance			
16 - Subsurface recycled water irrigation in public contact or buffer areas	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 16	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	GW-1, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, HYDRO-3 PHS-1, PHS-2, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1, PU-2, PU-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-5, BIO-4, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**4**	**27**	**30**

Table E-17				
Summary of Resource Impacts for Component 17 (Increase Snowshoe Thompson No. 1 conveyance capacity)				
	Resource Impact by Level of Significance			
17 - Increase Snowshoe Thompson No. 1 conveyance capacity	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 17	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7	BIO-4, BIO-5, ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-1, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**4**	**24**	**33**

Table E-18

Summary of Resource Impacts for Component 18
(Optimize application rate on existing irrigated lands)

	Resource Impact by Level of Significance			
18 - Optimize application rate on existing irrigated lands	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 18		ARCH-1, ARCH-2	GW-1, GW-2, SW-2, SW-3, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, BIO-1, BIO-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-2, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-3, SW-1, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**0**	**2**	**20**	**44**

Table E-19				
Summary of Resource Impacts for Component 19 (Pursue permitting of more land in Alpine County)				
	Resource Impact by Level of Significance			
19 - Pursue permitting of more land in Alpine County	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 19	GEO-2, BIO-1, BIO-2, BIO-3	GW-1, ARCH-1, ARCH-2	GW-2, SW-3, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, BIO-7, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**4**	**3**	**16**	**43**

Table E-20				
Summary of Resource Impacts for Component 20 (Improve operation of the Diamond Ditch system to meet District user needs)				
	Resource Impact by Level of Significance			
20 - Improve operation of the Diamond Ditch system to meet District user needs	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 20	GEO-2	ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-1, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, BIO-1, BIO-2, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**1**	**2**	**26**	**37**

Table E-21

Summary of Resource Impacts for Component 21
(Develop tailwater control system)

	Resource Impact by Level of Significance			
21 - Develop tailwater control system	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 21	GEO-2, GW-1, BIO-1, BIO-2, BIO-3	ARCH-1, ARCH-2	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-2, SW-3, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, BIO-7, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**5**	**2**	**25**	**34**

Table E-22				
Summary of Resource Impacts for Component 22 (Parallel recycled water pipeline along existing Diamond Ditch)				
	Resource Impact by Level of Significance			
22 - Parallel recycled water pipeline along existing Diamond Ditch	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 22	GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7	~~BIO-4,~~ BIO-5, ARCH-1, ARCH-2	BIO-4, GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, SW-3, SW-5, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, SW-4, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**6**	**4**	**24**	**32**

Table E-23				
Summary of Resource Impacts for Component 23 (Route Mud Lake winter flows through Indian Creek Reservoir)				
	Resource Impact by Level of Significance			
23 - Route Mud Lake winter flows through Indian Creek Reservoir	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 23	BIO-1, BIO-2, BIO-7		GW-1, SW-4, SW-5, HYDRO-2, HYDRO-3, HYDRO-4, HYDRO-5, PHS-1, PHS-3, PHS-4, PHS-6, BIO-4, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-2, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, GW-3, SW-1, SW-2, SW-3, HYDRO-1, HYDRO-6, PHS-2, PHS-5, BIO-3, BIO-5, BIO-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-1, ARCH-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**3**	**0**	**19**	**44**

Table E-24

Summary of Resource Impacts for Component 24
(Transfer additional water rights to storage in Indian Creek Reservoir)

	Resource Impact by Level of Significance			
24 - Transfer additional water rights to storage in Indian Creek Reservoir)	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 24	BIO-1, BIO-2, BIO-7		GW-1, SW-4, SW-5, HYDRO-2, HYDRO-3, HYDRO-4, HYDRO-5, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-2, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, GW-3, SW-1, SW-2, SW-3, HYDRO-1, HYDRO-6, PHS-2, PHS-5, BIO-3, BIO-4, BIO-5, BIO-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-1, ARCH-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**3**	**0**	**18**	**45**

Table E-29

Summary of Resource Impacts for Component 29
(Irrigate the District Pasture)

	Resource Impact by Level of Significance			
29 - Irrigate the District Pasture	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 29	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7, ARCH-1, ARCH-2	GW-1	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-3, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-2, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**7**	**1**	**24**	**34**

Table E-30

Summary of Resource Impacts for Component 30
(Irrigate the "Jungle" with recycled water)

	Resource Impact by Level of Significance			
30 - Irrigate the "Jungle" with recycled water	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 30	GEO-2, GW-1, SW-3, BIO-1, BIO-2, BIO-3, BIO-7, ARCH-1, ARCH-2		GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-2, SW-2, HYDRO-3 PHS-1, PHS-3, PHS-4, PHS-6, BIO-4, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, VISUAL-1	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-3, SW-1, SW-4, SW-5, HYDRO-1, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, ARCH-3, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**9**	**0**	**25**	**32**

Table E-31

Summary of Resource Impacts for Component 31
(Divert Storm water flow away from Harvey Place Reservoir to Indian Creek Reservoir)

	Resource Impact by Level of Significance			
31 - Divert Storm water flow away from Harvey Place Reservoir to Indian Creek Reservoir	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 31	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7, ARCH-1, ARCH-2	SW-4, SW-5	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-1, SW-3, HYDRO-1, HYDRO-3, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, HYDRO-2, HYDRO-4, HYDRO-5, HYDRO-6, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**7**	**2**	**23**	**34**

Table E-32				
Summary of Resource Impacts for Component 32 (Indian Creek Reservoir Spillway Channel)				
	Resource Impact by Level of Significance			
32 - Indian Creek Reservoir Spillway Channel	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 32	GEO-2, BIO-1, BIO-2, BIO-3, BIO-7, ARCH-1, ARCH-2	SW-5	GEO-1, GEO-3, GEO-4, GEO-5, GEO-6, GEO-7, GW-1, SW-3, SW-4, HYDRO-1, HYDRO-2, HYDRO-3, HYDRO-6, PHS-1, PHS-3, PHS-4, PHS-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-4, AQ-1, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GW-2, GW-3, SW-1, SW-2, HYDRO-4, HYDRO-5, PHS-2, PHS-5, BIO-4, BIO-5, BIO-6, TRAFFIC-3, TRAFFIC-5, AQ-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**7**	**1**	**26**	**32**

Table E-33				
Summary of Resource Impacts for Component NP-1 (Existing Freshwater System - No Project Component 1)				
	Resource Impact by Level of Significance			
NP-1 (Existing Freshwater System)	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component NP-1	GEO-2, GEO-3, GEO-4, HYDRO-1, HYDRO-2, BIO-1, BIO-2, BIO-3, BIO-5, BIO-7		GW-2, GW-3, SW-2, SW-3, HYDRO-3, HYDRO-6	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-5, GEO-6, GEO-7, GW-2, SW-1, SW-4, SW-5, HYDRO-4, HYDRO-5, BIO-6, PHS-1, PHS-2, PHS-3, PHS-4, PHS-5, PHS-6, BIO-4, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-4, TRAFFIC-5, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, ARCH-1, ARCH-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**10**	**0**	**6**	**50**

Table E-34				
Summary of Resource Impacts for Component NP-2 (Existing Recycled Water System - No Project Component 2)				
	Resource Impact by Level of Significance			
NP-2 (Existing Recycled Water System)	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component NP-2	GEO-2, GEO-3, GEO-4, SW-2, SW-3, SW-5, HYDRO-1, HYDRO-2, PHS-1, BIO-1, BIO-2, BIO-3, BIO-5, BIO-7		GW-1, GW-2, GW-3, HYDRO-3, HYDRO-6	LU-1, LU-2, LU-3, LU-4, AGR-1, AGR-2, AGR-3, GEO-1, GEO-5, GEO-6, GEO-7, SW-1, SW-4, HYDRO-4, HYDRO-5, PHS-2, PHS-3, PHS-4, PHS-5, PHS-6, BIO-4, BIO-6, TRAFFIC-1, TRAFFIC-2, TRAFFIC-3, TRAFFIC-4, TRAFFIC-5, AQ-1, AQ-2, AQ-3, AQ-4, NOISE-1, NOISE-2, NOISE-3, ARCH-1, ARCH-2, ARCH-3, VISUAL-1, VISUAL-2, VISUAL-3, VISUAL-4, PU-1, PU-2, PU-3, HOUSING-1, HOUSING-2, HOUSING-3
Total number of impacts	**14**	**0**	**5**	**47**

Alternative 1 - No Project

Implementation of the No Project Alternative would result in 26 significant and unavoidable impacts. Table E-35 provides a summary of impacts of the No Project Alternative.

Table E-35				
Summary of Impacts for Alternative 1 (No Project) by Component				
	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component NP-1	10	0	6	50
Component NP-2	14	0	5	47
Total number of impacts	**24**	**0**	**11**	**97**

The significant and unavoidable impacts that would result under the No Project Alternative (Components NP-1 and NP-2) are:

Existing recycled and freshwater water system significant and unavoidable impacts:
- GEO-2 Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?
- GEO-3 Will the Project Components be located in areas with soils and groundwater conditions that are susceptible to liquefaction during an earthquake?
- GEO-4 Will earthquake-induced strong ground shaking damage the Project Components?
- HYDRO-1 Will the No Project Components cause flooding?
- HYDRO-2 Will the No Project Components cause stream bank erosion?
- BIO-1 Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?
- BIO-2 Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?
- BIO-3 Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?
- BIO-5 Will the Project Components have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US Fish and Wildlife Service?
- BIO-7 Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?
- SW-2 Will the Project Components cause numeric criteria to be exceeded at West Fork Carson River at Stateline?
- SW-3 Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?
- SW-5 Will the Project Components cause narrative-based criteria to be exceeded in Indian Creek below Harvey Place Reservoir?
- PHS-1 Will the No Project Components create a public health risk due to its use of recycled water?

Alternative 2 - Project

Table E-36 provides a summary of impacts for the Project (Alternative 2). The significant and unavoidable impact categories that would result under the Proposed Project Alternative (Components 1 through 24 and 29 through 32) are:

- GEO-2 Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?
- GW-1 Will the Project Components degrade groundwater quality in the Carson Wade or Diamond Valleys?
- BIO-1 Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?
- BIO-2 Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?
- BIO-3 Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?
- BIO-7 Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?
- ARCH-1(Components 29, 30, 31 & 32), Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?
- ARCH-2 (Components 29, 30, 31 & 32), Will the Project Components disturb unknown archaeological resources or human remains?
- SW-3 (Component 30) Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?

Impacts ARCH-1 and ARCH-2 pertain to Components 29, 30, 31, and 32 only because the area where these components are to be implemented has not been surveyed for cultural resources. Impact SW-3 only applies to Component 30.

Table E-36

Summary of Impacts for Alternative 2 (Proposed Project) by Component

	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 1	6	3	25	32
Component 2	6	3	22	35
Component 3	6	3	24	33
Component 4	6	4	24	32
Component 5	6	4	23	33

Table E-36				
Summary of Impacts for Alternative 2 (Proposed Project) by Component				
	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 6	6	4	24	32
Component 7	5	2	26	33
Component 8	0	0	17	49
Component 9	5	4	26	31
Component 10	5	3	26	32
Component 11	4	4	28	30
Component 12	5	3	25	33
Component 13	5	3	26	32
Component 14	6	4	23	34
Component 15	5	3	25	33
Component 16	5	4	27	30
Component 17	5	4	24	33
Component 18	0	2	20	44
Component 19	4	3	16	43
Component 20	1	2	26	37
Component 21	5	2	25	34
Component 22	6	3	25	32
Component 23	3	0	19	44
Component 24	3	0	18	45
Component 29	7	1	24	34
Component 30	9	0	25	32

Table E-36				
Summary of Impacts for Alternative 2 (Proposed Project) by Component				
	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 31	7	2	23	34
Component 32	7	1	26	32
Total number of impacts	**133**	**69**	**662**	**978**

Alternative 3 - Master Plan Recommended Projects

Table E-37 provides a summary of impacts for the Master Plan Recommended Projects Alternative (Alternative 3). The significant and unavoidable impact categories that would result under the Master Plan Recommended Project Alternative are:

- GEO-2 Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?
- GW-1 Will the Project Components degrade groundwater quality in the Carson Wade or Diamond Valleys?
- BIO-1 Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?
- BIO-2 Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?
- BIO-3 Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?
- BIO-7 Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?
- ARCH-1(Components 29, 30, 31 & 32), Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources?
- ARCH-2 (Components 29, 30, 31 & 32), Will the Project Components disturb unknown archaeological resources or human remains?
- SW-3 (Component 30) Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?

Table E-37				
Summary of Impacts for Alternative 3 (MP Recommended Projects) by Component				
	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 3	6	3	22	33
Component 4	6	4	24	32
Component 6	6	4	24	32
Component 11	4	4	28	30
Component 18	0	2	20	44
Component 19	4	3	16	43
Component 22	6	3	25	32
Component 29	7	1	24	34
Component 30	9	0	25	32
Total number of impacts	48	24	210	312

Alternative 4 - Master Plan Trigger Projects

Table E-38 provides a summary of impacts for the Master Plan Trigger Projects Alternative (Alternative 4). The significant and unavoidable impact categories that would result under the Master Plan Recommended Project Alternative are:

- GEO-2 Will the Project Components be subject to ground rupture due to location near a surface trace of an active fault?
- GW-1 Will the Project Components degrade groundwater quality in the Carson Wade or Diamond Valleys?
- BIO-1 Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly?
- BIO-2 Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species?,
- BIO-3 Will the Project Components cause loss of active raptor nests, migratory bird nests or wildlife nursery sites?
- BIO-7 Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the Clean Water Act or waters of the U.S. through direct removal, filling, hydrological interruption, or other means?
- ARCH-1 Will the Project Components disturb known, potentially-eligible National or California Register properties, including archaeological, historical, architectural, and Native American/ traditional heritage resources?

- ARCH-2 Will the Project Components disturb unknown archaeological resources or human remains?
- SW-3 Will the Project Components cause numeric and narrative-based criteria to be exceeded at West Fork Carson River in California?

Table E-38				
Summary of Impacts for Alternative 4 (Master Plan Trigger Projects) by Component				
	Number of Impacts by Level of Significance			
Component Name and Number	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Component 1	6	3	25	32
Component 2	6	3	22	35
Component 3	6	3	24	33
Component 4	6	4	24	32
Component 6	6	4	24	32
Component 7	5	2	26	33
Component 11	4	4	28	30
Component 14	6	4	23	34
Component 16	5	4	27	30
Component 17	5	4	24	33
Component 18	0	2	20	44
Component 19	4	3	16	43
Component 22	6	3	25	32
Component 23	3	0	19	44
Component 24	3	0	18	45
Component 29	7	1	24	34
Component 30	9	0	25	32
Component 31	7	2	23	34
Total number of impacts	**89**	**46**	**417**	**632**

Impacts and Analysis

The three action alternatives would result in a total of nine categories of impacts: GEO-2, GW-1, BIO-1, BIO-2, BIO-3, BIO-7, ARCH-1, ARCH-2, and SW-3. Table E-39 below summarizes the number of resource impacts by alternative. It shows that the Project contains the highest number of significant and unavoidable impacts at 133, followed by the Master Plan Trigger Projects at 89, then the Master Plan Recommended Projects Alternative at 48 and the No Project Alternative with 26. While the number of resource impacts differs by alternative, the impact categories are the same between the action alternatives (Alternatives 2, 3, and 4). The degree of impact is directly proportional to the number of components that are included in each alternative. The Proposed Project would result in greater impacts to groundwater and biological resources than the other two action alternatives due to the greater number of components that would be implemented.

Table E-39

Alternative Comparison by Impacts

	Number of Resource Impacts by Level of Significance			
Alternative	**Significant Impact Before and After Mitigation**	**Significant Impact Before Mitigation; Less than Significant Impact After Mitigation**	**Less than Significant Impact; No Mitigation Proposed**	**No Impact**
Alternative 1	26	0	11	95
Alternative 2	133	69	662	978
Alternative 3	48	24	210	312
Alternative 4	89	46	417	632

Appendix F - Diamond Valley Ranch Nutrient Management Plan

DIAMOND VALLEY RANCH

NUTRIENT MANAGEMENT PLAN

Prepared For

South Tahoe Public Utilities District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150-7401

Prepared By

WOOD RODGERS

Wood Rodgers, Inc.
5440 Reno Corporate Drive
Reno, Nevada 89511

September 2009

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EXECUTIVE SUMMARY

Wood Rodgers was retained by the South Tahoe Public Utilities District (DISTRICT) to develop a nutrient management plan (NMP) for the Diamond Valley Ranch (DVR). The DISTRICT intends to use recycled water to irrigate the ranch.

Wood Rodgers collected site-specific soils data for the development of this NMP. The DISTRICT provided recycled water quality data (final effluent data from the plant as well as Harvey Place Reservoir data).

Wood Rodgers prepared four technical memoranda addressing Irrigation Methods, Crop/Plant Selection, Recommended Fields, and Grazing Options for the DVR. The recommendations developed in the Technical Memoranda are brought forward for consideration in the development of this NMP.

The purpose of the NMP was to determine the best combination of crop and irrigation method to maximize recycled water reuse and nutrient uptake while also protecting groundwater and surface water resources. Acknowledging the fact that the application rate would logically be different dependent on crop selection and irrigation method, several analyses were completed using different crops (alfalfa and grass hay) under both surface and aerial irrigation methods.

Wood Rodgers initial calculations considered crop consumptive use (irrigation demand), crop capacity for nitrogen uptake, and soil permeability to determine the **maximum volume of recycled water that could be applied**. This work is detailed in Section 5.0 of this Nutrient Management Plan. Results of the analyses determined that growing alfalfa with surface (flood/furrow) irrigation would maximize recycled water reuse and nutrient uptake, thereby meeting the DISTRICT's objective. Thus, the initially calculated maximum recycled water application rate was 71.89 in/yr, which equates to 5.99 ac-ft/ac for 904 irrigable acres, or a total flow of 1,765 Mgal/yr (4.8 MGD). This is the maximum allowable application rate that would meet the crop requirements as well as meet the DISTRICT's objective to use the maximum recycled water for irrigation purposes; however, this application rate exceeds the average discharge from the DISTRICT treatment plant. It must also be acknowledged that surface irrigation methods may result in runoff (tailwater) production. The tailwater can be used to irrigate subsequent areas and must ultimately be collected and contained at the final irrigation area. The DISTRICT may need to implement a tailwater management protocol to protect surface water sources, as discussed in Section 7.0 of this report, if surface irrigation is selected as the preferred alternative.

Given that the application rate calculated under the initial assumption exceeds the production of recycled water from the plant, the next step was to assume that the DISTRICT intends to reuse the entire annual volume of recycled water (total flow of 4.5 MGD or 1640 Mgal/yr, which equals 5,032 ac-ft) for irrigation every year with no net annual storage in Harvey Place Reservoir. Thus, this total water volume was then used as the starting point to calculate the total available amount of recycled water that could be applied per month. Based on using the total 4.5 MGD per year, the nitrogen balance (Table 9 in Section 5.0) was developed to maximize uptake.

Based on this assumption (the DISTRICT intends to reuse the entire annual volume of recycled water), the recommended application rate calculated for growing alfalfa with surface irrigation would therefore be 66.80 in/yr, or 5.57ac-ft/ac for the 904 irrigable acres. (It should be noted this number is very close to the maximum allowable application rate for growing alfalfa with spray irrigation. Wood Rodgers is recommending surface as the preferred method due to the minimal capital and O&M costs). The nitrogen balance calculation is detailed in Table 9, located in Section 5.0 of this report. Once again, as with any surface irrigation system, there may be runoff and tailwater associated with surface irrigation and the DISTRICT may need to implement a tailwater management protocol to protect surface water sources, as discussed in Section 7.0 of this report.

Conversely, on the more conservative side, the DISTRICT could select an aerial irrigation method growing alfalfa with spray irrigation, with a maximum application rate of 66.75 in/yr or 5.57 ac-ft/yr, with minimal resulting tailwater.

Table ES-1, below, compares application rates for alfalfa and grass hay under surface and aerial irrigation methods.

Table ES-1. Summary of Calculated Application Rates

Crop	Irrigation	Maximum Application Rate (ac-ft/yr)
Alfalfa	Surface	5.99
Alfalfa	Spray	5.57
Pasture grass	Surface	3.03
Pasture grass	Spray	3.18

At the request of the DISTRICT, pursuant to a requirement from the Lahontan Regional Water Quality Control Board (Lahontan), Wood Rodgers prepared a brief technical report addressing Assimilation Capacity. The results of that report are included in Appendix 4.

This NMP also contains information related to recycled water release prevention, public protection, monitoring and reporting.

The DISTRICT acknowledges the proposed direction provided in the DRAFT November 4, 2008 Recycled Water Policy with regard to the management of salts and nutrients being on a basin-wide or watershed-wide basis. However, at the time that the DISTRICT commenced development of Diamond Valley Ranch NMP, this specific guidance had yet to be developed. The DISTRICT, being knowledgeable of forthcoming regulatory requirements, thought it prudent to embark on development of an NMP for DISTRICT owned property as soon as possible with an opportunity to bring the document into compliance with future regulations as they become accepted and implemented.

1.0 INTRODUCTION

South Tahoe Public Utilities District (DISTRICT) intends to use filtered secondary treated effluent from their South Lake Tahoe wastewater treatment plant (WWTP) for agricultural irrigation of the Diamond Valley Ranch. This nutrient management plan (NMP) is intended to provide adequate information for the DISTRICT to determine a recommended domestic wastewater application rate for agricultural purposes. This NMP considers and is dependent on variables such as recycled water quality, irrigation practices, crop selection, and protection of ground- and surface water resources. The NMP is also intended to be a "living" document, thus, it will be updated as needed to ensure that it adequately describes and represents current and proposed operations, maintenance, management, and emergency procedures related to the irrigation system. Proposed updates to this document will be based on annual monitoring results.

The State of California is in the process of developing regulations and guidelines for the land application of recycled water for agriculture. The Lahontan Regional Water Quality Control Board (Lahontan) regulates domestic wastewater reuse in Alpine County where wastewater reuse in this area is largely supplemental agricultural irrigation. The DISTRICT acknowledges the proposed direction provided in the DRAFT November 4, 2008 Recycled Water Policy with regard to the management of salts and nutrients being on a basin-wide or watershed-wide basis. However, at the time that the DISTRICT commenced development of Diamond Valley Ranch NMP, this specific guidance had yet to be developed. The DISTRICT being knowledgeable of forthcoming regulatory requirements thought it prudent to embark on development of an NMP for DISTRICT owned property as soon as possible with an opportunity to bring the document into compliance with future accepted regulations when that time came.

Wood Rodgers proposal anticipated that this NMP would be developed using the Natural Resources Conservation Services Nutrient Management 590. In researching the development of an NMP using Nutrient Management 590, it was determined that this guidance document is intended to be used when management (area to be used, crop to be grown, method of irrigation) is known. Given that the DISTRICT is in the "planning process" for future use of recycled at the Diamond Valley Ranch, we chose with the DISTRICT's approval to use existing guidelines. As such, the Diamond Valley Ranch NMP was developed using the Nevada Division of Environmental Protection (NDEP) guidance documents (*WTS-1B: General Criteria for Preparing an Effluent Management Plan)* and input from California Regional Water Quality Control Board. These guidelines are contained in Appendix 2.

An NMP is primarily developed for use by the reuser as a current reporting mechanism and a future planning document. It is secondarily intended as a reporting mechanism for regulators. The purpose of this NMP is to provide guidance for irrigating with recycled water as follows:

- Provide a description of the recycled water delivery system and ancillary system components to inform responsible personnel of the system operation and capabilities.
- Identify responsibilities of the permittee/operator in the operation, maintenance and management of the recycled water reuse on the permitted site.
- Instruct system operators in the purpose and intended operation of components within the irrigation system under normal operating conditions and during emergency conditions. This report includes procedures for emergency response and notification, and
- Annual monitoring and reporting requirements.

In addition, The Diamond Valley Ranch NMP is also intended as a report of findings and recommendations as requested by the DISTRICT. This NMP was also developed based on Technical Memos developed, reviewed and approved by the DISTRICT. These technical Memos are also presented in Appendix 1.

Immediately adjacent to the DISTRICT's disposal area in Alpine County, California, domestic wastewater operator/managers in Douglas County, Nevada, comply with current NDEP effluent management planning guidelines and monitoring standards and requirements for the safe reuse of treated domestic wastewater. Since this protocol has been largely successful in protecting the groundwater resources of the Carson River hydrologic basin (of which Diamond Valley is a part), this guidance document was selected to be the most appropriate current basis for determining recommended recycled water application rates for use by the DISTRICT on the Diamond Valley Ranch.

The results of the preliminary analyses indicate that growing alfalfa for harvest using surface irrigation will provide the greatest benefit to the DISTRICT for the least cost. Benefit used here means, the greatest opportunity for quantity of reuse of recycled wastewater and the greatest opportunity for nutrient uptake by the crop.

2.0 SITE DESCRIPTION

Background (From Harding ESE 2000)

In 1980 and 1998, the USDA Natural Resources Conservation Service completed two studies. Both of these studies covered the same project area and included Diamond Valley Ranch. Surface water features in the project area addressed in past work included the West Fork of the Carson River and Indian Creek as well as a complex system of ditches to convey irrigation water.

The first study (USDA 1980) was premised on the preferred alternative of converting the DISTRICT's reclamation plant to secondary treatment, and the potential impacts of use of the domestic wastewater for land application (agricultural irrigation). The first report concluded that use of the DISTRICT's secondary treated wastewater for agricultural irrigation under prudent management would not contaminate soil, surface water, or groundwater resources.

The second study (USDA 1998) was conducted as a follow up to the 1980 study. Since 1981, a monitoring program has been in place to collect water quality and soil quality data. This study completed an independent review and analysis of the data collected to date, and evaluated the overall impact of the use of domestic wastewater for land application. It concluded that some soil sites and some well sites showed nitrate nitrogen (NO_3-N) accumulation. The values measured were below the critical thresholds but exhibited upward trends. Some of the soil site analyses reported accumulation of salts and sodium. The 1998 report also included Best Management Practices to reduce percolation of nitrates to the groundwater table. Disposal areas included Harvey Place Reservoir, Diamond Ditch, the two Fredricksburg Ditches, and the irrigated agricultural lands.

Harding ESE (2000) developed domestic wastewater application guidelines using USDA (1971) Soil Survey data. The purpose of this study was to determine the recommended application rates for reuse of domestic wastewater for agricultural purposes. More specifically, this was to be a tool that would allow the operator/manager to determine the recommended wastewater application rate for irrigation purposes based on varying soil texture characteristics, the crop that will be grown (irrigation requirement and salt tolerance levels), irrigation season, interval of application, and percentage mixing with fresh water.

The DISTRICT expressed an interest in obtaining a better understanding of appropriate agricultural application rates for domestic wastewater for their current disposal area in Alpine County, California, and potential disposal areas immediately to the north in Douglas County, Nevada. This interest was premised on the desire to exercise better management decision-making processes regarding where, how, and how much recycled domestic wastewater can safely be applied to a given area of land. Through the review of the two previous USDA NRCS studies and close coordination with DISTRICT personnel, it is the intention of this NMP to provide that understanding.

2.1 Communications and Staff

Hal Bird is the Land Application Manager for the DISTRICT. Recycled water and groundwater depth data are collected and analyzed by the DISTRICT laboratory.

South Tahoe Public Utilities District
Hal Bird, Land Application Manager
1275 Meadow Crest Drive
South Lake Tahoe, California 96150

Lahontan Regional Water Quality Control Board has direct regulatory jurisdiction regarding the use of recycled water in Alpine County, California. Robert Tucker is the Water Resources Control Engineer that coordinates with the DISTRICT.

Lahontan Regional Water Quality Control Board
Rob Tucker, Water Resource Control Engineer
2501 Lake Tahoe Blvd.
South Lake Tahoe, California 96150

2.2 Reuse Site Characteristics

2.2.1 Diamond Valley Ranch

The 2,500-acre Diamond Valley Ranch is located in eastern Alpine County, California, at the base of the Carson Range, just west of the Nevada-California state line. Highways 88 and 89 intersect at Woodfords, California a small town located within 3 miles of the Diamond Valley Ranch (Figure 1, Vicinity Map; Figure 2, Site Plan). The elevation of the Ranch property ranges from 5,400 to 6,100 feet. Average annual precipitation is approximately 19 inches (Western Regional Climate Center Markleeville, CA (045356). Please see Appendix 2, Table 1. Indian Creek Reservoir is located immediately to the south of the Ranch with the West Fork of the Carson River flowing to the north of the Diamond Valley Ranch. Prevailing winds are from the northwest.

The DVR is separated into 11 pastures (1 through 10 and the DISTRICT Pasture). These existing fields as presented in Figure 2 are largely delineated by existing fences, and are as designated by the DISTRICT.

To determine the area of potentially irrigable lands using recycled wastewater (Please see Recommended Fields Technical Memo, Appendix 1) on the DVR, Wood Rodgers considered areas that are either currently irrigated with fresh water and/or have been historically irrigated. The proximity of streams, irrigation ditches, springs, and areas of high groundwater, as well as infrastructure have also been taken into consideration. In addition, a sketch of the fields provided by Mr. Hal Bird was digitized into GIS. Based upon the topographic information provided by the DISTRICT associated with the May 15, 2008, aerial photography, the field boundaries were subsequently revised. The field boundaries were adjusted to follow the fence lines, streams, ditches, or roadways. The Field boundaries provide the overall framework for the quantification of potentially recycled water irrigable acreage at the DVR.

To prevent contamination of freshwater sources from the application of recycled water, the following buffers were applied in the determination of irrigable acreage:

A 25-foot setback from DISTRICT property lines along Diamond Valley Road.
Currently irrigation occurs up to the property line along Diamond Valley Road. An overestimation of the buffer which considers a 25-foot setback allows the DISTRICT some discretion on irrigation methods.

A 25- foot setback from the center line of irrigation ditches.
In the areas currently under consideration for irrigation by the DISTRICT, piping or rerouting of fresh water away from the recycled irrigation areas is being proposed, thus no buffers would be required. However, for planning purposes, the DISTRICT requests a 25 foot buffer from the center of the primary ditches.

A 25-foot buffer from the edge of Streams should be applied for planning purposes.
The line work in the ditches_03.shp and streams_03.shp files, as provided by the DISTRICT Engineering Department, formed the basis of analysis for the buffer areas. However, some of the line work in these files was adjusted based on the 2008 aerial photography and topographic data to more closely follow the alignments of existing water features. To provide a 25-foot buffer from the edge of the IC Flood Control Channel and Indian Creek, the top of the streambanks were approximated from the 2008 topographic data. A 25 foot buffer was created in GIS from the streambank linework.

The DISTRICT requested a 25-foot setback of irrigable lands along DISTRICT property lines extending along Diamond Valley Road. To determine the location of the setback, a 25-foot offset was applied to the DISTRICT Field boundaries. The 25-foot setback was not applied to areas designated as high groundwater nor areas defined as “Not a Part of Study”. These areas extend to the DISTRICT Field boundary.

Areas of high groundwater were identified based upon field visits, aerial photography (USA Imagery, April 2007, © 2007 i-cubed. Boundaries and transportation: © 2006 ESRI, AND, TANA), the results of the August 2008 soil sampling, and DISTRICT groundwater monitoring data. Please see the Recommended Fields technical Memo contained in Appendix 1 for additional information.

Locations and areas designated as “Not a Part of the Study Area” in Figure 2 of this NMP either contain infrastructure prohibiting the application of recycled waters, are too small in area to manage as effluent reuse areas, or are constrained due to topographic conditions, or were not studied at this time.

2.2.2 Recycled Water Supply (From Harding ESE 2000)

California state law requires the DISTRICT to export recycled water out of the Lake Tahoe Basin. Domestic wastewater exported from the DISTRICT’s South Lake Tahoe plant has been used as supplemental irrigation water in Alpine County since 1968.

Until 1989, the DISTRICT exported tertiary treated effluent. As is common in the treatment process, the DISTRICT's tertiary domestic wastewater contained high concentrations of dissolved salts. Thus, the tertiary treatment was changed to secondary treatment in 1989 to reduce these concentrations. Secondary treatment resulted in lower concentrations of dissolved salts; however, higher concentrations of nutrients such as nitrates resulted. The State of California, Lahontan Regional Water Quality Control Board, and the U.S. Environmental Protection Agency regulate the quality of domestic wastewater as well as the quantity produced at the DISTRICT's plant.

Treated domestic wastewater was conveyed twenty-seven (27) miles from the DISTRICT's plant in South Lake Tahoe, over Luther Pass, to Indian Creek Reservoir in Alpine County. Harvey Place Reservoir was constructed to the north of Indian Creek Reservoir in 1989 for storage of domestic wastewater storage via an earthen dam. As a result, Indian Creek Reservoir was converted to a fresh water lake.

2.2.3 Recycled Water Quality

Recycled water quality data at the Wastewater Water Treatment Plant (WWTP) for the years 1980-2007 was provided by the DISTRICT, and is included in the Appendix 2, Table 2. Below in Table 1 is a summary of that data. In addition, water quality data for Harvey Place Reservoir (HPR) for the years 1989-2007 was provided by the DISTRICT and is contained in Table 3 of Appendix 2. Table 2 below presents a summary of that data.

The DISTRICT's HPR recycled water constituents were used to determine the recycled water application rates for Diamond Valley Ranch.

Table 1. Summary of Final Effluent Annual Trends, 1980-2007 (DISTRICT)

Parameter	Average (1980-2007)
Flow	4.5 MGD
BOD	5.6 mg/l
SS	3.5 mg/l
NO_3-N	3.9 mg/l
Total P	2.3 mg/l
TDS	318 mg/l

Table 2. Summary of Harvey Place Reservoir Water Quality Data, 1989-2007 (DISTRICT)

Parameter	Average (1989-2007)
pH	7.86
BOD	5.1 mg/l
SS	12.7 mg/l
NO_3-N	2.8 mg/l
Total P	2.7 mg/l
TDS	258 mg/l
EC	490 umhos
Total N	17.6 mg/l

2.2.4 Soils

The Soil Survey of the Carson Valley Area, Nevada-California and Douglas County, Nevada provide non site specific information and thus provide limited utility regarding the determination of an application rate and assimilative capacity for recycled wastewater reuse on the DVR. In order to provide more site-specific information, the soils that occur on the DVR were sampled in August 2008 to determine site-specific limiting physical and chemical attributes.

Sample locations and number of samples collected at each location is summarized in Table 3 below and locations are presented on Figure 2. Fields sampled, and the location of samples within those fields, was based on the DISTRICT's guidance regarding fields that would most likely be developed as irrigation fields.

Table 3. Summary of Soil Samples Collected

Field Number	Sample Locations 18 Total	Samples per Location, respectively
1	2 A, B	4, 3
2	2 A, B	4, 4
3	1 A	4
4	2 A, B	3, 4
6	3 A, B, C	5, 5, 4
7	3 A, B, C	4, 1, 3
8	1 A	3
9	2 A, B	4, 3
DP	2 A, B	4, 3

Soil samples we submitted to AgSource Harris (Lincoln, Neb.) for laboratory analysis. A full suite of analyses was requested to be performed and the results are contained in Appendix 3.

2.2.4.1 Physical Properties

Physical properties of the DVR soils that would be of interest in determining an application rate for treated wastewater include texture, percent coarse fragments (gravel, cobbles), depth to a restrictive layer, and depth to evidence of groundwater.

Pursuant to laboratory analysis results, dominant soil textures for the DVR are loamy sand, sandy loam, and sand, in order of dominance. There was only one occurrence of a clayey soil. That soil texture occurred at sample location 8A2, which is located in Field 8 at a depth of 42 to 57 inches below ground surface. The texture is a clay loam, which is a layer of accumulation of clay; however, it does not contain a high enough clay content to meet the criteria as a restrictive layer for infiltration of surface water (irrigation water). The loamy sands, sandy loams and sand that dominate the site are highly conducive to managed agricultural irrigation and cropping practices. These soil textures are also very conducive to either sprinkler or surface irrigation practices.

Evidence of depth to groundwater includes soil mottling and/or gleying. These conditions are described in the Recommended Fields Technical Memo, Appendix 1 and are therefore not repeated here. High groundwater areas were designated using soils sample location notes as well as DISTRICT groundwater monitoring data. There is potential for areas of high ground water to occur within Fields 5, 6, 7, 9 and 10 based on currently available data. It has been recommended to the DISTRICT, that additional investigation be conducted in those fields preliminarily identified as having potential for shallow groundwater to more accurately determine depth to groundwater.

2.2.4.2 Chemical Properties

The laboratory analysis conducted by AgSource Harris of the soils provides background levels of nutrients contained in the soils under a freshwater irrigation regime. This information is helpful to the DISTRICT in developing a nutrient balance for the Ranch using these background levels as an input of nutrients. The laboratory analysis indicated the DVR soils are in the "normal" range for background levels of nutrients and constituents. There are no significantly high levels of nutrients/constituents and no significantly low levels of soil nutrients/constituents that would affect a nutrient balance for the DVR. Please see Appendix 3.

There is one instance (one sample) that showed an elevated Buffering Capacity, which occurs in Field 1. Given that this is one location across the Ranch, this instance is not deemed significant. The AgSource Harris data contained in Appendix 3 provides nutrient management guidelines for production of pasture grass. These guidelines hold true whether the crop is harvested or grazed in place.

2.2.5 Livestock Grazing

Currently the DVR is grazed in the late spring through early fall by approximately 1000 head of cattle under a grazing permit with the DISTRICT. Although the DISTRICT Pasture (see Figure 1 and DP on laboratory results) has not been subject to consistent grazing over the last seven years, chemical properties are not significantly different as compared to the areas of the Ranch that have been consistently grazed.

Wood Rodgers professional opinion is that the level of grazing which is occurring on the DVR is moderate, dispersed, and managed based on availability of feed. Thus, under this management regime no one area or field would be impacted by the production of manure and associated input of nutrients under a freshwater irrigation regime. Under a recycled water regime there would be a small excess of nitrogen available (Table 5, Appendix 1, Grazing Options tech Memo). Conversely, if the cattle were managed to remove 90 percent of the available feed in any field before being rotated to the next field, cattle use would be concentrated, and an elevation in the levels of available nitrate would be expected.

If cattle grazing is to continue within the irrigation/reuse fields, it is recommended that the carrying capacity of the crop be determined and livestock use be limited to a moderate level on a rotation system. Carrying capacity is defined as the maximum stocking rate possible that is consistent with maintaining or improving vegetation or related resources. It may vary from year to year on the same area due to fluctuating forage production. The field could be drug with a tractor and harrow between use periods to break up the "cow pies" allowing them to dry and disperse. Please see the Grazing Options Technical Memo, Appendix 1 for additional information.

2.2.6 Vegetation

Existing vegetation on the Diamond Valley Ranch consists of pasture grass species. The wetter portions of the ranch support grass-likes such as Baltic rush and sedges. When reviewing soil physical and chemical characteristics with the vegetation the Ranch is currently supporting, there are no unique vegetation species or communities. In other words, the species that occur are what is expected for mountain meadow community types, and are closely tied to soil moisture conditions rather than soil texture and soil chemical properties.

An important consideration in developing an NMP is to maximize nutrient uptake by the vegetation. Alfalfa and pasture grass were examined as crop alternatives for the Diamond Valley Ranch reuse area specifically for nutrient uptake calculations.

In addition, a Technical Memo was developed for use by the DISTRICT that explored alternative crops. Please see Appendix 1. Technical Memo recommendations were as follows:

- The DISTRICT consider a mix of crop uses (hay, crop, and wetlands mitigation plant materials). This would allow the DVR a variety of revenue opportunities as well as opportunity to maximize nutrient uptake and effluent reuse.
- Another viable option would be to practice hay production for harvest or grazing, or both. One cutting could be harvested due to short growing season from pasture hay fields, followed by grazing on irrigated stubble of that crop.
- The DVR Nutrient Management Plan should consider crop/plant alternative opportunities for nutrient uptake for the crops as determined by the DISTRICT. Nutrient uptake would be considered as a nutrient loss in the nutrient balance of the ranch under the effluent irrigation scenario. This analysis will provide the DISTRICT with information to be able to determine the crops they want to consider for production and maximize nutrient uptake and effluent reuse.
- Wetland sod may still be an alternative; however, citations for the nutrient uptake of species that would grow in a non-open water situation were not available. If this were to be considered as an alternative, tissue samples would need to be collected on a current wastewater wetland site and compared to tissue samples of a natural site.

2.2.7 Surface Water

The West Fork of the Carson River, located north of the Diamond Valley Ranch, provides fresh water irrigation to the Ranch. Flows from Indian Creek are transported along the southern boundary of the Ranch in the IC Flood Control channel and in Indian Creek. Figure 4 shows the location of the West Fork of the Carson River, creeks, and the irrigation ditches in relation to the Diamond Valley Ranch property.

2.2.7.1 Water Rights

Water rights for the Carson River are administered per the Alpine Decree. The reach of the West Fork of the Carson River from the gage at Woodfords to the California/Nevada state line has a rotating weekly water supply during the irrigation season. As long as an adequate water supply is available for all water-righted lands, the priority of the water right is of no consequence. However, when quantities are not available to supply all water- righted lands with their full rights, the priority of the water right is considered. The priority of a given water right has been established based upon the date of first use.

The DISTRICT holds surface water rights to the West Fork of the Carson River and Indian Creek. These water rights provide irrigation flows to the Diamond Valley Ranch via a number of ditches. Figure 4 displays the West Fork of the Carson River and Indian Creek water rights held by the Diamond Valley Ranch and surrounding properties.

2.2.8 Ground Water

Monitoring well locations were identified by the DISTRICT (Figure 2). The average groundwater depths in the existing monitoring wells and average water quality for selected parameters for the period from October 1988-August 2007 are listed in Table 4 below. The DVR has potential for shallow depth to groundwater in several locations. It has been recommended that further investigation be conducted to more accurately determine depth to groundwater in these areas.

Table 4. Groundwater Quality Data, 1988-2007 (DISTRICT)

Well	Depth to groundwater (ft btoc)	NO3-N (mg/l)	Total N (mg/l)	Total P (mg/l)	TDS (mg/l)
ACMW-01AW (Main Dam)	6.99	0.51	0.56	0.05	85.6
ACMW-01BE (Secondary Dam)	10.35	0.34	0.50	0.03	83.5
ACMW-02N (Access Gate)	6.71	0.10	0.20	0.02	94.5
ACMW-02S (Access Gate)	6.98	0.13	0.24	0.02	76.9

Note: Total nitrogen data from Oct 1988-Nov 2001.

3.0 RECYCLED WATER IRRIGATION PLANNING

This section of the Diamond Valley Ranch NMP is intended to present the foundation for evaluating the hydraulic loading limit for the Diamond Valley Ranch pursuant to the guidance used to develop this NMP.

Wood Rodgers prepared an Irrigation Methods Technical Memo (Appendix 1) that included an evaluation of an array of irrigation methods that the DISTRICT can consider for future management of the recommending that the Diamond Valley Ranch. In addition, Wood Rodgers evaluated typical surface and aerial irrigation methods to determine hydraulic loading rates under a recycled wastewater irrigation regime.

As previously stated, the primary intent of this NMP is to maximize nutrient uptake. Surface and spray irrigation were examined as irrigation method options for the Diamond Valley Ranch reuse area, per the recommendation of the Irrigation Methods Technical Memo.

3.1 C-Line Delivery System

Recycled water is currently delivered to Harvey Place Reservoir for agricultural irrigation purposes. Recycled water is delivered to the reservoir year-round. The 28-year average flow rate, per the DISTRICT, is 4.5 MGD. Modifications to the C-Line will need to be made to deliver recycled water to DVR.

3.2 Irrigation System

Irrigation would typically occur between April 1 and October 15. For this NMP, Harvey Place Reservoir is assumed to be the source of the recycled irrigation water and infrastructure upgrades will be needed to convey the recycled water to the proposed fields for irrigation.

If the DISTRICT were to select an aerial irrigation method, engineered design of fields and the conveyance and field delivery systems would be required. Selection of an aerial application system would result in greater initial capital investment.

Technical Memo recommendations were as follows:

- It is Wood Rodgers opinion that the type of irrigation method chosen should be dependent on the type of crop to be grown, capital budget for initial materials costs, operating budget for pumping if required, and labor if needed by the system.
- The Diamond Valley Ranch should consider a type of surface irrigation and a type of aerial irrigation to determine hydraulic loading rates.

3.2.1 DVR Irrigation System

Surface irrigation and spray irrigation were examined as potential alternatives. Surface irrigation provides the highest benefit based upon maximizing recycled water use. Please see Section 5.0 Hydraulic Loading.

3.2.2 Storage

Recycled water is currently stored in Harvey Place Reservoir with a capacity of 3,800 ac-ft.

3.3 Irrigable Areas

Wood Rodgers prepared a Recommended Fields Technical Memo that determined that the Diamond Valley Ranch has approximately 904 irrigable acres. Please see Appendix 1 and Section 2.2.1.

3.4 Operating Procedures

Following are typical procedures that are presented as a template for the DISTRICT and Lahontan to build on for recycled water reuse at the Diamond Valley Ranch. They are written from the perspective of a surface irrigation system. However, they are also applicable to irrigation with an aerial application method.

3.4.1 Coordination to Initiate Irrigation

Typically, recycled water is released for irrigation as the crop needs arise. A typical procedure using existing guidelines used to develop the DVR NMP is as follows:

1. Take initial readings for volume calculations.
2. Identify where recycled water will be released, start date and time, approximate irrigation duration.
3. Release recycled water.
4. Confirm when recycled water supply should be closed off.
5. Shut off flow and take final readings for volume calculations.
6. Check irrigation ensuring tailwater management.

3.4.2 Reuse Irrigation

The following outlines typical steps for irrigation with recycled water:

1. Diamond Valley Ranch fields have been primarily irrigated with West Fork Carson River Water. The Ranch intends to transition to recycled water.
2. Determine proposed irrigation schedule and determine that the schedule will not interfere with Ranch management/crop production.
3. Open valves releasing water to appropriate sites. Read/record water flow meters prior to and immediately following completion of irrigation.
4. Fields can be irrigated on a schedule depending on season, precipitation, and air temperature.
5. Tailwater containment is initiated by closing check gates located at field boundaries to irrigate downhill fields with any tailwater.

3.4.3 Tracking

The DISTRICT will be required to track the quantity of recycled irrigation water applied to each irrigation area.

The DISTRICT will be required to record total volume released for irrigation.

The DISTRICT will create a log to track the irrigation within each irrigation area. The log will indicate the date, area irrigated, irrigated acreage, start time, stop time, amount of water used, and any comments.

3.4.4 Tailwater Management

The DISTRICT will apply recycled water for agricultural irrigation purposes inclusive of tailwater management. The following procedures will be used to manage tailwater when irrigating with recycled water:

1. Attend irrigation of fields and stop flow as water advances toward the end of the field to manage tailwater.
2. In the event that tailwater is generated, containment can be accomplished by two methods, depending on the location of the field. Water can be conveyed by ditch or pipe and released for irrigation on a downstream field, or water can be contained by closing check gates and impounding the water in the containment area.
3. A tailwater containment area will be located on the property (size and location to be determined).

3.4.5 Tailwater Return

The DISTRICT will use the recycled water for agricultural purposes with tailwater management to ensure no discharge to surface water systems. The following procedures will be used to contain tailwater, if generated from the project site when irrigating with recycled water:

1. Irrigation will be managed to optimize irrigation efficiency. Personnel will attend irrigation of the fields to ensure that flows are stopped when irrigation demands have been met to avoid tailwater generation from the fields.
2. Fields may be designed so that tailwater from upper fields flows onto lower fields as irrigation.
3. All tailwater reaching the low end of the project area will flow into a tailwater recovery area with a capacity to be determined to prevent any surface discharge from the site when irrigating with recycled water.

3.4.6 Winter Operation

Recycled water will be stored in Harvey Place Reservoir until it is needed at the beginning of the irrigation season. As such, winter irrigation will not be authorized. Emergency disposal of recycled wastewater from HPR to the DVR may be authorized if approved by Lahontan.

4.0 CROP MANAGEMENT PLAN

4.1 Crops

Wood Rodgers prepared a Crop/Plant Selection Technical Memo (Appendix 1) recommending that the DISTRICT consider a mix of crop uses (hay, crop, and wetlands mitigation plant materials) in order to allow the DVR a variety of revenue opportunities as well as opportunity to maximize nutrient uptake and recycled water reuse. Another viable option recommended in the Crop/Plant Selection Technical memo was to practice hay production for harvest. It is presently assumed that one cutting could be harvested due to short growing season from pasture hay fields.

Final crop selection will be dependent on growing season in the study area, availability of supplemental irrigation, the quality of the domestic wastewater with respect to the salinity tolerance of the crop, and market if the DISTRICT determines that it is beneficial to produce a cash crop.

In turn, the crop(s) selected will be used to determine the hydraulic loading limit and water balance calculations. The hydraulic loading limit can be largely influenced by the potential of the crop to uptake nutrients, primarily nitrate. The water balance is primarily based on the need of the crop or the evapotranspiration rates and soil permeability rates. Nutrient uptake is considered as a nutrient loss in the nutrient balance of the ranch under the recycled water irrigation scenario. (Please see the Grazing Options Technical Memo, Appendix 1).

4.1.1 Crop Selection

Potential forage crops selected for wastewater application modeling in this NMP included alfalfa and pasture grass. These crops are appropriate for this planning application as they are adapted to the local climatic and soil conditions, a market exists for sales, and they are grown on the DVR (pasture grass) and nearby ranches (alfalfa). In addition, the majority of source information available for determining hydraulic loading limit uses alfalfa as the crop. Flax, soybeans, and sunflowers were not considered at this time, since a market analysis would need to be completed to determine if production would be of benefit to the DISTRICT.

4.1.2 Evapotranspiration Rates

Evapotranspiration (ET) rates are used as water losses in hydraulic loading limit and water balance calculations. Values for average monthly ET were obtained from WRCC (2008) for measurements made at Markleeville, California, for the period 1998-2008. The data are summarized in Table 5. Please see Appendix 2, Table 1 for supplemental climate data.

Table 5. Monthly Average ET for Markleeville, CA (WRCC 2008)

Month	Average ET (in)
January	1.44
February	1.82
March	3.76
April	4.66
May	7.22
June	8.56
July	9.05
August	8.63
September	8.51
October	3.86
November	1.81
December	1.27
Annual total=	57.89

4.1.3 Nutrient Uptake

A primary concern with recycled water application for agricultural irrigation purposes is maintaining ground water quality. In order to prevent nitrogen from leaching to groundwater, nitrogen uptake by plant species is used as a factor in computing hydraulic loading based on nitrogen as the limiting factor. Plants will uptake nitrate, the soluble form of nitrogen that is present in recycled water.

Nitrogen uptake by alfalfa is well documented, and a value of 200 lb/ac/day is commonly used in hydraulic loading limit calculations (Metcalf and Eddy 1991). The value for nitrogen uptake by pasture grass, 80 lb/ac/day, was obtained from California Plant Health Association (2002).

4.1.4 Soil Salinity Tolerated by Crop

Soil salinity tolerated by a specific crop is used for determining the leaching fraction in calculating irrigation water requirements. The assumption is that excessive salinity causes a decrease in crop production.

The soil salinity tolerance value for alfalfa (2 mmhos/cm) was obtained from Metcalf and Eddy (1991) and USDA (1992). The soil salinity tolerance value for pasture grass (3.1 mmhos/cm) was obtained from USDA (1992).

4.1.5 Other Variables

Additional Variables are considered when determining the irrigation requirements/consumptive use of crops. These are discussed following.

4.1.5.1 Precipitation

An estimate of monthly hydraulic loading is determined by considering the partial contribution of nutrients by estimating recycled domestic wastewater demand. Recycled wastewater irrigation is considered supplemental to natural precipitation. Average monthly values for total precipitation obtained from WRCC (2008) for measurements made at Markleeville, California, for the period 1909-2004 are summarized in Table 6. Please see Appendix 2, Table 2 for supplemental information.

Table 6. Monthly Average Total Precipitation for Markleeville, CA (WRCC 2008)

Month	Average P (in)
January	3.72
February	3.14
March	2.10
April	1.29
May	0.99
June	0.60
July	0.39
August	0.46
September	0.47
October	0.93
November	2.11
December	3.01
Annual total=	19.20

4.1.5.2 Irrigation Method Efficiency

Irrigation efficiency varies with the method chosen for distribution. For the initial development of this NMP, surface (flood/furrow) irrigation and spray irrigation (hand/wheel lines or center-pivot sprinklers) were analyzed. The efficiency rates are listed in Table 7 (Metcalf and Eddy 1991).

Table 7. Irrigation Efficiency (Metcalf and Eddy 1991)

Irrigation Method	Efficiency (%)
Surface	65
Spray	70

4.1.6 Limiting Factor Determination

The hydraulic loading rates based on irrigation water, nitrogen limits, and soil permeability were calculated for the following four combinations:

- alfalfa/surface
- alfalfa/spray
- pasture grass/surface, and
- pasture grass/spray.

There were three loading rates (consumption, nitrogen, and permeability) calculated for each of the four combinations listed above. The comparison of the three hydraulic loading rates ensures that the quantity of recycled water applied to the crops will adequately fulfill specific crop requirements, safely percolate through the soil profile, and protect groundwater. In comparing these hydraulic loading rates, the lowest value of the three (maximum allowable application rate of recycled water) is the primary limiting factor. Please see Section 5.0 Hydraulic Loading for more in-depth discussion.

4.2 Nutrient Balance Comparison

Groundwater samples should be collected from existing and new monitoring wells that will be located at various distances down gradient from the fields that are proposed to be irrigated with recycled water. The nitrate concentration in the groundwater should be monitored quarterly and compared to the previous year's data. The drinking water standard (regulatory threshold) for nitrate is 10 mg/l, however the DISTRICT feels that it is prudent to monitor for a "red-flag" threshold level of 7 mg/l, as suggested in "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). This will allow for alternative management opportunities prior to reaching the regulatory threshold. The DISTRICT understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired.

5.0 HYDRAULIC LOADING

Application of recycled water will vary with seasonal demands of the crop. During the non-irrigation season, recycled water irrigation will not occur and it will be stored in Harvey Place Reservoir. During the irrigation season, recycled water irrigation will be used to meet the requirements of the crops. The DISTRICT will control the recycled water application rates. Monthly recycled water irrigation totals will be recorded by the DISTRICT.

Allowable hydraulic loading for irrigation with recycled water must be evaluated based on irrigation water requirements, nitrogen uptake rates for crops, and soil permeability. Given the fact that the DVR is not irrigated with recycled wastewater, hydraulic loading rates were calculated (estimated) per the methods outlined in Metcalf and Eddy (1991) for use later when comparing to current year and past year site-specific loading rates as described in Section 4.2.

5.1 Estimating a Hydraulic Loading Rate

To provide an estimate of hydraulic loading rates for the DVR, three distinct irrigation balances were calculated for each crop/irrigation combination for the reuse site. For each combination listed above under Section 4.1.6, the first two balances—plant consumptive use needs and nitrogen loading limit—are prepared to determine the optimal recycled water application rate for the crops per the chosen method of irrigation and protect groundwater quality. The third evaluation for each combination considers the effect of soil permeability at the site, and is used for design purposes to help insure that the site is appropriate for recycled water irrigation and ponding and runoff will not occur.

Depending upon site-specific factors, such as the recycled water nitrogen content and the plant crop's nitrogen uptake rate, one of the first two balances (consumptive use or nitrogen loading) will govern for groundwater protection.

Table 8. Summary of Calculated Hydraulic Loading Rates and Irrigation Application Rate

		Hydraulic Loading (in/yr)			Irrigation Application Rate ac-ft/Ac
Crop	**Irrigation**	**Consumptive Use**	**Nitrogen Loading**	**Soil Permeability**	
Alfalfa	Surface	***71.89***	86.05	274.72	5.99
Alfalfa	Spray	**66.75**	86.05	274.72	5.57
Pasture grass	Surface	70.49	**36.33**	274.72	3.03
Pasture grass	Spray	65.45	**38.20**	274.72	3.18

Interpretation of the results presented in Table 8 is as follows:
The lowest number in a given row (**bolded, 36.33**) is the maximum hydraulic loading rate for the given crop/irrigation combination; the highest value of the collected minima from all rows will identify the best crop/irrigation combination (***bolded/italics, 71.89***). For example, the allowable loading for alfalfa/surface irrigation is 71.89 in/yr, the allowable loading for alfalfa/spray is 66.75 in/yr, the allowable loading for pasture grass/surface irrigation is 36.33 in/yr and the allowable loading for pasture grass/spray is 38.20 in/yr (because the pasture grass does not have the nitrogen-fixing capability of alfalfa). From these numbers, 71.89 in/yr is the greatest, and alfalfa/surface irrigation presents the best possible combination since the goal is to maximize recycled water use.

The limiting rate calculated for the alfalfa/surface irrigation combination (71.89 in/yr) is the irrigation water requirement (consumptive use). Equations are included in Sections 5.2 through 5.4, and full calculations are in included in Appendix 2 (Tables 4 through 15).

For the combination of alfalfa/surface irrigation, the maximum annual nitrogen hydraulic loading rate will be:

71.89 in/yr
5,416 ac-ft/904 irrigable ac (5.99 ac-ft/ac)
1.95 Mgal/ac

The above calculations were based on the assumption that there are no additional inputs of nitrogen being added to the crop as fertilizer.

Table 9 presents an example of calculating the hydraulic loading for nitrogen with the necessary steps for the calculations identified following.

Table 9. Example Nitrogen Load Calculation

Month	Irrigation Monthly Flow	Irrigation Monthly Flow	Irrigated Area	Irrigation Monthly Flow	Monthly Avg Total Nitrogen in Effluent	Factor for volatilization, mineralization, leaching	Available Nitrogen in recycled water	Fertilizer	Total Available nitrogen applied	Cumulative Nitrogen Applied to Date	% Annual Nitrogen
	Mgal Q1	ac-ft Q2	ac A	ac-ft/ac Q2/A	mg/L Cn	f	lb/ac/mo Neff	lb/ac/mo Nfer	lb/ac/mo N	lb/ac Ncum	% Ncum/U*100
Jan	0	0	-	-	-	-	-	-	-	0	0
Feb	0	0	-	-	-	-	-	-	-	0	0
Mar	205	629	904	0.696	17.6	0.25	25	0	25	25	12.5
Apr	205	629	904	0.696	17.6	0.25	25	0	25	50	25.0
May	205	629	904	0.696	17.6	0.25	25	0	25	75	37.5
Jun	205	629	904	0.696	17.6	0.25	25	0	25	100	50.0
Jul	205	629	904	0.696	17.6	0.25	25	0	25	125	62.5
Aug	205	629	904	0.696	17.6	0.25	25	0	25	150	75.0
Sep	205	629	904	0.696	17.6	0.25	25	0	25	175	87.5
Oct	205	629	904	0.696	17.6	0.25	25	0	25	200	100.0
Nov	0	0	-	-	-	-	-	-	-	200	100.0
Dec	0	0	-	-	-	-	-	-	-	200	100.0
Total	1640	5032	904	5.57	17.6	0.25	200	0	200	200	100.0

Notes: Average 4.5 MGD x 365d/yr = 1642.5 Mgal/yr [use 1640 Mgal for calculation purposes]
Monthly flow (Q1) = 1640 Mgal/yr x yr/8mo irrigation = 205 Mgal/mo
Monthly flow (Q2) = 205 Mgal/mo x 1cf/7.48 gal x 1ac-ft/43560cf = 629ac-ft/mo
Irrigated Area (A) = 904 ac irrigable [Wood Rodgers Tech Memo]
Monthly Average Total N (Cn) = 17.6 mg/l [DISTRICT]
Fraction of Nitrogen Lost (f) = 0.20 from denitrification and volatilization [Metcalf and Eddy 1991] + 0.05 lost to leaching [Wood Rodgers calculations, DVR NMP] = 0.25
Available N in effluent (Neff) = 205 Mgal/mo x 17.6 mg/l x 3.79 l/gal x 1g/1000mg x 1lb/454g x (1-0.25) / 904 ac = 25 lb/ac/mo
% Annual N = 100 x Ncum / 200 lb/ac/yr for alfalfa

Example calculated assuming that the alfalfa/ surface irrigation combination is selected and all 904 of the irrigable acres are used, entire volume of recycled water from treatment plant for the year is used over the 8mo irrigation season, and no additional fertilizer is applied. f = 0.2 and U = 200 lb/ac/yr from Metcalf and Eddy (1991). 5.57ac-ft/ac = 66.80 in/yr for 904ac. This value is less than the maximum calculated hydraulic loading rate of 71.89 in/yr.

1. Calculate "actual nitrogen loading" applied on a monthly basis from volume of recycled water applied, concentration of total nitrogen in recycled water used for irrigation, and factors accounting for nitrogen available for plant uptake. Nitrogen available from recycled water is based on a 20% loss to volatilization/denitrification and a 5% loss to leaching (ref hydraulic loading spreadsheets in the appendix) for a total loss of 25%.
2. Include any nitrogen added as commercial fertilizer to determine the "actual nitrogen loading." (Wood Rodgers recommends against application of nitrogen-containing commercial fertilizer since doing so would reduce the amount of recycled water that can be applied for irrigation).
3. Calculate "cumulative annual nitrogen loading" each month as the sum of the monthly "actual nitrogen loading" from the beginning of the year through each quarter.
4. The "allowable nitrogen loading" is the annual nitrogen uptake rate for the crop grown on the irrigated fields. Compare available nitrogen applied to the annual uptake rate by calculating the percentage on a monthly basis: monthly "cumulative annual nitrogen loading" divided by "allowable nitrogen loading."

5.2 Grazing

Wood Rodgers prepared a Grazing Options Technical Memo (Appendix 1) in order to determine if livestock grazing nutrient inputs from manure would have an impact on the nutrient balance for the DVR under a treated effluent irrigation regime. This information will be useful to the DISTRICT in their decision-making process on whether to continue livestock grazing under a treated effluent irrigation regime.

The Grazing Options Technical Memo recommended that manure be analyzed at a statically accurate level to provide precise nutrient inputs before a decision is made regarding livestock grazing.

The initial results of the grazing analyses indicated that the grazing coupled with recycled water irrigation would result in an excess of nitrogen due to the input from manure. Although livestock grazing removes nutrients from the ranch through harvesting of the crop, it continues to provide nutrient input to the system from manure. As a result, this NMP assumed no grazing for calculating the hydraulic loading rates as reported above in Section 5.0.

5.3 Recycled Domestic Wastewater

Recycled water typically contains high levels of mineral salt concentrations. This constituent can affect plant growth, soil permeability and ground water quality. In addition, recycled water contains a biological component that has health implications based on degree of human contact. The DISTRICT laboratory provided domestic wastewater quality data for the treatment plant at South Lake Tahoe, California, from 1980-2007 (key parameters were summarized in Table 1, Section 2.2.3 Recycled Water Quality, and for Harvey Place Reservoir in Alpine County, California, from 1989-2007 (key parameters summarized in Table 2, Section 2.2.3.

The data provides a basis for a conservative estimate for recycled water application rates. Physical, chemical, and biological wastewater constituents evaluated include electrical conductivity (EC), suspended solids (SS), ammonia, nitrate, total phosphorus, chloride, total dissolved solids (TDS), and total Kjeldahl nitrogen (TKN—organic nitrogen plus ammonia nitrogen), chemical oxygen demand (COD), biochemical oxygen demand (BOD), and coliforms (total and fecal). Full data tables, as provided by the DISTRICT, are included in Appendix 2, Tables 2 and 3. TDS, EC, and nitrogen parameters are used in developing hydraulic loading limits. TDS and EC are parameters used to describe the concentration of salts in the applied wastewater.

From a health and regulatory perspective, the level of fecal coliform is of primary concern. This component of the applied recycled wastewater is given in MPN/100ml (most probable number). Existing guidance from Nevada does not require a buffer zone for spray or surface irrigation at values less than or equal to 2.2 MPN, but public access must be limited.

5.4 Irrigation Requirements – Hydraulic Loading Based on Consumptive Use

The equation for hydraulic loading based on irrigation requirements as the limiting factor (Metcalf and Eddy 1991) is:

$$R = \frac{ET - P}{1 - LR/100} \tag{1}$$

Where R = net irrigation requirement, in
ET = crop evapotranspiration, in
P = precipitation, in
LR = leaching requirement, %

Arid climates require leaching of salts from the soil profile to control salinity in the crop root zone. The leaching requirement is calculated from the following equation (USDA 1992):

$$LR = \frac{EC_w}{5EC_e - EC_w} \tag{2}$$

Where LR = leaching requirement, %
EC_w = salinity of applied recycled water (mmhos/cm)
EC_e = soil salinity tolerance of crop (mmhos/cm)

A depth of water (D) greater than the net irrigation water requirement (R) calculated from equation 1 must be applied to the irrigated area in order to ensure that it receives the net irrigation water requirement. This is due to water loss during application and the fact that a distribution system is unable to apply water uniformly over the entire irrigated area. The total irrigation requirement is this depth of water (D), and it is calculated from the following equation (Metcalf and Eddy 1991):

$$D = \frac{R}{E_u / 100} \qquad (3)$$

Where D = total irrigation requirement, in
R = net irrigation requirement, in
E_u = unit application efficiency for distribution system, %

The irrigation water budget is based on the selected crop, irrigation method, and irrigation interval.

5.5 Nitrogen Balance - Hydraulic Loading Based on Nitrogen

The equation for hydraulic loading based on nitrogen as the limiting factor (Metcalf and Eddy 1991) is:

$$L_{w(n)} = \frac{(C_p)(P - ET) + (4.4U)}{(1 - f)(C_n - C_p)} \qquad (4)$$

Where $L_{w(n)}$ = allowable hydraulic-loading based on nitrogen loading rate, in/yr
C_p = total nitrogen in percolating water, mg/L
P = design precipitation rate, in/yr
ET = design evapotranspiration rate by crop, in/yr
U = nitrogen uptake by crop, lb/ac-yr
4.4 = combined conversion factor
f = fraction of applied total nitrogen removed by denitrification and volatilization
C_n = total nitrogen in applied wastewater, mg/L

Potential nitrogen contamination of groundwater is a major concern with recycled water application. Recycled water is naturally rich in nutrients and supplies these nutrients to the crops. The above equation balances the crop utilization of nitrogen with the nitrogen concentration of the recycled water and the fraction of applied total nitrogen that is removed by denitrification and volatilization.

In order to determine the hydraulic loading based on nitrogen, Wood Rodgers consulted "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). Wood Rodgers set a conservative "red-flag" threshold level of 7 mg/l for C_p, as is common practice in developing a Nevada Effluent Management Plan (EMP). This was done to insure that the receiving groundwater resource will not be excessively degraded to a point where it is no longer useable (please also refer to the Assimilation Capacity Technical Report, Appendix 4). The DISTRICT understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired.

5.6 Soil Permeability - Hydraulic Loading Based on Soils

The equation for hydraulic loading based on soil permeability as the limiting factor (Metcalf and Eddy 1991) is:

$$L_{w(p)} = ET - P + W_p \tag{5}$$

Where $L_{w(p)}$ = wastewater hydraulic-loading rate based on soil permeability, in/mo
ET = design evapotranspiration rate, in/mo
P = design precipitation rate, in/mo
W_p = design percolation rate, in/mo

The design percolation rate (W_p) based on soil permeability was assumed to be 4% of the minimum soil permeability (Metcalf and Eddy 1991). This equation determines the allowable limits of a soil to transmit percolating water below the rooting zone to groundwater. Prevention time of nitrate migration to groundwater is of utmost importance; therefore, limits imposed by nitrogen will take precedence.

6.0 ASSIMILATIVE CAPACITY

Lahontan informed the DISTRICT that an Assimilative Capacity Model must be completed as an element of the NMP. At the direction of the DISTRICT, Wood Rodgers calculated an assimilative capacity for the receiving waters of the DVR and prepared a brief Assimilation Capacity Technical Report. Please see Appendix 4.

The Technical Report initially analyzed water quality data from sites in Carson Valley, Nevada, that have been using recycled water for irrigation. The intent was to determine whether a degradation of the groundwater was occurring because of the recycled water irrigation. This method was the best available given the availability of site-specific data. A predictive model, developed from various assumptions, would not provide the same level of confidence as the actual site data.

The type of predictive model requested by Lahontan could not be developed, as there was no evident trend correlating the concentration of nitrate in the receiving groundwater to the concentration of total nitrogen in the applied recycled water that was observed at the Carson Valley locations.

Wood Rodgers proceeded in developing the DVR NMP using the methods required by NDEP (outlined in "WTS-1B: General Criteria for Preparing an Effluent Management Plan") to determine the maximum amount of recycled water that could be applied as agricultural irrigation. The process is described in Section 5.0 Hydraulic Loading.

As stated in the Technical Report, Wood Rodgers believes that the "nitrogen loading" determination (Metcalf and Eddy 1991) accomplishes the same goal as an assimilation capacity model, but in a different manner. The Metcalf and Eddy method allows for precise determination of the amount of recycled water that can be applied, given the nitrogen concentration of the recycled water, the threshold nitrate concentration for the receiving water, the specific crop (alfalfa fixes nitrogen and more recycled water can be applied compared to pasture grass), and the climate conditions (evapotranspiration and precipitation).

Because no cumulative effect (nitrogen loading) was observed in the recorded NDEP data, Wood Rodgers concluded that the assimilative capacity of receiving waters will not be impacted when irrigating with high-quality recycled water such as that produced by the South Tahoe WWTP and a predictive degradation model is not necessary. The accepted practice of using the three distinct irrigation balances to determine the limiting hydraulic loading rate is adequate because of the "nitrogen loading" determination, which allows the reuser to set the threshold and calculate the total amount of recycled water that could be applied before theoretically reaching that specified threshold number.

In the case of this specific NMP for the Diamond Valley Ranch, the recommended application rate is significantly less than the application rate calculated based on nitrogen loading.

Wood Rodgers' professional opinion is that the only way to absolutely observe the presence or absence of cumulative effects is to determine the existing (pre-irrigation) baseline concentrations of nutrients in the groundwater (which the DISTRICT has already collected), begin irrigating, monitor the groundwater for specific nutrients, and compare post-irrigation concentrations to pre-irrigation concentrations to determine if a trend exists. Continued monitoring while irrigating with recycled water will allow the DISTRICT a means to track the site-specific effects and modify their irrigation management/ranch management plan as needed.

7.0 RELEASE PREVENTION AND PUBLIC PROTECTION

The following is presented as existing guidelines that the DISTRICT may wish to use as a foundation from which to build site-specific guidance for the Diamond Valley Ranch. These guidelines are also applicable to an aerial irrigation system.

7.1 Release Prevention

Recycled water must be applied in a manner to minimize any potential impacts to groundwater quality. The following summary describes the specific measures that will be taken to minimize the potential for surface release from the reuse site and preserve groundwater quality.

7.1.1 Standing Water

Unnecessary ponding of recycled water should be avoided. In order to prevent unnecessary standing water, it is imperative that the irrigation system and tailwater recovery be operated properly. Standing water may be minimized through the following means:

1. Control of irrigation to prevent excessive tailwater
2. Use of laser leveled border strips irrigation
3. Manual control of pasture valves
4. Presence of an on-site irrigator monitoring surface irrigation progress
5. Maintenance of perimeter ditches and tailwater containment area

7.1.2 Tailwater Recovery

A tailwater recovery and return area may need to be constructed on the property. This area will contain any excess recycled water.

7.1.3 Unstable Ground Conditions

The irrigation system will be operated to minimize potential surface runoff by considering ground conditions before irrigating. Unsuitable conditions include frozen, saturated, or flooded soils. Fields will not be irrigated during or immediately following significant precipitation events.

7.14 Irrigation System Malfunction

DVR personnel will inspect the irrigated areas to ensure the irrigation system is operational. Any problems identified will be addressed and all necessary repairs will be completed promptly.

7.2 Spill Response

Spill response may be required in the event of bypass or failure of check gate structures, breach of irrigation ditches, or breach of containment berms. Spill response will entail the following:

1. Shut down irrigation
2. Close check gates to retain irrigation on upstream or downstream fields
3. Contain runoff and minimize any off-site discharge by diverting water with temporary ditches, impounding water at topographic low spots, and/or constructing containment berms

7.3 Public Protection

7.3.1 Controlled Access

The DVR has a perimeter fence defining the property boundary and locked gates will restrict access to the reuse area.

7.3.2 Public Notification

The existing perimeter fence will be posted with "No Trespassing" and "Warning Recycled water Do Not Drink" signs. Notification signs will be placed at the access points and at minimum 500-foot intervals along the exterior fence line of application areas.

7.3.3 Worker Notification

DVR personnel directly involved with irrigating will receive training and notification regarding possible hazards and appropriate personal hygiene for working with recycled water.

Personal hygiene practices include:

1. Do not drink the irrigation water
2. Do not use the irrigation water for washing
3. Always wash hands and face with clean water and soap before eating or drinking
4. Wear rubber gloves when working on the irrigation system
5. Minimize skin contact with recycled water
6. Treat cuts immediately before continuing to work on the irrigation system
7. Report any problems that might pose a risk

8.0 MONITORING AND REPORTING

The DISTRICT will supply monitoring and reporting data to Lahontan in compliance with the Discharge Permit.

8.1 Monitoring

Monitoring associated with the DVR will be performed as required by the Discharge Permit. Suggested terms are as follows:

8.1.1 Recycled Water Volume

Monitoring of irrigation volume and rate of application will be performed through an automated metering device. DVR personnel will collect readings in order to determine the 30-day average flow.

8.1.2 Recycled Water Quality

Harvey Place Reservoir recycled water quality will continue to be monitored.

8.1.3 Groundwater

Groundwater quality will continue to be monitored at the existing monitoring wells. New monitoring wells may be added in the vicinities of the fields proposed for recycled water irrigation.

8.1.4 Nitrogen Balances

A nitrogen balance will be calculated on an annual basis (Table 9). The annual balance will be compared to the initial calculation and the results of the previous year's balance, as well as the DVR groundwater "red-flag" threshold of 7 mg/l. The DISTRICT understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired.

8.2 Reporting

8.2.1 Standard Reporting Procedures

Monitoring data will be provided monthly, quarterly, or annually as required by Lahontan and others.

8.2.2 Emergency Reporting

Should an unauthorized discharge of recycled water occur, Lahontan shall be notified as soon as the release is identified. A written report on the release/discharge and the methods used for mitigation shall be submitted to Lahontan. The report shall list:

1. Date and time of discharge
2. Exact location and estimated amount of discharge
3. Flow path and bodies of water which the discharge reached
4. Specific causes of the discharge

5. Preventive and/or corrective actions taken

8.3 Sampling Protocol

8.3.1 Monitoring Wells

Sampling of the monitoring wells by the DISTRICT will follow the procedure outlined below.

1. Document sampling on field data sheet
2. Measure depth to groundwater from the top of casing
3. Remove approximately three well volumes with bailer or pump. Do not contaminate the well or samples if using a bailer. If a particular well is known to recharge slowly, pump well till casing is empty, allow well to refill then collect sample.
4. Obtain sample bottles with preservatives from the laboratory
5. Collect samples and immediately place them in a cooler

8.3.2 Recycled Water Sampling

Samples will be collected from Harvey Place Reservoir using containers, preservatives, and procedures recommended by the laboratory.

8.3.3 Flow Monitoring

Flow monitoring will be done with a flow meter. Daily and monthly readings will be recorded during irrigation. Readings may be collected manually or electronically. Location of daily irrigation applications will also be recorded to demonstrate appropriate distribution throughout the irrigation areas.

8.3.4 Soils

Soil samples in irrigated areas will be collected and will be analyzed as required by Lahontan. Given the high quality of the South Tahoe WWTP effluent, it is recommended that soils be sampled every 3 to 5 years during recycled wastewater irrigation application.

8.3.5 Vegetation

If the DISTRICT determines that it will be beneficial to produce a crop other than alfalfa, it is recommended that tissue samples be collected and analyzed annually to determine plant nutrient uptake specific to the DVR. A plant sample protocol would need to be developed in coordination with Lahontan if a crop other than alfalfa or pasture grass is grown.

9.0 REFERENCES

California Plant Health Association (2002) *Western Fertilizer Handbook*

Harding ESE (2000) *Domestic Wastewater Application Guidelines*

Metcalf and Eddy (1991) *Wastewater Engineering: Treatment, Disposal, and Reuse*

NDEP (no date) *WTS-1B: General Criteria for Preparing an Effluent Management Plan*

USDA (1971) *Soil Survey Carson Valley Area Nevada-California*

USDA (1980) *Impacts of Land Application of Domestic Wastewater, Alpine County, California*

USDA (1992) *Nevada Irrigation Guide*

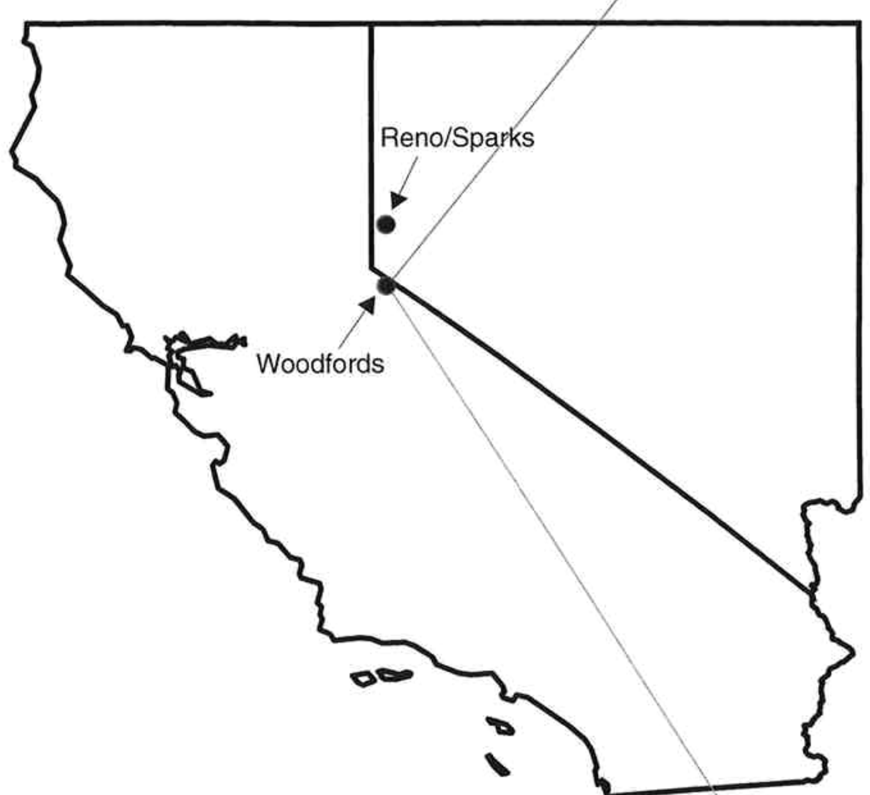
USDA (1998) *Review of 15 Years of Land Application of Domestic Wastewater, Alpine County, California*

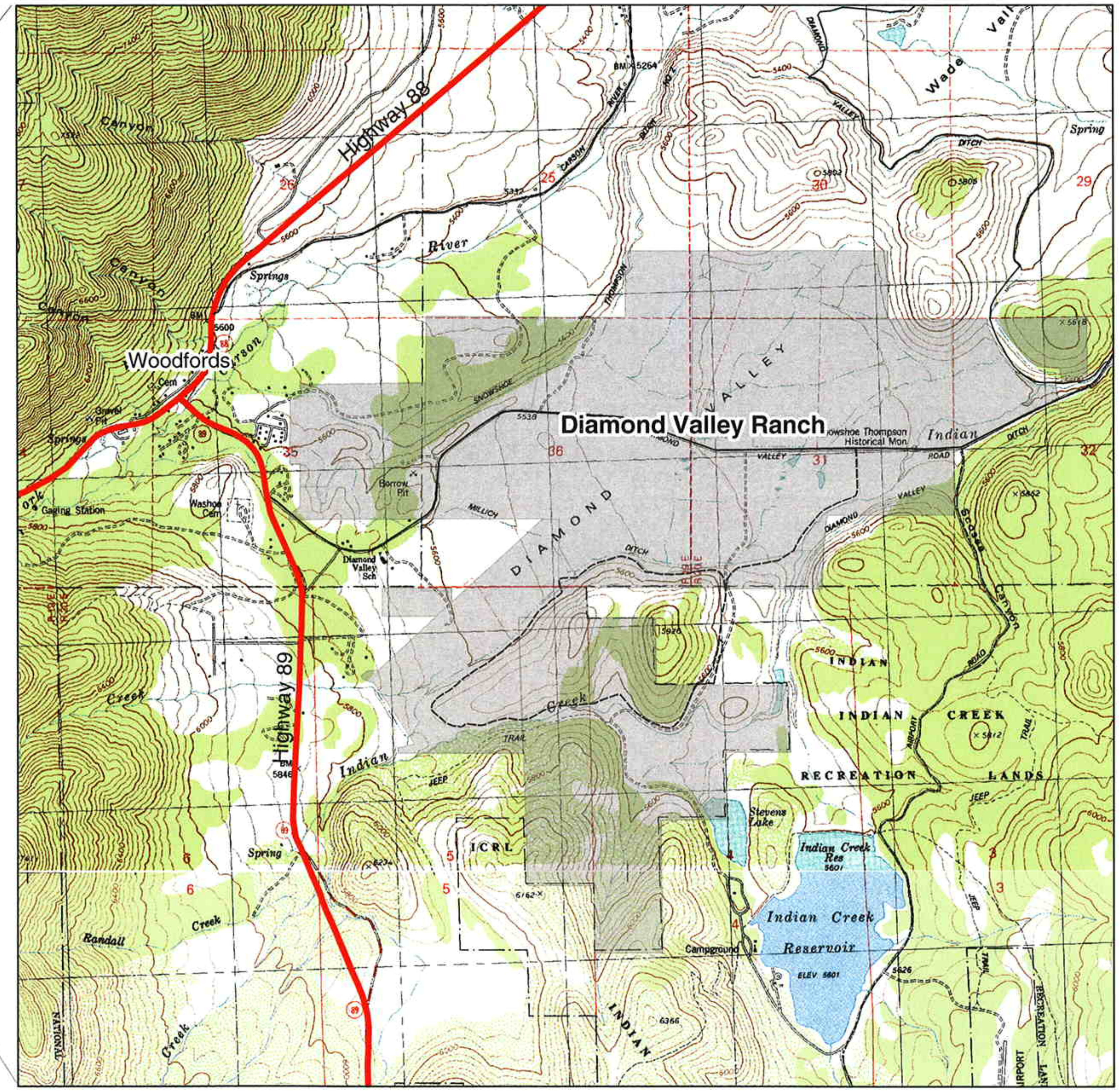
WRCC (2008) Historical Climate Information, Markleeville, California (Station 045356)

FIGURES

Vicinity Map

Site Plan, Soil Sample Locations, and Monitoring Well Locations





Layer	Description
State Boundary	ESRI
Transportation	South Tahoe PUD
Parcels	South Tahoe PUD
Quad Maps	USGS

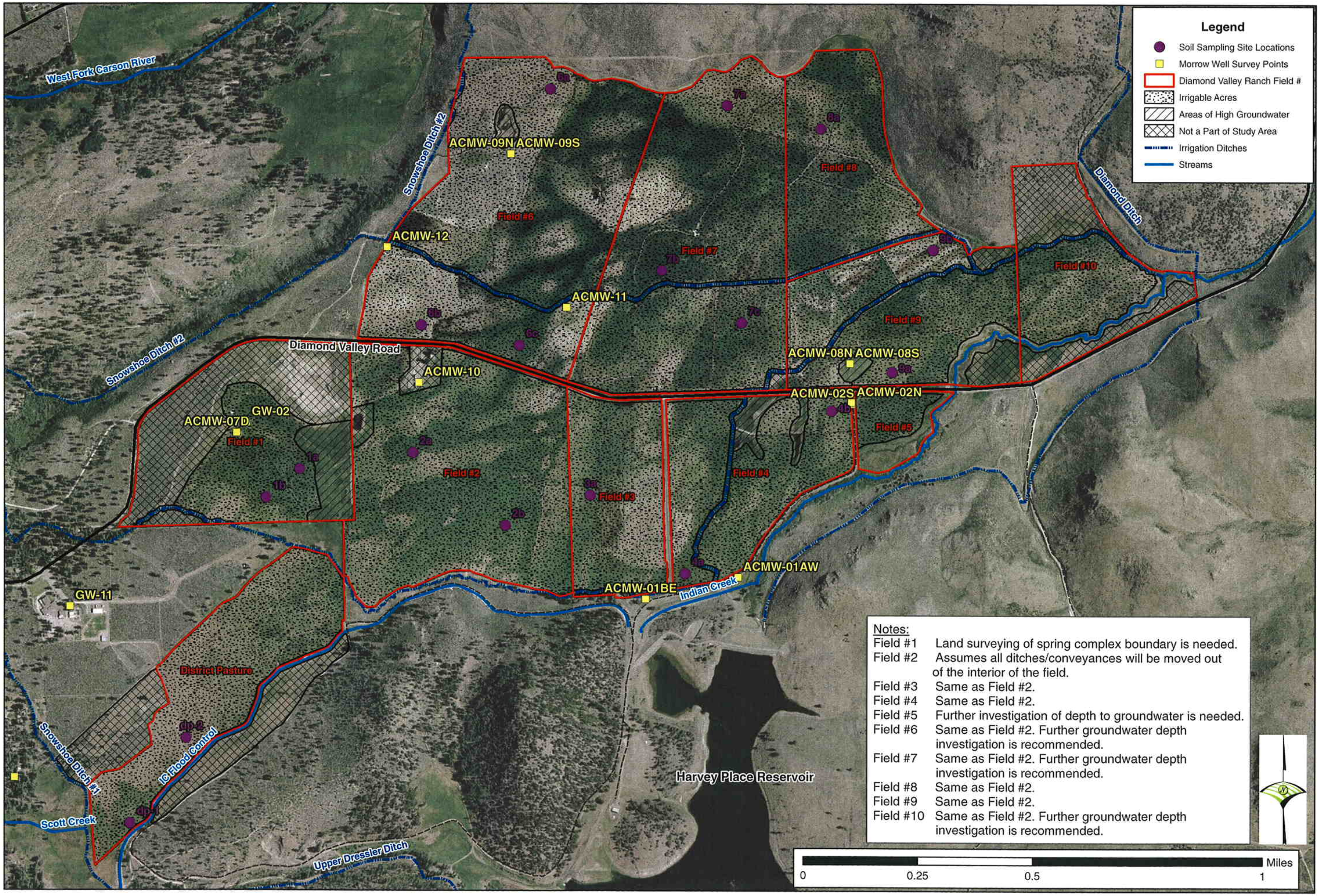
Date: February 2009
Scale: NTS
Drawn By: CMK
Designed By: CMK
Checked By:

WOOD RODGERS
ENGINEERING PLANNING MAPPING SURVEYING

Diamond Valley Ranch NMP
South Tahoe PUD
Vicinity Map

PROJECT NO.
8361

Figure
1



Layer	Description
Imagery	ESRI
Transportation	South Tahoe PUD
Streams & Ditches	South Tahoe PUD

Date: February 2009
Scale: 1" : 1000'
Drawn By: CMK
Designed By: CMK
Checked By:

WOOD RODGERS
ENGINEERING · PLANNING · MAPPING · SURVEYING

Diamond Valley Ranch NMP
Site Plan, Soil Sampling Locations, and Monitoring Well Locations

PROJECT NO.
8361

Figure
2

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APPENDIX 1
TECHNICAL MEMOS

WOOD RODGERS

Technical Memo

To: Hal Bird **Date:** February 6, 2009

From: Leslie Burnside **Subject:** Crop/Plant Selection Tech Memo

Project Number: 8361.001 **Project Name:** STPUD NMP DVR

Topic Introduction

The South Tahoe Public Utility District (STPUD) is seeking guidance regarding crops that are regionally adapted, and grazed and/or harvested under effluent irrigation. The Diamond Valley Ranch (DVR) currently supports native pasture grasses maintained under fresh water irrigation and cattle grazing. Given the location and "short" growing season as a result of the mountain shadow and other influences relevant to the DVR, cool season plant species will suit it best. Cool-season plants are those that germinate and grow at lower temperatures of spring and fall and are not injured by light frost. Cool-season plants do not perform (grow) as well during periods of extended hot temperatures.

The science in brief:

Cool season plants and reduce (fix) CO_2 directly by the enzyme ribulose bisphosphate carboxylase in the chloroplast. The reaction between CO_2 and ribulose bisphophate, a phosphorylated 5-carbon sugar forms two molecules of a 3-carbon acid. This 3-carbon acid is called 3-phosphoglyceric acid and explains why the plants using this chemical reaction are called C3 plants. The 3-phosphoglyceric acid molecules move out of the chloroplast to the cytoplasm and are used to make hexose, sucrose and other compounds. The enzyme ribulose bisphosphate carboxylase also triggers a reaction where oxygen splits ribulose bisphophate into a 2-carbon acid and a 3-phosphoglyceric acid. The 2-carbon acid is respired to carbon dioxide and basically a loss to plant function. 15-40% of the light energy taken into the C3 plants is lost in this process called photorespiration. The percentage goes up in higher temperatures, so C3 plants use more available oxygen in cooler environments.

It is understood that the District may choose several plants/crops or mixture of pasture grasses to have in production at the same time. Thus, several options are presented for consideration.

Information Sought

1. **What crops/plants are adapted to this area under effluent irrigation?**
2. **What crops/plants can be grazed/and or harvested under effluent irrigation?**
3. **What crops/plants optimize nutrient uptake under effluent irrigation?**

Sources Investigated

(1) Chapter 6 Role of Plants in Waster Management. Agricultural Waste management Field Handbook. Soil Conservation Service. 210-AWMFH, 4/92

(2) Process Design Manual, Land Treatment of Municipal Wastewater Effluents. EPA/625/R-06/016. September 2006.

(3) Land Application of Domestic Effluent onto Four Soil Types: Plant Uptake and Nutrient Leaching. J. Environ. Qual. 34:635-643 (2005).

(4) Constructing Wetlands in the Intermountain West: Guidelines for Land Managers. Univ. of Wyoming. 1999.

(5) Design Manual Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment. EPA/625/1-88/022. September 1988.

Findings

1. What crops/plants are adapted to this area under effluent irrigation?

The most common agricultural crops grown for revenue using waste water are corn (silage), alfalfa (silage, hay or pasture) forage grass (silage, hay or pasture), grain sorghum, and grains (2). However any crop including food crops can be grown with reclaimed wastewater after suitable reapplication treatment.

Alfalfa:

Although length of growing season at the DVR is of concern, legumes such as alfalfa even if they fix their own nitrogen from the soil, can cycle large amounts of nitrogen from effluent application from depths of up to 6 feet. Over 500 pounds of nitrogen uptake per acre by alfalfa has been reported (1). Therefore it is plausible to consider alfalfa production at a scale that is beneficial to the disposal of treated wastewater, uptake of nitrogen and potential for monetary return. At the present time alfalfa hay is priced quite high at $20/bale. Average production for a short growing season is approximately 2 Tons/Acre. Each ton averages 20 bales per ton. Monetary return could be potentially $400/acre for one cutting. Forecast for hay prices in Nevada and California is that hay prices will remain high until these states are not experiencing a drought (LBurnside personal experience). The DVR could support one cutting and then cattle could be grazed on the stubble for the later summer and fall months. Stubble could be irrigated with effluent intermittent with grazing to allow for effluent disposal, drying of soil surface to alleviate potential for compaction, and provide pasture forage.

Grass Pasture for Grazing and/Harvest (Hay):

Same price scenario applies to grass hay as it does for alfalfa right now and into the near (2 year) future.

Cool season opportunities are optimal as a mixture of grass species that have growth characteristics that complement each other, such as sod formers and bunch grasses and species that are dormant at different times of the year.

Sod-forming grasses are characterized by their capacity to produce either rhizomes or stolons, each being a modified stem, which extends laterally enabling the grass to develop a firm sod. Rhizomes are underground stems, varying widely in length, often extending 12 inches or more before the tip breaks through the soil crust to form a new shoot. Stolons remain largely at the soil surface with new shoots and roots arising from nodes.

Most grass species classified as bunchgrasses do not produce well developed rhizomes or stolons and therefore have a tufted growth habit as opposed to dense sod. The adventitious buds of bunchgrasses are found on the basal nodes in crown tissue and produce new tillers which remain within the surrounding leaf sheath of the mother stem.

This feature results in a bunch or tussock type of growth with minimal lateral spreading as occurs with rhizomes and/or stolons. The upward growth means that their growing points are often susceptible to removal by defoliation.

Another advantage of using a mixture of grasses is that, due to natural selection, one or two grasses will often predominate and a mix of species will provide protection against the whole stand being denuded by species specific disease.

Other Crops:
Marketability and pricing for flax, soybeans and sun flower is sophisticated (a national market rather than a local/regional market such as hay). Thus, marketability of these crops would need to be researched outside the scope of this project if these crops will be under consideration by the District. These crops are currently socially popular. Flax seed is a source of essential fatty acids, soybeans have numerous health wise uses, and sunflower seeds will never go out of fashion.

WOOD RODGERS

Technical Memo Page 4

Table 1. Crops from Table 4-6 (2) seeking the higher potential N, P, K uptake rates (percent of dry harvested material) are as follows:

			Percent of Dry Harvested Material			
Crop	**Dry Wt lb/bu**	**Typical Yield/Acre-Yr Plant Part**	**N**	**P**	**K**	**Crop Water Requirements [1, 2] Inches/year**
Flax	56	15 bu 1.75 Tons straw	4.90	0.55	0.84	15 to 17
Soybeans	60	35 bu 2 Tons stover	6.25	0.64	1.90	45
Sun Flower	25	1100 lb 4 Tons stover	3.57	1.71	1.11	15 to 17
Alfalfa		4 Tons	2.25	0.22	1.97	~40
Birdsfoot trefoil		3 Tons	2.49	0.22	1.82	18 to 20
Bluegrass (paste extract)		2 Tons	2.91	0.43	1.95	18 to 20
Red Clover		2.5 Tons	2.0	0.22	1.66	18 to 20
Bromegrass		5 Tons	1.87	0.21	2.55	18 to 20
Orchardgrass		6 Tons	1.47	0.20	2.16	18 to 20
Tall fescue		3.5 Tons	1.97	0.20	2.00	18 to 20
Bentgrass*		2.5 Tons	3.10	0.41	2.21	18 to 20
Rushes		1 Ton	1.67			20 to 30
Sedges		0.8	1.79	0.26		20 to 30
Arrowweed			2.74			20 to 30
Phragmites		1.83	0.10	0.52		20 to 30

* Sod farm product – used at golf courses

Wetland Plants – can be sold as plugs or as sod

1 "Crop water requirements" is defined as the total water needed for evapotranspiration, from planting to harvest for a given crop in a specific climate regime, when adequate soil water is maintained by rainfall and/or irrigation so that it does not limit plant growth and crop yield. Source "AQUASTAT Glossary"

2 These water requirements are estimated based on talking to growers, common types of crops such as the grass species listed above, as well as a web search.

2. What crops can be grazed/and or harvested under effluent irrigation?
All of the species of plants/crops included in table one can be harvested. The following species are not considered as forage for livestock:

Table 2. Plants/Crops not considered as forage for livestock.

			Percent of Dry Harvested Material		
Crop	**Dry Wt lb/bu**	**Typical Yield/Acre-Yr Plant Part**	**N**	**P**	**K**
Flax	56	15 bu 1.75 Tons straw	4.90	0.55	0.84
Soybeans	60	35 bu 2 Tons stover	6.25	0.64	1.90
Sun Flower	25	1100 lb 4 Tons stover	3.57	1.71	1.11
Phragmites		1.83	0.10	0.52	

3. What crops optimize nutrient uptake under effluent irrigation?
Please refer to Table 1. where nutrient uptake is presented as a percentage of dry harvested material.

Recommendations to be carried forward to the DVR NMP

It is highly recommended that the District consider a mix of crop uses (hay, crop, and wetlands mitigation plant materials). This would allow the DVR a variety of revenue opportunities as well as opportunity to maximize nutrient uptake and effluent disposal.

Another viable option would be to practice hay production for harvest or grazing, or both. One cutting could be harvested due to short growing season from pasture hay fields, followed by grazing on irrigated stubble of that crop.

The Draft DVR Nutrient Management Plan should consider crop/plant alternative opportunities for nutrient uptake for the crops as determined by the District. Nutrient uptake would be considered as a nutrient loss in the nutrient balance of the ranch under the effluent irrigation scenario. This analysis will provide the District with information to be able to determine the crops they want to consider for production and maximize nutrient uptake and effluent disposal.

Technical Memo

To:	Hal Bird	**Date:**	March 13, 2009
From:	Leslie Burnside	**Subject:**	Irrigation Methods Tech Memo
Project Number:	8361.001	**Project Name:**	STPUD NMP DVR

Topic Introduction

The South Tahoe Public Utility District (STPUD) is seeking guidance regarding the method to provide land application of recycled water to the Diamond Valley Ranch. Guidance provided below is based on published guidance for irrigation of recycled water. The District has expressed that a sprinkler delivery system is a preference. The intent is for Wood Rodgers to provide the pros and cons for each type of delivery system including:

Surface Distribution: flood, furrow, and border.
Aerial Distribution: sprinkler, solid set, wheel line and center pivot.

Definitions: (1)

Flood	uncontrolled application to a vegetated surface via gravity or low head pumping
Furrow	application to a graded surface field via small ditches between row crops
Border	application to a leveled field in 20 to 100 foot wide strips, bordered by dikes
Sprinkler	application of water to the soil through sprinkling or spraying
Solid Set	permanently or semi-permanently installed sprinklers are used in blocks of the field
Wheel line	engine movable sprinklers cover the field in sets
Center pivot	mechanical sprinkler system with a fixed central water supply moves in a circle to irrigate 20 to more than 400 acres
Linear Move	Mechanical sprinkler system with end or center feed water supply moves in a straight line to irrigate fields up to 5000 feet long

It is understood that the District is planning to have several fields/separate locations that they will irrigate with recycled water. Thus, the District may choose a different irrigation system depending on the crop that will be grown.
Furthermore, the fields that will be irrigated with recycled water will also be available as temporary storage areas on an as needed basis.

Information Sought

1. **What irrigation delivery systems suit potential crops to be grown?**
2. **What are the advantages and disadvantages for each delivery system that is suited to potential crops to be grown?**
3. **What are the relative costs associated with each irrigation system that is suited to potential crops to be grown?**

Sources Investigated

(1) Process Design Manual, Land Treatment of Municipal Wastewater Effluents. EPA/625/R-06/016. September 2006.

(3) Land Application of Domestic Effluent onto Four Soil Types: Plant Uptake and Nutrient Leaching. J. Environ. Qual. 34:635-643 (2005).

(4) Constructing Wetlands in the Intermountain West: Guidelines for Land Managers. Univ. of Wyoming. 1999.

(5) Design Manual Constructed Wetlands and Aquatic Plant Systems for Municipal Wastewater Treatment. EPA/625/1-88/022. September 1988.

1. What irrigation delivery systems suit potential crops to be grown?

The following list presents crops that were considered in The February 4, 2009 Crop Alternative Technical Memo and common irrigation methods used to grow these crops.

Table 1. Crops Considered and Typical Irrigation Methods

Crop	Dry Wt lb/bu	Typical Yield/Acre-Yr Plant Part	Typical Irrigation Method(s)
Flax	56	15 bu 1.75 Tons straw	Sprinkler, Solid Set, Wheel line, Center pivot, Liner Move, Furrow
Soybeans	60	35 bu 2 Tons stover	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Furrow
Sun Flower	25	1100 lb 4 Tons stover	Sprinkler, Solid Set, Center pivot, , Linear Move, Furrow
Alfalfa		4 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Birdsfoot trefoil		3 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Bluegrass (paste extract)		2 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Red Clover		2.5 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Bromegrass		5 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Orchardgrass		6 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Tall fescue		3.5 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Bentgrass*		2.5 Tons	Sprinkler, Solid Set, Wheel line, Center pivot, Linear Move, Flood, Border
Rushes		1 Ton	Flood, Border
Sedges		0.8	Flood, Border
Arrowweed			Flood, Border
Phragmites		1.83	Flood, Border

2. **What are the advantages and disadvantages for each delivery system that is suited to potential crops to be grown?**

Table 2. Summary of Irrigation Method Advantages and Disadvantages.

Method	Advantages/Disadvantages
Surface Irrigation – Flood Uncontrolled application to a vegetated surface via gravity or low head	• Poor uniformity of application • Not generally suited for effluent irrigation due to potential for runoff • Does not require leveled or graded fields • **Minor initial costs**
Surface Irrigation – Furrow Application to a graded field via small ditches between row crops	• For row crops • Requires carefully leveled fields • Uniform application occurs on finer soils • **Costs are associated with field leveling**
Surface Irrigation – Border Application to a leveled field in 20 to 100 foot wide strips, bordered by dikes	• For grass or perennial crops • Requires carefully leveled fields • Uniform application occurs on finer soils • **Costs are associated with field leveling**
Aerial Irrigation - Sprinkler Application through sprinkling or spraying Several types of sprinkler or spray are listed below	• Components can be sensitive to process water chemistry • Almost eliminates runoff • Susceptible to wind drift • **Highest pumping costs** • Good method for coarser sols and uneven ground
Aerial Irrigation - Solid Set Application via permanently or semi-permanently installed sprinklers are used in blocks of the field	• Good for winter irrigation if subsurface piping is used • Harvest and tillage are difficult around sprinkler risers • Rapid rotation among blocks is feasible to provide smaller applications • **Small initial materials costs** • **Labor required while irrigating**
Aerial Irrigation - Wheel Line Application via engine movable sprinklers cover the field in sets	• **Less labor than hand move sprinkler lines** • **Labor required to move sprinklers which makes long sets common** • Only suitable for low height crops and rectangular fields • **Inexpensive equipment**
Aerial Irrigation - Center Pivot Application via mechanical sprinkler system with a fixed central water supply moves in a circle to irrigate 20 to more than 400 acres	• **Moderate initial expense but less labor** • Flexible, efficient irrigation with proper design • Frequent light irrigation of fields can be done in winter to minimize soil storage • Not suitable for boggy or sticky soils • High instantaneous application rates
Aerial Irrigation - Linear Move Mechanical sprinkler system with end or center feed water supply moves in a straight line to irrigate fields up to 5000 feet long	• **High initial capital but less labor** • Efficient irrigation with proper design • Not suitable for boggy or sticky soils • High instantaneous application rates • Covers large rectangular fields

3. What are the relative costs associated with each irrigation system that is suited to potential crops to be grown?

Relative costs associated with types of irrigation methods considered are in bold text in Table 2. Real costs will be dependent on the market and economy at the time of purchase and installation.

Findings

It is Wood Rodgers opinion that the type of irrigation method chosen should be dependent on the type of crop to be grown, capital budget for initial materials costs, operating budget for pumping if required and labor if needed by the system.

Recommendations to be carried forward to the DVR NMP

The Diamond Valley Ranch should consider a type of surface irrigation and a type of aerial irrigation to determine hydraulic loading rates.

Technical Memo

To: Hal Bird **Date:** February 3, 2009

From: Leslie Burnside **Subject:** Recommended Fields Tech Memo

Project Number: 8361.001 **Project Name:** STPUD NMP DVR

Topic Introduction

There are areas of the Diamond Valley Ranch (DVR) that may not be irrigable with treated effluent due to evidence of a high groundwater table. To provide a recommendation to the South Tahoe Public Utility District (District) regarding the application of effluent for irrigation at the DVR as part of the development of a Nutrient Management Plan (NMP), soil conditions and depth to groundwater were considered. In August 2008, Wood Rodgers collected soil samples at the DVR. The depth to groundwater and other groundwater indicators were documented in the field, where applicable, in the soil sampling trenches.

Information Sought

District Fields appropriate for application of treated effluent water for purposes of irrigation are to be identified.

Sources Investigated/Used

To determine the area of potentially irrigable lands on the DVR, Wood Rodgers has considered areas that are either currently irrigated with fresh water and/or have been historically irrigated. The proximity of streams, irrigation ditches, springs, and areas of high groundwater as well as infrastructure have also been taken into consideration.

To aid in the August 2008 soil sampling at the DVR, Hal Bird provided Wood Rodgers with a sketch of the layout of the District Fields. Wood Rodgers digitized the outline of the Fields in GIS and attributed them according to their District assigned field numbers. Based upon the topographic information provided by the District associated with the May 15, 2008, aerial photography, the field boundaries were revised. The Field boundaries were adjusted to follow the fence lines, streams, ditches, or roadways. The Field boundaries provide the overall framework for the quantification of potentially effluent irrigable acreage at the DVR.

To prevent contamination of freshwater sources from the application of treated effluent, the following buffers were applied in the determination of irrigable acreage:

- A 25 foot set back from District property lines along Diamond Valley Road.
  This setback is in excess of other irrigation areas that currently irrigate up to the property line. An overestimation of the buffer allows the District some discretion on irrigation methods.

- A 25 foot set back from the center line of irrigation ditches.
  In the areas currently under consideration for irrigation by the District, piping or rerouting of fresh water away from the recycled irrigation areas is being proposed, thus no buffers would be required. However, for planning purposes, the District requests a 25 foot buffer from the center of the primary ditches.

- A 25 foot buffer from the edge of Streams should be applied for planning purposes.

The line work in the ditches_03.shp and streams_03.shp files, as provided by the District Engineering Department, formed the basis of analysis for the buffer areas. However, some of the line work in these files was adjusted based on the 2008 aerial photography and topographic data to more closely follow the alignments of existing water features.

To provide a 25 foot buffer from the edge of the IC Flood Control Channel and Indian Creek, the top of the streambanks were approximated from the 2008 topographic data. A 25 foot buffer was created in GIS from the developed streambank linework.

The District has requested a 25 foot set back of irrigable lands along District property lines extending along Diamond Valley Road. To determine the location of the set back, a 25 foot offset was applied to the District Field boundaries. The 25 foot set back was not applied to areas designated as high groundwater nor areas defined as "Not a Part of Study". These areas extend to the District Field boundary.

Areas of high groundwater were identified based upon field visits, aerial photography (USA Imagery, April 2007, © 2007 i-cubed. Boundaries and transportation: © 2006 ESRI, AND, TANA), the results of the August 2008 soil sampling, and District groundwater monitoring data.

Please refer to Table 1 and the Soil Sample logs for soil conditions and depth to groundwater for all August 2008 soil sample locations as shown on Figure 1. (Attachment 1).

Ivo Bergsohn provided Wood Rodgers with two spreadsheets containing District well monitoring data and survey data of Alpine County wells as collected by Marrow Surveying. These data were applied to determine the depth to groundwater for the ACMW wells. Well locations with depths to groundwater measuring less than 2.5 feet were classified as areas of high groundwater.

Locations and areas designated as "Not a Part of the Study Area" in Figure 1 either contain infrastructure prohibiting the application of recycled waters, are too small in area to manage, or are limited due to topography.

Findings/Figure References

District well monitoring data indicate Wells ACMW-01AW south of Field # 4, ACMW-02S adjacent to Field #4 and Field #5, and ACMW-08N and ACMW-08S in Field #9 have registered depths to groundwater less than 2.5 feet as measured from the ground elevation at the well casing. High groundwater levels tend to coincide with the spring months at Wells ACMW-01AW, ACMW-02S, ACMW-08N, and ACMW-08S. However, ACMW-08N and ACMW-08S also register shallow depths to groundwater during fall and winter months.

Groundwater data from Wells ACMW-08N and ACMW-08S are inconsistent with soil characteristics from the August 2008 soil sampling. Soil characteristics from Sampling Site 9a do not indicate the presence of high groundwater, nor was high groundwater present during sampling. However, indicators of high groundwater, such as the presence of gleyed inclusions and characteristics of reduction, were noted at Sampling Site 9b. At this site, groundwater was encountered at an approximate depth of 60 inches.

The alignment of Indian Creek through Field #9 reduces the area of potential application of recycled waters for irrigation purposes. A 25 foot buffer was applied to the top of both stream banks of Indian Creek. Due to the relatively small area located between the stream buffer and the southeast corner of Field #9, this piece was designated as "Not a Part of the Study Area" in Figure 1. The piece is approximately 6 acres in size.

The areas of irrigable acreage and high groundwater have been determined in GIS and are summarized in Table 1. The results correspond to the areas shown in Figure 1. These quantities do not include stream, ditch, or roadway buffers, nor do they include areas designated as "Not a Part of the Study Area".

Recommendations to be carried forward to the DVR NMP

Wood Rodgers suggests that additional investigation be undertaken in Fields #5, #6, #7, #9, and #10 to determine the depth to groundwater during the spring, as well as during drier months. This information can be used to confirm whether high groundwater measurements are attributed to flood irrigation or to a seasonally high groundwater table and ultimately which areas of the fields can be used for treated effluent irrigation.

Due to the presence of springs and groundwater seeps at the eastern boundary of Field #1, as well as other locations on the ranch, Wood Rodgers recommends land surveying to better define the wetted area boundaries areas of influence of groundwater features, such as seeps and springs, to better define boundaries for management purposes.

Based upon soil sampling data collected in August 2008 and District groundwater well data, Figure 1 represents irrigable acres that can be used for the application of treated effluent if, as noted for the Fields listed above, additional groundwater elevation monitoring is implemented.

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It is further recommended that the District seek concurrence from Lahontan regarding buffer widths for streams and primary irrigation ditches and proposed irrigable acres to allow the District a firm planning foundation for the implementation of a NMP for the DVR.

Table 1. Irrigable Area of the Diamond Valley Ranch

Field	Total Field Area	Area of High Groundwater		Irrigable Area	
	Acres	Acres	% of Total Field Area	Acres	% of Total Field Area
District Pasture	80.8	0.0	0	78.8	97
Field #1	107.3	13.1	12	39.6	37
Field #2	153.3	0.0	0	144.8	94
Field #3	56.4	0.0	0	54.1	96
Field #4	78.2	6.4	8	67.9	87
Field #5	16.8	0.0	0	9.6	57
Field #6	184.1	2.4	1	176.5	96
Field #7	163.4	0.0	0	158.0	97
Field #8	69.8	0.0	0	67.3	96
Field #9	94.6	1.9	2	74.8	79
Field #10	67.0	0.0	0	31.7	47
			TOTAL ACRES	902.9	

Notes: 1. Buffer areas around streams, primary ditches, and the edge of the property are not represented in Table 1.
2. Areas designated as "Not a Part of Study Area" are not included in Table 1.
3. The areas provided in Table 2 were quantified in GIS.

Attachment 1.

Recommended Fields Tech Memo - Indications of and Evidence of Ground Water
Samples were collected mid August 2008 – Not a Maximum Hydrology for Groundwater Evidence

Field Number	Soil Sample Number as approved by STPUD	Depth to Indication of High Ground Water (mottling [oxidation & reduction], reducing [anaerobic] conditions – highlighted yellow in attached field notes)	Depth to Ground Water (seeping into hole – highlighted blue in attached field notes)
District Pasture	DP1	None	60 inches
	DP2	0 to 6.5 inches*	none
1	1a	none	54 inches
	1b	none	50 inches
2	2a	none	54 inches
	2b	none	60 inches
3	3a	none	none
4	4a	0 to 19 inches*, Oxidized rhizospheres**	43.5 inches
	4b	None	60 inches
5	NOT SAMPLED PER STPUD	During irrigation too saturated too sample	During irrigation too saturated too sample
6	6A	none	none
	6B	none	none
	6C	none	none
7	7A	none	55 inches
	7B	Gray (gleyed) 40 inches	40 inches
	7C	3 to 4.5 inches, oxidized rhizospheres**	30 inches
8	8A	3 to 16 inches* 42 inches	57 inches
9	9A	none	65 inches
	9B	12 - 60 inches	60 inches
10	NOT SAMPLED PER STPUD	During irrigation too saturated too sample	During irrigation too saturated too sample

*Please be advised that if mottles in the profile extend from 0 to usually up to 24 inches below ground surface and then disappear, this is an indication of flood irrigation on tight/heavy/clay containing soils/or high application rates – NOT NECESSARY INDICATION OF A SEASONALLY HIGH GROUND WATER TABLE.

** Oxidized Rhizopheres: Indicates wetting and drying conditions as would expect with irrigated conditions. Oxidation occurs on the sides of root channels.

Diamond Valley Ranch
Soil Sample Log

Location DP-1

Date 8/11/08

Horizon Designations ____

Sampler LB, SW, LIZ, JP, MW

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 6	e.g. horizon, gravels, cobbles, clay layer etc root layer
A1 #1	6 to 18	extremely gravelly
B #2	18 to 37	very gravelly
B2 #3	37 to 44	
C #4	to 44-60	coarse sand
	__ to __	@ 5' seep
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location: Diamond Valley Ranch DP-2 Date: 8/11/08

Horizon Designations: ______ Sampler: ______

Photos: Yes/No adjacent to dirt access road

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
"O"	0 to 6-7"	e.g. horizon, gravels, cobbles, clay layer etc ORGANICS MOTTLES TOP 6 1/2"
"A"	6 1/2-7 to 14	MOTTLES DECREASE
"C1"	14 to 50	
C2	50 to 60	
	__ to __	
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location Field 7-A

Date 8/11/08

Horizon Designations ______

Sampler LIZ, JP, MW, CK

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 4.5	e.g. horizon, gravels, cobbles, clay layer etc rooting
A1	4.5 to 17	sandy clay w/mottles
A2	17 to 33	transition
B1	33 to 40	clay lens
B2	40 to 60 @54" - ground water	sandy/gravelly
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location: Field 1B

Date: 8/11/08

Horizon Designations: ______

Sampler: LIZ, JP, MW, SW, LB,

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 5	e.g. horizon, gravels, cobbles, clay layer etc
A	5 to 23	
B	23 to 41	
C	41 to 60 50-54"	ground water
	__ to __	
	__ to __	
	__ to __	

Same as 1A

Diamond Valley Ranch
Soil Sample Log

Location Field 2A Date 8/11/08

Horizon Designations ________ Sampler LB SW LIZ, CICUP

Photos: Yes/No ________

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc rooting
A	2 to 20	
B1	20 to 40	
B2	40 to 54	
C	54 to 60 @54" ground water	
	__ to __	
	__ to __	

Same as field 1

Diamond Valley Ranch
Soil Sample Log

Location Freid 2B

Date 8/11/08

Horizon Designations

Sampler SW, LB, CK, UZ, DW

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc rooting
A	2 to 17	silt compacted
B1	17 to 29	gravelly sandy clay compacted w clay lenses
B2	29 to 52	gravelly sandy clay w/ more clay than above
C	52-60	coarse clayey sand
@ 60 ground water		
	to	
	to	

Diamond Valley Ranch
Soil Sample Log

Location Field 3A   Date 8/11/08

Horizon Designations ____   Sampler ____

Photos: Yes/No ____

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 1.5	e.g. horizon, gravels, cobbles, clay layer etc
A	1.5 to 12	gravelly
B1	12 to 33	
B2	33 to 45	
C	45 to 60	STONY
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location Field 4A   Date 8/11/08

Horizon Designations ____   Sampler LB, LiZ, SW, MW, CIC, JP

Photos: Yes/No ____

2
2-19
6½
18"
H_2O

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc
	2 to 19	mottled to surface rhizospheres oxidized
	19 to 25.5	
	25.5 to ~~43.5~~ 18" to water	gravelly sandy clay
	__ to __ gr water @ ~~43.5"~~	
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location Field 4B Date 8/11/08

Horizon Designations ______ Sampler LIZ, LB, MW, SW, CK, JP

Photos: Yes/No ______

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc
A1	2 to 17	Silty loam, compacted
A2	17 to 31	Silty loam, friable
B	31 to 43	Sandy clay loam
C	43 to 60	loamy Sand Groundwater ~ 60 in.
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location Field 6A

Date 8/12/08

Horizon Designations

Sampler LZ, JP, CK, BC

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 3	e.g. horizon, gravels, cobbles, clay layer etc rooting
A	3 to 10	sand
B1	10 to 27	gravelly loamy clay
B2	27 to 55	loamy clay more compacted than B1
C	55 to 60	silty sand this goes down > 84" still no ground H_2O - texture changes
	__ to __ to	~~clay~~ more clay w/ silt-sand
	__ to __	

no groundwater

Diamond Valley Ranch
Soil Sample Log

Location: Field 6B Date: 8/12/08

Horizon Designations: ________ Sampler: CK

Photos: Yes/No ________

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 1	e.g. horizon, gravels, cobbles, clay layer etc
A * SEE BELOW/NOTES 4-8"	1 to 26	uniform; silt
B	26 to 30	silty loam w/small gravels
	to	
	30 to 36	Rooting stops @ this layer silty/gravelly loam
B	36 to 48	gravelly silty loam
C	48 to 60	decomposing granite

site has been leveled + sludge distributed on soil surface; CIRCA 80's.

*@ 4-8" BS = DISCOLORED/LIGHTER SHALLOW LENS = 2" THICK.

Diamond Valley Ranch
Soil Sample Log

Location: Field 6B

Date: 8/12/08

Horizon Designations:

Sampler: LIZ, JP, CK, BC

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc rooting zone
A1	2 to 3	fine sandy silt
A2	3 to 22	sandy silty loam roots continue to 22
C1	22 to 30	transition - start picking up cobble w/ DG
C2	30 to 60	cobble stone rock DG
	__ to __	
	__ to __	

dry, no groundwater

Diamond Valley Ranch
Soil Sample Log

Location Field 7A

Date 8/12/08

Horizon Designations

Sampler CK, LIZ, JP, BC

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc
A1	2 to 22	gravelly silty clay compacted dry
A2	22 to 42	~~medium dry~~ Moderate moisture
B1	42 to 50	gravelly sandy clay
B2	50 to 60	silty sandy clay color change gr water @ 55-57
	to	
	to	

Diamond Valley Ranch
Soil Sample Log

Location Field 7B

Date 8/12/08

Horizon Designations

Sampler CK, JP, HZ, BC

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
0	0 to 5	e.g. horizon, gravels, cobbles, clay layer etc rich brown color
	5 to 40	fine gravel, sandy clay gravel inclusions, dark gray in color Groundwater @ 40 inches
	to	
	to	
	to	
	to	
	to	

wet pasture w/ Carmelt

Diamond Valley Ranch
Soil Sample Log

Location Field 7C Date 8/12/08

Horizon Designations ______ Sampler VP, UZ, KD, BC

Photos: Yes/No ______

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
"0"	0 to 3	e.g. horizon, gravels, cobbles, clay layer etc DENSE ROOT MASS
	3 to 4 1/2	OXIDIZED RHIZOSPHERES (CLAY) CONFINING LAYER / COMPACTED SILTY CLAY W/ SPARSE GRAVELS
	4 1/2 to 14"	OXIDIZED RHIZOSPHERES CLAY SLIGHTLY GRITTY (SANDY CLAY) TRANSITIONAL SOIL / VARIES IN COLOR & TEXTURE
	14 to ~~36~~"	
	__ to __	
	__ to __	
	__ to __	

* GROUNDWATER @ 30"

Diamond Valley Ranch
Soil Sample Log

Location Field 8A Date 8/12/08

Horizon Designations ____ Sampler LIZ, JP, CK, BC

Photos: Yes/No ____

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
0	0 to 3	e.g. horizon, gravels, cobbles, clay layer etc
A/B1	3 to 16	silty clay mottling present Compacted
B1	16 to 42	silty clay less compacted
B2	42 to 57	sandy clay mottles sand component
	__ to __	Groundwater @ 57"
	__ to __	
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location Field 9A Date 8/11/08

Horizon Designations ______ Sampler LIZ,

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc
A1	2 to 26	Loam
A2	26 to 35	Loam - more compacted than A1
B	35 to 48	silty clay
C	48 to 60	fine sand
	__ to __	
@ 65 groundwater		
	__ to __	

Diamond Valley Ranch
Soil Sample Log

Location: Field 9B

Date: 8/12/08

Horizon Designations:

Sampler: LE, LK, BC, JP

Photos: Yes/No

Sample # Starting from Surface down	Depth Below Ground Surface (inches)	Notes/Distinguishing Characteristics
O	0 to 2	e.g. horizon, gravels, cobbles, clay layer etc
A1	2 to 12	silty loam
A2	12 to 28	gravel, silty loam coarser silts; some gravel Some reduction occurring decayed root mass found
B	28 to 60	cobbly clay with gleyed gleyed inclusions
C	60 to +	sand - coarse
No sample taken		groundwater ~ 60 in
	__ to __	
	__ to __	

WOOD RODGERS

Technical Memo

To: Hal Bird **Date:** February 4, 2009

From: Leslie Burnside **Subject:** Grazing Options Tech Memo

Project Number: 8361.001 **Project Name:** STPUD NMP DVR

Topic Introduction

The Diamond Valley Ranch (DVR) has been an operational cattle grazing operation historically, thus it has been assumed that the input of manure to the soil and hydrologic systems has had an impact on the nutrient balance of the ranch. There is one pasture, *District Pasture* which has been somewhat alleviated from consistent cattle grazing for the past ten years. Please refer to Figure 1.

Information Sought

The District Pasture provided an opportunity to:

1. Collect soil samples and compare soil nutrient levels of the District Pasture relative to the rest of the ranch which is consistently grazed on an annual basis
2. Determination of whether the input of manure is having an impact on the DVR nutrient balance under existing fresh water irrigation.
3. Determination of whether the input of manure may have an impact on the DVR nutrient balance under treated effluent irrigation application.
4. Provide information necessary to make a determination of whether to maintain the DVR with cattle grazing or discontinue cattle grazing.

Sources Investigated

Powell, J.M. 2006. USDA Agricultural Research Service. Enhanced use of Feed and Manure Nutrients in Animal Agriculture. 1/5/2006

Cameron, Di and Moir. Centre for Soil and Environmental Quality, Lincoln University. Nitrogen: Is it a SIDE Issue?

Ohio State University Livestock Management Guide, Bulletin 604-06

Findings

1. Comparison of soil nutrient levels of the District Pasture relative to the rest of the ranch which is consistently grazed on an annual basis:

SOUTH TAHOE Sewer • 1950 • Water PUBLIC UTILITY DISTRICT

Table 1. Soil Nutrients – Existing Management – Cattle, Fresh Water Flood Irrigation

DVR Field	N lb/ac	P lb/ac	K lb/ac
District Pasture	4	19	91
1*	5	33	210
2*	22	9	96
3	6	28	266
4*	6	28	204
5	Not sampled	Not sampled	Not sampled
6*	5	22	98
7*	6	38	172
8	8	46	179
9*	13	40	197
10	Not sampled	Not sampled	Not sampled
TOTAL	75	263	1513
Avg Grazed Fields	9	31	78

- These values are summarized from soil samples collected at DVR in August 2008
- *If there was more than one sample location in any field lab results were averaged
- Consistently Grazed – Consistently receiving nutrients via manure
- To convert lb/acre to ppm – use conversion factor based on Bulk Density of soil samples analyzed (conversion factor is as reported form AgSource Harris)

The District Pasture is lower in Nitrogen and Phosphorous, yet higher in Potassium. In-situ soil nutrients within the District Pasture which could be naturally occurring or from past manure inputs may be from several sources and do not appear to be significantly different than that found in the remaining fields of the ranch. Sources of nutrients include manure, fresh irrigation water, atmospheric deposition, etc. In order to mathematically determine the level of significance in the difference of nutrient levels between the District Pasture and the remaining fields, a statistical analysis would need to be conducted which is not within the scope of this Technical Memo.

2. Determination of whether in fact the input of manure is having an impact on the DVR nutrient balance under existing fresh water irrigation.

Nutrient Budget for DVR using
Ohio State University Livestock Management Guide, Bulletin 604-06

Manure and Nutrient Production:
<u>Total Manure Output</u>
Assumptions:

- 1000 head that average 1000 lbs/head
- Manure is not stored – direct application = handled as a solid
- Each cow produces 11.5 tons of manure per year (see Bulletin column 9)

1000 cows x 11.5 tons per year manure production = 11,500 tons/year
*Assume livestock on ranch for average of 6 months/year = 5,750 tons of manure/year

Technical Memo Page 3

Manure Nutrient Production

N	5750 T/Yr x 7.4 lb/Ton	=	42,550 lb/Yr
P_2O_5	5750 T/Yr x 6.0 lb/Ton	=	34,500 lb/Yr
K_2O	5750 T/Yr x 8.3 lb/Ton	=	47,725 lb/Yr

Acres of each Crop and Average Yield per Acre

Current Crop Pasture Grass Maintenance

Production = 2 to 4 Tons/Acre (please see attached Common Agronomic & Horticultural Crop Codes)

Total Acres (this is the sum of field acres minus high GW areas) **903 acres[1]**

[1] Based on 2/4/09 Irrigable Acres Tech Memo findings

Table 2. Recommended Nutrient Needs

Livestock Management Guide, Bulletin 604-06. The lbs/per acre used as Nutrient Needs in this table are those taken form the Ohio State University (attached)

Crop	Yield [1]	Irrigable Acres	Nutrient Needs = Yield x Acres x Crop Removal (See Bulletin Tables 5 and 6)		
			N (max 175 lbs/ac)	**P_2O_5 Removed for the Given Unit Yield**	**K_2O Removed for the Given Unit Yield**
Pasture Grass Maintenance	2 Tons/Acre	255	40 lbs/ton **(Max 175 lbs/acre)**	13.0 lb/ton	50 lb/ton
Pasture Grass Maintenance	3 Tons/Acre	67	40 lbs/ton **(Max 175 lbs/acre)**	13.0 lb/ton	50 lb/ton
Pasture Grass Maintenance	4 Tons/Acre	580	40 lbs/ton **(Max 175 lbs/acre)**	13.0 lb/ton	50 lb/ton
TOTAL	**3,031 Tons**	**903**			

[1] Based on professional experience of irrigated pasture production, L Burnside
Please see Attachment 1.

Table 3. DVR Nutrient Need

Table 3. takes the nutrient needs of the current crop and applies what is used by the crop to determine where, if any a deficit occurs so that a fertilizer management plan may be developed, or in the case of the DVR to show if there is an excess or deficit of nutrients on the DVR.

Crop	Yield [1]	Irrigable Acres	DVR Nutrient Needs = Yield x Acres x Crop Removal (See Bulletin Tables 5 and 6)		
			N [1] (max 175 lbs/ac)[2]	P_2O_5 [2] Removed for the Given Unit Yield	K_2O [3] Removed for the Given Unit Yield
Pasture Grass Maintenance	2 Tons/Acre	255	-20,400 lbs/year	- 6,6,30 lbs/year	- 25,500 lbs/year
Pasture Grass Maintenance	3 Tons/Acre	67	-8,040 lbs/year	- 2,613 lbs/year	- 10,050 lbs/year
Pasture Grass Maintenance	4 Tons/Acre	580	-92, 800 lbs/year	- 30,160 lbs/year	- 116,000 lbs/year
TOTAL	**3,031 Tons**	**903**	**- 121,240 lbs/yr**	**- 39,403 lbs/yr**	**- 151,550 lbs/yr**

Calculations for Table 3.

[1] N Nutrient Needs =
40 lb/ton x 2 tons/acre/year x 255 acres
40 lb/ton x 3 tons/acre/year x 67 acres
40 lb/ton x 4 tons/acre/year x 580 acres

[2] P_2O_5 Nutrient Needs =
13 lb/ton x 2 tons/acre/year x 255 acres
13 lb/ton x 3 tons/acre/year x 67 acres
13 lb/ton x 4 tons/acre/year x 580 acres

[3] K_2O Nutrient Needs =
50 lb/ton x 2 tons/acre/year x 255 acres
50 lb/ton x 3 tons/acre/year x 67 acres
50 lb/ton x 4 tons/acre/year x 580 acres

Table 4. Comparison of Manure Nutrient Inputs and Nutrient Crop Needs

	N (max 175 lbs/ac)	P_2O_5	K_2O
Nutrient Available from Manure	42,550 lb/Yr	34,500 lb/Yr	47,725 lb/Yr
Crop Nutrient Needs/Removal See Table 3 above	- 121,240 lbs/yr	- 39,403 lbs/yr	- 151,550 lbs/yr
Whole Ranch Nutrient Balance (What is available from + Manure – Crop Needs)	**- 78,690 lb/Yr**	**- 4,903 lb/Yr**	**- 103,825 lb/Yr**

Based on the comparison provided in Table 4., under a fresh water irrigation regime the DVR is in a deficit for major nutrients, Nitrogen, Phosphorous and Potassium.

3. Determination of whether the input of manure may have an impact on the DVR nutrient balance under treated effluent irrigation application.

The only method by which to be absolutely sure what the nutrient balance impacts are, would be to irrigate with the Districts treated effluent with a know quantity of nutrients as an input, sample soils annually to determine assimilation of nutrients in the soils for grazed and ungrazed pastures. However, we have been asked to forecast what this management option might result in for this tech memo.

The scenario of treated effluent irrigation application with flood irrigation method and pasture grass and irrigating 15 days per month for eight months of the year gives us an idea of what the relative impacts may be.

Table 5. Comparison of Manure Nutrient Inputs and Treated Effluent Nutrient Inputs and Nutrient Crop Needs

Table 5 is the same as Table 4, however it includes the addition of nutrient Nitrogen as an input as added by the STPUD treated effluent.

	N (max 175 lbs/ac)	P_2O_5	K_2O
Nutrient Available from Manure	42,550 lb/Yr	34,500 lb/Yr	47,725 lb/Yr
Nutrient Available from Treated Effluent	79,320 lb/yr [1]		
Crop Nutrient Needs/Removal See Table 3 Above	- 121,240 lbs/yr	- 39,403 lbs/yr	- 151,550 lbs/yr
Whole Ranch Nutrient Balance (What is available from + Manure – Crop Needs)	**630 lb/Yr**	**- 4,903 lb/Yr**	**- 103,825 lb/Yr**

[1] 4.5 MGD x 17.6 mg N/l x 3.79 l/gal x 1 lb/454g x 1 g/1000mg = 661 lb N/day; 4.5 MGD avg daily discharge, from STPUD; 17.6 mg/l avg total N in HPR water, from STPUD; Remainder of terms are conversion factors. 661 lb N/day x 15d/mo x 8mo/yr = 79,320 lb N/yr

Based on the comparison provided in Table 5., under a treated effluent water irrigation regime the DVR is in a deficit for major nutrients Phosphorous and Potassium, and has a small excess of Nitrogen.

Table 6. Comparison of Treated Effluent Nutrient Inputs and Nutrient Crop Needs with out Livestock Grazing.

Table 6 is the same as Table 5, however the input of nutrients from manure have been removed (no grazing and irrigation with treated effluent.

	N (max 175 lbs/ac)	P_2O_5	K_2O
Nutrient Available from Treated Effluent	79,320 lb/yr [1]		
Crop Nutrient Needs/Removal	- 121,240 lbs/yr	- 39,403 lbs/yr	- 151,550 lbs/yr
Whole Ranch Nutrient Balance (What is available from + Manure – Crop Needs)	**- 41,920 lb/Yr**	**- 39,403 lbs/yr**	**- 151,550 lbs/yr**

[1] 4.5 MGD x 17.6 mg N/l x 3.79 l/gal x 1 lb/454g x 1 g/1000mg = 661 lb N/day; 4.5 MGD avg daily discharge, from STPUD; 17.6 mg/l avg total N in HPR water, from STPUD; Remainder of terms are conversion factors. 661 lb N/day x 15d/mo x 8mo/yr = 79,320 lb N/yr

Based on the comparison provided in Table 6., under a treated effluent water irrigation regime the DVR is in a deficit for major nutrients Nitrogen , Phosphorous and Potassium.

Summary:
Under a treated effluent irrigation regime, irrigating 15 days per month for 8 months, grass hay pasture, with livestock grazing the DVR (1000 head for 6 months) results in an estimated excess of available major nutrients Nitrogen , and has a deficit for Phosphorous and Potassium (Table 5).

	N (max 175 lbs/ac)	P_2O_5	K_2O
Whole Ranch Nutrient Balance (What is available from + Manure – Crop Needs)	**630 lb/Yr**	**- 4,903 lb/Yr**	**- 103,825 lb/Yr**

Under a treated effluent irrigation regime, irrigating 15 days per month for 8 months, grass hay pasture, with no livestock grazing the DVR results in an estimated deficit of all major nutrients Nitrogen, Phosphorous and Potassium (Table 6).

	N (max 175 lbs/ac)	P_2O_5	K_2O
Whole Ranch Nutrient Balance (What is available from + Manure – Crop Needs)	**- 41,920 lb/Yr**	**- 39,403 lbs/yr**	**- 151,550 lbs/yr**

These calculations have not been subjected to statistical accuracy, nor has the Nitrogen input from manure been verified.

Proposed Irrigable acres have been reviewed by the District in the Recommended Fields Technical Memo, February 4, 2009

Recommendations to be carried forward to the DVR NMP

The objective for this Tech Memo was to use available information and determine if livestock grazing nutrient inputs from manure would have an impact on the nutrient balance for the DVR under a treated effluent irrigation regime. This information will be useful to the District in their decision making process on whether to continue livestock grazing under a treated effluent irrigation regime.

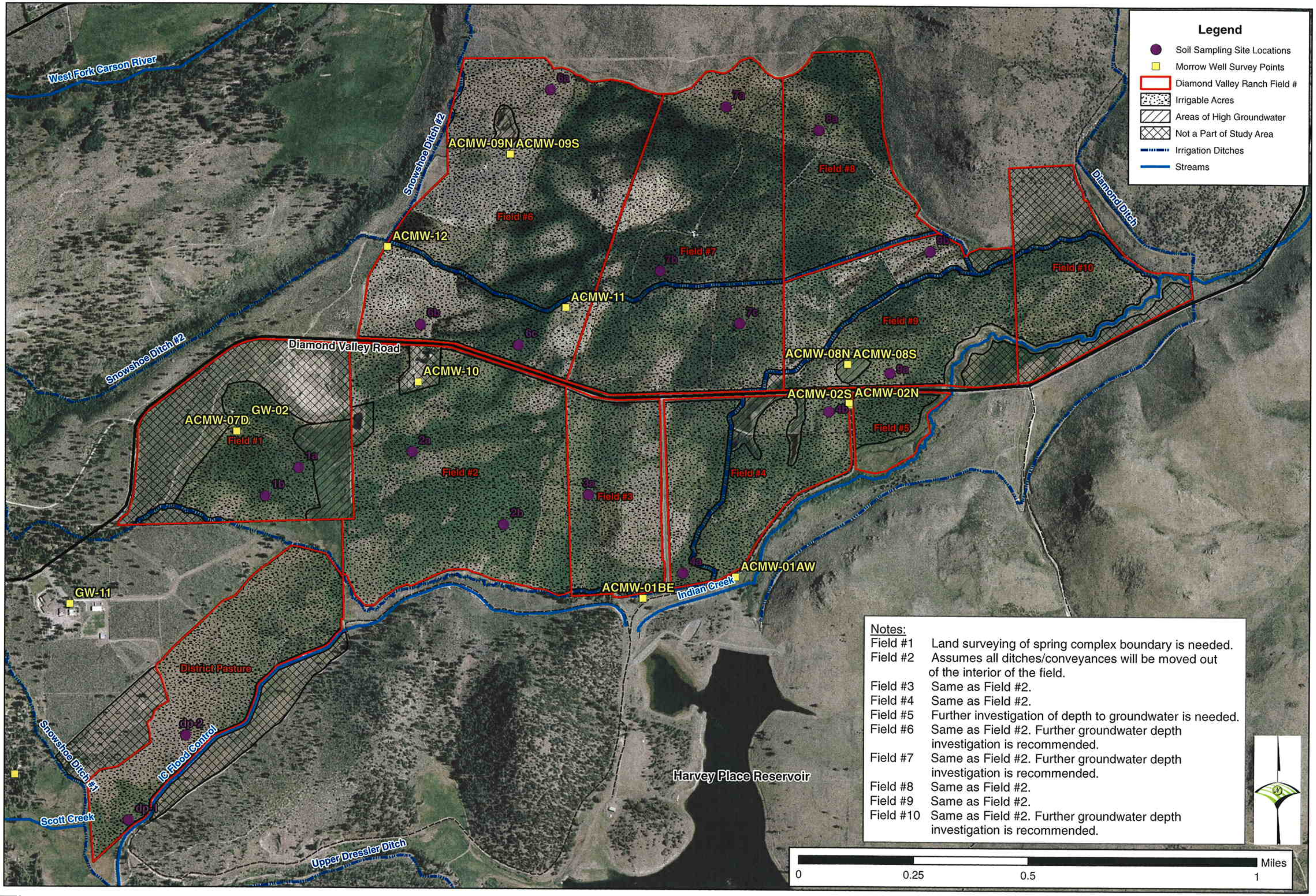
Grazing and treated effluent irrigation:
Nutrient input from manure will result in excess of available major nutrients Nitrogen and a deficit for Phosphorous and Potassium (Table 5).

Livestock grazing removes nutrients from the ranch through harvesting of the crop while also providing nutrient input (manure) to a system. Managed grazing of pasture hay also assists in maintaining the quality of the crop. If pasture grass is not grazed, it will become "wolfey" or decadent where the centers of the plants will begin to die out as the plants stagnate due to shading from growth not removed. This is very similar to what the layman observes when a landscaped lawn is not mowed.

Removal of grazing under treated effluent regime: Under a treated effluent irrigation regime, irrigating 15 days per month for 8 months, grass hay pasture, with no livestock grazing the DVR results in an estimated deficit of all major nutrients Nitrogen, Phosphorous and Potassium (Table 6).

Technical Memo Page 7

It is recommended that manure be analyzed at a statically accurate level to provide precise nutrient inputs before a decision is made regarding livestock grazing of pasture or any other crop that also provides grazing opportunities. In addition, calculations need to be verified by the District regarding times frames and type or irrigation chosen.



Notes:

Field #1	Land surveying of spring complex boundary is needed.
Field #2	Assumes all ditches/conveyances will be moved out of the interior of the field.
Field #3	Same as Field #2.
Field #4	Same as Field #2.
Field #5	Further investigation of depth to groundwater is needed.
Field #6	Same as Field #2. Further groundwater depth investigation is recommended.
Field #7	Same as Field #2. Further groundwater depth investigation is recommended.
Field #8	Same as Field #2.
Field #9	Same as Field #2.
Field #10	Same as Field #2. Further groundwater depth investigation is recommended.

Layer	Description
Imagery	ESRI
Transportation	South Tahoe PUD
Streams & Ditches	South Tahoe PUD

Date: February 2009
Scale: 1" : 1000'
Drawn By: CMK
Designed By: CMK
Checked By:

WOOD RODGERS
ENGINEERING · PLANNING · MAPPING · SURVEYING

Recommended Fields Tech Memo
Diamond Valley Ranch NMP
Proposed Irrigable Acres

PROJECT NO.
8361

Figure
1

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Attachment 1. Irrigable Area of the Diamond Valley Ranch and Estimated Production of Pasture Grass

Field	Total Field Area	Area of High Groundwater		Irrigable Area		Production
	Acres	Acres	% of Total Field Area	Acres	% of Total Field Area	Tons/Acre
District Pasture	80.8	0.0	0	78.8	97	2
Field #1	107.3	13.1	12	39.6	37	4
Field #2	153.3	0.0	0	144.8	94	4
Field #3	56.4	0.0	0	54.1	96	4
Field #4	78.2	6.4	8	67.9	87	4
Field #5	16.8	0.0	0	9.6	57	4
Field #6	184.1	2.4	1	176.5	96	2
Field #7	163.4	0.0	0	158.0	97	4
Field #8	69.8	0.0	0	67.3	96	3
Field #9	94.6	1.9	2	74.8	79	4
Field #10	67.0	0.0	0	31.7	47	4
			TOTAL ACRES	**902.9**		

Notes: 1. Buffer areas around streams, primary ditches, and the edge of the property are not represented in Table 2.
2. Areas designated as "Not a Part of Study Area" are not included in Table 2.
3. The areas provided in Table 2 were quantified in GIS.

Acres at 2 T/Ac	255.3
Acres at 3 T/Ac	67.3
Acres at 4 T/Ac	580.4
	902.9

APPENDIX 2
SUPPLEMENTAL INFORMATION

Xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL PROTECTION
BUREAU OF WATER POLLUTION CONTROL
Carson City Office
901 South Stewart Street, Suite 4001
Carson City, Nevada 89701
(775) 687-4670

http://www.ndep.gov

WTS-1B: GENERAL CRITERIA FOR PREPARING AN EFFLUENT MANAGEMENT PLAN

GENERAL NOTES:

The Nevada Division of Environmental Protection (NDEP) must be contacted whenever the use of reclaimed water is planned in order to determine the appropriate regulatory oversight requirements. NDEP shall also be available to assist the applicant in preparing the effluent management plan (EMP).

The Nevada Division of Water Resources (775) 687-4380 must be notified of the plan to use reclaimed water in order to address requirements for secondary water rights. Also, the Nevada State Health Division (775) 687-9521 should be consulted to ensure the use of reclaimed water is consistent all water supply protection requirements. Finally, please be aware that the local government and water purveyor may have rules on reclaimed water usage and should be consulted.

GUIDANCE INTRODUCTION:

Pursuant to NAC 445A.275.1(b), NDEP must issue a discharge permit for the use of reclaimed water. As part of this permitting process, NAC 445A.275.1(a) states that an EMP must be submitted and approved prior to the use of reclaimed water. This guidance was prepared to assist the permittee in preparing a satisfactory EMP. Please be aware that the extent of information and content for each individual EMP will vary for the different types of reclaimed water use, so not all portions of this guidance may apply to your particular EMP.

This guidance was organized to cover only existing usages of reclaimed water in Nevada. Items that the Division deems a requirement are so marked in the document and items that are simply recommendations are so marked. Information on any guidance referenced in WTS-1B may be gathered by contacting this Bureau.

Past guidance documents for reclaimed water use (WTS-1, WTS-9, and the outline format), are now effectively replaced by this guidance and WTS 1A (General Design Criteria for Reclaimed Water Irrigation Use). This Guidance is considered a dynamic document, and revisions may be made in the future as changes in reclaimed water usage regulations dictate.

Thanks is given to the Reuse Nevada Committee for their assistance in helping NDEP prepare this guidance.

The EMP is intended for use by the reuser (golf course superintendent, farmer, park maintenance worker, industrial worker, etc.) so it should be written in a user friendly format. The use of illustrative figures, maps, and tables throughout the EMP is highly recommended. The EMP should be bound in a loose leaf binder to facilitate updates. The date of printing for the EMP and all subsequent revisions must be shown on the title page of the EMP.

This document does not replace best professional judgement in reuse system management and NDEP reserves the right to require further information and review additional factors as needed.

TABLE OF CONTENTS

KEYWORDS

AIR GAP:

Generally, the safest method of back flow prevention control.
For this document, it is defined to be an unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe conveying potable water to the flood level rim of any container with treated effluent. The Uniform Plumbing Code details the requirements for Air Gaps and enforcement is the role of the local water purveyor and/or health authority.

BUFFER ZONE:

NAC 445A.076 defines a buffer zone to be the shortest distance between the boundary of the site being irrigated with reclaimed water and either; **one**, the property line boundary of the site; **two,** a posted public warning sign, or; **three**, any point where the property is open to public access, whichever is least. NAC 445a.276 lists the various buffer zones for spray irrigation sites based on reclaimer water quality and type of site being irrigated.

DMR: Discharge Monitoring Report. A table-formatted report where results from permit sampling and monitoring are recorded for submittal to NDEP.

COLIFORM:

Bacteria from feces of mammals which is used as an indicator of pathogenic organisms.

RECLAIMED WATER:

Domestic Wastewater that has been treated to secondary treatment standards and disinfected to levels necessary (per NAC 445A.276) for the chosen method of reuse. Other terms for this water include Treated Effluent, Reuse Water, and Recycled Water.

SAR : Sodium adsorption Ratio, a ratio determined from the concentration (milliequivalents/liter) of sodium, calcium, and magnesium in water. It is used as an indicator of potential soil problems.

$$\mathbf{SAR} = \frac{Na}{[(Ca + Mg)/2]^{1/2}}$$

A modification of this ratio, termed the adjusted SAR, considers the changes in calcium solubility in soil water. The procedure for determining this ratio is listed in <u>Wastewater Engineering Treatment, Disposal and Reuse. 1991.</u>

SOIL LEACHING:

Irrigation practice of applying water to soils in an effort to drive salts beyond the crop root zone. The rate is a function of crop salinity tolerance and salt level in irrigation water.

SPRAY IRRIGATION:

For purposes of this guidance, spray irrigation is categorized into three types; solid set (golf courses), move-stop (wheel lines), and constant move (center pivot) systems.

SURFACE IRRIGATION:

Surface irrigation is categorized as either flood irrigation or drip irrigation. Flood irrigation is further subdivided into ridge/furrow systems and graded borders.

GENERAL ITEMS FOR ALL EMP'S

REQUIREMENTS:

A. Overview of Project

A comprehensive overview of the reclaimed water application for the project. Outline the distribution system, application site, application method, and permit responsibilities. Use figures to illustrate the general system layout.

B. Staff Listing

A listing of supervisors and key responsible staff at the reuse site, including a description of their accompanying responsibilities. This list shall include each person's phone number, cell phone number, mailing address, and e-mail address (if available).

C. Discharge Permit

A complete copy of the active ground water discharge permit issued by this Division shall be inserted into the EMP.

D. Reuse Provider - User Agreement (If Applicable)

A copy (if applicable) of the reuse agreement between the reclaimed water supplier and the user/permit holder. This agreement should include an updatable copy of the reclaimed water quality analysis and special restrictions that may be in place on the reuse.

E. Communication Procedure

The communication procedure(s) between all parties involved in the transfer of reclaimed water, storage of reclaimed water, and use of reclaimed water shall be outlined in the EMP.

F. Hygiene

A brief document describing the proper hygiene of working with reclaimed water. This document should be written in English and any other languages deemed appropriate for the site. (Sample documents are provided in Appendix 4)

G. Reclaimed Water Run-Off Control Plan

1. Identification of areas where a release off the site may occur and how it will be detected (daily rounds, pressure readouts, etc.).

2. Steps that will be taken to control the release.

3. Phone numbers for key personnel involved in the release response plan and persons who are responsible for reporting the release to NDEP.

G. Reclaimed Water Run-Off Control Plan (continued)

4. Description of the permit requirements for reporting a release to NDEP. This includes notification by phone, at (775) 687-4670 as soon as the release is identified and controlled (within 24 hours). Also, a written report on the release (discharge) and the methods used to mitigate the release must be submitted to the NDEP within five days. This report shall list:

   i. the time and date of the discharge;
   ii. exact location and estimated amount of discharge;
   iii. flow path and bodies of water which the discharge reached;
   iv. the specific cause of the discharge; and
   v. the preventive and/or corrective actions taken.

H. Cross Connection and Back Flow Prevention (If applicable)

Summarize the cross connection control plan and back flow prevention plan that has been accepted by the Health Authority and/or water purveyor. Reference all figures that show these controls.

I. Discharge Monitoring Reports (DMR'S)

Outline of the procedure for completing the permit required DMR from field readings and laboratory data sheets. This section shall include a sample DMR to guide the reuser.

RECLAIMED WATER IRRIGATION - GENERAL ITEMS

A. Irrigation Plan

Provide a summary of the irrigation plan for the site(s). This summary shall detail the times of irrigation, the application rates, and flow measuring procedures. Critical focus shall be given to preventing run-off of reclaimed water from the site(s) and reducing reclaimed water ponding. For sites using automated or computer controlled irrigation systems, please include a brief description of how the system operates.

Depending upon the site type and physical location, several items that should be addressed in the irrigation plan are:

1. A plan to avoid irrigation during or just after significant precipitation events.

2. A plan to provide sufficient drying time for soils (after irrigation) before allowing animal grazing. It's recommended that the grazing periods be limited, to the best extent possible, to reduce soil compaction.

3. Plans to harvest crop(s) annually (if applicable).

4. A plan to prevent irrigation on frozen soils or saturated soils.

B. Site Maps

A detailed site map for the irrigation site(s). This map shall delineate the surrounding water courses, storm water controls, buffer zones (if applicable), prevailing wind direction, surrounding dwelling units, and any wells within 250 feet of the reuse site boundary.

C. Irrigation System

Schematic or scaled map of the reuse site that shows the conveyance system and components for the reclaimed water. This includes details on the location of control valves, drain valves, air gaps, flow meters, pumps, and other key components that the reuser will operate and maintain.

D. Ponds

Operation and maintenance plan for the reclaimed water storage ponds (if applicable). Items to address could include water level recording devices and storage volume estimates, algae control, odor control, reclaimed water transfer procedures, free board requirements, berm inspection, weed control, vector control , flow recirculation, notification signage, and mechanical aeration (Note: the generation of aerosols from aeration equipment should be minimized to limit drift).

E. Treatment Systems (if applicable)

The operation and maintenance plans for treatment units that may be required to meet permit limits are to be included in the EMP. This may include such units as sand filters, disinfection systems, or any chemical treatment systems.

F. Crop/Turf Management Plan

It is recommended that management plans addressing maintenance of a healthy crop be summarized in the manual. Items relevant to this pursuit include soil leaching practices, soil amendment applications, soil chemistry monitoring, and other specific procedures for the site's crop. Please contact the local agricultural agency for guidance.

G. Storm Water

Storm water control structure maintenance. This shall include a maintenance program for diversion berms, conveyance ditches, conduits, and pump systems (if applicable).

H. Sampling

Sampling plans required by the permit must be outlined in the EMP. The proper QA/QC for sample preservation, sample holding times, sample containers, and chain of custody

This includes the procedures for collecting a ground water sample from a monitoring well and (if applicable) collecting a reclaimed water samples. Groundwater sampling protocol guidance is available from the Division.

I. Water Balance

Completion of a water balance is required by reuse permits. The procedures for completing the water balance summary for the site(s) must be clearly outlined in the EMP. Completed worksheet “1-B” from Appendix One, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms. Blank worksheets should also be included. Sample forms are attached in Appendix One. Information from these worksheets can be used by the permittee in completing the Annual Report that is typically required to be submitted with the fourth quarter DMR.

J. Nitrogen Balance

Completion of a nitrogen balance is required by reuse permits if the total nitrogen in the effluent is greater than 10 mg/l total nitrogen. The procedures for computing the total amount of nitrogen applied to the site(s) must be clearly outlined in the EMP. This shall include the mass of nitrogen applied from the reclaimed water and fertilizers. Completed Worksheet “2-B” from Appendix Two, or a comparable form, should be included to present the design assumptions and to provide guidance for filling out subsequent reporting forms (Worksheet “2-C” and DMR forms). Blank worksheets should also be included. Sample forms are attached in Appendix Two. Information from these worksheets can be used by the permittee in completing the Annual Report which is typically required to be submitted with the fourth quarter DMR.

K. Signage

Any site using reclaimed water for irrigation or other uses shall post a notice warning the general public to avoid contact with the reclaimed water (NAC 445A.2752). Signage examples are included in Appendix Five for reference. Score cards at golf courses are one option for providing notification to the public that reclaimed water is being used for irrigation.

ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:

SPRAY IRRIGATION

A. Run-Off Containment Berms

Maintenance plan for containment berms that serve to prevent the surface flow of reclaimed water off the site boundary (NAC 445A.2754) if there is a significant line break or other failure. These berms are site specific requirements and therefore may not apply to your site.

B. Freezing Weather Protection

Depending upon the site location, necessary maintenance items to prevent freezing and damage to the distribution system should be included. Items to address are piping insulation, drains, or valve enclosures.

C. Drinking Water Fountain Protection and Food Serving Areas

Plans to cover or protect drinking water fountains or water stations located on the reuse site prior to the start of irrigation shall be included. Additionally, plans to shield areas where food is handled should be presented.

D. Buffer Zone Controls

Describe the required buffer zones for the quality of reclaimed water used (see table on next page). Also, list procedures for maintaining spray irrigation within these zones. The irrigation plan should control the drifting of aerosols beyond the buffer zones (NAC 445A.2754).

E. Irrigation Scheduling

Spray irrigation under Category B, C, and D criteria (see regulations) should be conducted during the nighttime hours at public areas (parks, golf courses, etc.) and the public shall be restricted from entering the site during the irrigation period.

Treated effluent irrigation for golf courses shall primarily take place during times after the course is closed and shall cease one hour before the course opens for play in the morning. The irrigation system can be operated briefly during daylight hours when golfers are not present or approaching provided the operator ensures that the public are not exposed to effluent spray or wet grass. Daytime irrigation system operation or hand watering shall be supervised at the site of irrigation by course personnel at all times.

Specific areas within the site that are first accessed (example: first few holes on golf course) by the public should be irrigated during the initial stages of the watering cycle to allow drying time before the public is permitted to enter.

F. Agricultural Irrigation

All irrigation shall ensure that the public is not exposed to effluent spray. Appropriate buffers shall be maintained according to Category of effluent used. All sites shall be fenced and posted.

G. Spray Irrigation with Reclaimed Water: Category B, C, D, and E

1. Plans to control public *access* to the irrigation site during times of reclaimed water application are required. Relevant items include fencing, adherence to the required buffer zones (if applicable), and notification of reclaimed water usage. The quality of reclaimed water will dictate the level of access controls (see Table next page) .

2. Plans to control public *contact* with reclaimed water at the site are required. Relevant items include prevention of ponded water, notification signage, irrigation scheduling (ex. night time irrigation), and notification of reclaimed water usage on scorecards, signage or other related documents available to the public. Quality of reclaimed water will dictate level of contact controls required (see Table next page).

Category B	Category C	Category D	Category E
Public Access is Controlled. Human contact with reclaimed water cannot reasonably be expected to occur.	Public Access is Controlled. Human contact with reclaimed water does not occur.	Public Access is prohibited during irrigation periods. No human contact due to site isolation.	Public Access is prohibited during irrigation periods. No human contact due to site isolation.
Areas covered in all categories, plus parks, playgrounds, commercial lawns, and residential lawns.	Golf courses, green belts, cemetery, and other areas	Pasture Lands, other agricultural uses	Pasture Lands, other agricultural uses
No Buffer Zone	**100 ft. Buffer Zone**	**400 ft. Buffer Zone**	**800 ft. Buffer Zone**
30 day Fecal Coliform Geometric Mean equal to or less than: 2.2 mpn (cfu)/100ml. Daily Max: 23 mpn (cfu)/100 ml	**30 day Fecal Coliform Geometric Mean equal to or less than: 23 mpn (cfu)/100ml. Daily Max: 240 mpn (cfu)/100 ml**	**30 day Fecal Coliform Geometric Mean equal to or less than: 200 mpn (cfu)/100ml. Daily Max: 400 mpn (cfu) /100ml**	**No Limit**

ADDITIONAL RECLAIMED WATER IRRIGATION ITEMS FOR:

SURFACE IRRIGATION

A. **FLOOD IRRIGATION**:

1. Irrigation Methodology

   Operational plan(s) for flow distribution. Relevant items to address include promoting even spreading of reclaimed water over the site(s), reducing soil erosion at the distribution points, and operation of the tailwater recovery system operation (if applicable).

2. Containment Berms and Detention Areas

   A maintenance plan and inspection schedule for containment berms and detention areas (NAC 445A.2754) that are in place to prevent the run-off of the reclaimed water from the site(s) is required.

B. **DRIP IRRIGATION**

1. Irrigation Methodology

   Operational plan for flow distribution. Relevant items include site inspections (checking for line breaks, etc.) and emitter line maintenance (clogging controls).

C. **SUBSURFACE IRRIGATION**

The operation of the subsurface irrigation system shall be such that no surfacing or ponding of treated effluent occurs. All piping and control valves shall be properly identified as reclaimed water appurtenances (purple coloring, reclaimed water wording, etc.).

Specific tasks for freezing protection shall be conducted as needed.

CONSTRUCTION USAGE

A. DUST CONTROL

1. Fecal Coliform Levels

   The typical minimum fecal coliform limits for this application are 200mpn (cfu)/100 ml for the 30 day geometric mean and 400 mpn (cfu)/100 ml for a daily maximum.

2. Application Items

   Plans for controlling the application rate shall address the prevention of ponded reclaimed water. Also, a plan to control the generation of aerosols and the migration of aerosols from the site(s) should be developed. Methods to prevent the application of reclaimed water near water courses (rivers, streams, and lakes) must be presented.

3. Reclaimed Water Dust Control Trucks

   Tank trucks and other equipment that hold reclaimed water shall be properly identified with notification signs. **Tank trucks that carry reclaimed water shall not be used to carry potable water**. It is recommended that the tanks be cleaned and disinfected after the project is complete. Please consult the State or local health authority on rules that may be in place for this criteria

INDUSTRIAL USAGE

A. **COOLING WATER**

1. Fecal Coliform Level

   The typical minimum fecal coliform limits for this application are 2.2 mpn (cfu)/ 100 ml for a 30 day geometric mean and 23 mpn (cfu)/100 ml for a daily maximum. .

2. Application Items

   List operational controls to reduce aerosol drift.

   NDEP recommends that facilities institute operational methods for treatment (lime addition, alum, etc.) to handle scaling, corrosion, fouling, and biological growth throughout the system. This will help reduce line clogging and other system problems. Also, if algae growth is a concern, chlorine can be used to control algae growth provided the water is not discharged to a water course. This should also help reduce the formation of Legionella.

OTHER USES OF RECLAIMED WATER

A. Site specific management plans for the use of reclaimed water will be considered on a case by case basis with appropriate controls and requirements determined by the NDEP.

WTS-1B: APPENDIX ONE

PLANT CONSUMPTIVE USE WORKSHEET

The consumptive use equation for determining the crop's water requirement takes into account precipitation, evapotranspiration, the efficiency of the irrigation system, and the salt tolerance of the plant species. The salt tolerance of the plant species is used to calculate the leaching requirement (Lr) to remove excess salts from the root zone. Excess salts within the soil cause the plant cells to expend more energy adjusting the salt concentration within the plant tissues, and therefore, less energy is available for vigorous plant growth. The hydraulic loading rate and the TDS to ECw conversion equation included below are derived from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991), the equation for the leaching requirement is from the Nevada Irrigation Guide, (USDA, Soil Conservation Service, 1981).

$$Lw_{(c)} = \frac{(ET-P)}{[E \times (1-Lr)]} \qquad Lr = \frac{ECw}{[(5 \times ECe)-ECw]}$$

where:

- $Lw_{(c)}$ = Allowable Hydraulic Loading Rate Based on Crop Water Needs (in/yr);
- ET = Evapotranspiration Rate (in/yr);
- P = Precipitation Rate (in/yr);
- Lr = Leaching Requirement (%, expressed as a fraction);
- E = Efficiency of Irrigation System (%, expressed as a fraction) For example: 75% = 75/100 = 0.75; example efficiencies are included below;
- ECe = Salinity Tolerance of Plant Crop (mmho/cm or dS/m)(1);
- ECw = Salinity of Applied Effluent (mmho/cm); If TDS is supplied by the laboratory, see conversion below; and
- TDS = Average Total Dissolved Solids in Applied Effluent (mg/l).

"ET" - Evapotranspiration

Evapotranspiration is defined as the "loss of water from the soil both by evaporation and by transpiration from the plants growing thereon" (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

"E" - Irrigation Efficiency
The irrigation system efficiency is related to how effective the method is in delivering the irrigation water equally to all parts of the crop. Example values for efficiency are[4]:

Sprinkler Irrigation Type	**Application Efficiency**	**Surface Irrigation Type**	**Application Efficiency**
Solid Set	0.70 - 0.80	Narrow Graded Border (< 15' wide)	0.65 - 0.85
Portable Hand Move		Wide Graded Border (<100' wide)	0.65 - 0.85
Wheel Roll		Level Border	0.75 - 0.90
Center Pivot or Traveling Lateral		Straight or Graded Contour Furrows	0.70 - 0.85
Traveling Gun		Drip	0.70 - 0.85

"ECe" - Salinity Tolerance of Plant Crop
The plant salt tolerance is crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. The low end of the range identifies the ECe value which would result in a 0% reduction of crop yield. The upper end of the range identifies the ECe value which could result in a 25% reduction of crop yield[4].

Example ECe's:
- Annual Ryegrass[2] = 3 to 6 mmho/cm or dS/m
- Perennial Ryegrass[2,4] = 5.6 to 8.9 mmho/cm or dS/m
- Bermudagrass[2,4] = 6.9 to 10.8 mmho/cm or dS/m
- Tall Fescue[2,4] = 3.9 to 8.6 mmho/cm or dS/m
- Alfalfa[3,4] = 2.0 to 5.4 mmho/cm or dS/m

"ECw" - Salinity of Applied Effluent
Direct measurement of ECw is typically preferred. However, if the laboratory has supplied the reuser with a concentration of TDS, an approximate conversion[4] is $ECw \approx TDS \div 640$. This conversion is considered accurate within 10%. The value for ECw or TDS is obtained from the treatment plant supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports should be used.

(1) For clairty in this document, the unit for electrical conductivity (EC) is expressed as mmho/cm. However, EC can also be expressed in decisiemens per meter, dS/m.
1 mmho/cm = 1 dS/m
(2) Wastewater Reuse for Golf Course Irrigation, US Golf Association, 1994.
(3) Nevada Irrigation Guide, USDA Soil Conservation Service, 1981.
(4) Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

Worksheet 1-A

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = ____________________

$Lw_{(c)} = \dfrac{(ET-P)}{[E \times (1-Lr)]}$; $Lr = \dfrac{ECw}{[(5 \times ECe)-ECw]}$; $ECw \approx TDS \div 640$

(A) Annual Evapotranspiration (ET, in/yr) = ____________
(Multiply by Crop Coefficient (Kc) if value is known)

(B) Annual Precipitation (P, in/yr) = ____________

(C) (A) - (B) = ____________ (in/yr)

(D) Salinity of Applied Effluent (ECw, mmho/cm) or ≈ (TDS, mg/l) ÷ 640 = ____________
(Indicate which method was used to determine ECw, Direct Measurement or Approximation by Calculation.)

(E) Salinity Tolerance of Plant Crop (ECe, mmho/cm) = ____________

(F) 5 x (E) = ____________ (mmho/cm)

(G) (F) - (D) = ____________ (mmho/cm)

(H) Leaching Requirement (Lr, %, expressed as a fraction) = (D) ÷ (G) = ____________

(I) 1 - (H) = ____________

(J) Efficiency of Irrigation System (E, %, expressed as a fraction) = ____________

(K) (J) x (I) = ____________

(L) (C) ÷ (K) = $Lw_{(c)}$ = ____________ (inches/year)

If the water use rate calculated in (“L”) above is the lowest application volume calculated between the annual Consumptive Use Limit (This Worksheet) and the Nitrogen Limit (Worksheet 2-A), then fill out Worksheet 1-B to estimate the planned maximum daily flow for the site.

Worksheet 1-B

CONSUMPTIVE USE REQUIREMENT WORKSHEET:
Maximum Loading Rate Based on Plant Water Use Requirements

Page _____ of _____ Crop Type = ____________________

$Lw_{(c)} = \dfrac{(ET-P)}{[E \times (1-Lr)]}$; $Lr = \dfrac{ECw}{[(5 \times ECe)-ECw]}$; $ECw \approx TDS \div 640$

Monthly values for evapotranspiration are dependent on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable source. Please see the explanation in the "WTS-1B: Appendix One" text for futher discussion of crop coefficients.

To calculate the monthly value for $Lw_{(c)}$, perform the calculation for each month as outlined in Worksheet 1-A, and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Million Gals/Mo = $Lw_{(c)}$ in/mo x ________ ac ÷ 12 in/ft x 43,560 ft^2/ac x 7.481 gals/ft^3 ÷ 1,000,000
(Enter and use the number of acres for the crop type being irrigated)

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

Month	**Days/Mo**	**ET (in/mo)**	**P (in/mo)**	**$Lw_{(c)}$ (in/mo)**	**M Gals/Mo**	**MGD**
Jan	31					
Feb	28					
Mar	31					
Apr	30					
May	31					
Jun	30					
Jul	31					
Aug	31					
Sep	30					
Oct	31					
Nov	30					
Dec	31					
Totals (in/yr):					Note: These totals should approximate the annual values calculated in Worksheet 1-A	

WTS-1B: APPENDIX TWO

NITROGEN LOADING LIMIT WORKSHEET

The nitrogen loading equation takes into account precipitation, evapotranspiration, plant nitrogen uptake, nitrogen content of the applied effluent, nitrogen denitrification and volitilization in the soils, and allowable percolate nitrogen concentration. The equation included below is from Wastewater Engineering: Treatment, Disposal, and Reuse, (Metcalf and Eddy, 1991)

$$Lw_{(n)} = \frac{[(Cp, mg/l) \times (P\text{-}ET, in/yr)] + [(U, lb/acre\text{-}yr) \times (4.4)]}{[(1\text{-}f) \times (Cn, mg/l)] - (Cp, mg/l)}$$

where:

- $Lw_{(n)}$ = Allowable Hydraulic Loading Rate Based on Nitrogen Loading rate (in/yr);
- Cp = Total Nitrogen Concentration in Percolating Water (mg/l);
- ET = Evapotranspiration Rate (in/yr);
- P = Precipitation Rate (in/yr);
- U = Nitrogen Uptake Rate by Crop (lb/acre-yr);
- 4.4 = Combined Conversion Factor;
- Cn = Total Nitrogen Concentration in Applied Wastewater (mg/l); and
- f = Fraction of Applied Total Nitrogen Removed by Denitrification and Volatilization.

“Cp” - Nitrogen in Percolating Water

A conservative value for Total N in the water that percolates past the root zone (Cp) is 7 mg/l, which is the first “red flag” value for Nitrate as N in monitoring well samples. Setting the Cp limit at a constant value aids in obtaining an hydraulic nitrogen loading rate ($Lw_{(n)}$) which should be protective of groundwater resources. The drinking water standard for Nitrate as N is 10 mg/l, which would be the maximum allowable value for Cp.

“ET” - Evapotranspiration

Evapotranspiration is defined as the “loss of water from the soil both by evaporation and by transpiration from the plants growing thereon” (Websters Dictionary, 1990). Since different plants transpire at different rates, a crop coefficient (Kc) can be used to modify the potential ET for a particular area. Values for Kc vary depending upon the geographical location of the crop, and the species grown. If a crop coefficient can be determined, when multiplied by the potential ET rate, the result is a more accurate estimate of ET for an irrigation site. The Division recommends that reusers contact local agriculture representatives identified in Appendix Five for further crop-specific and regional information.

“U” - Crop Nitrogen Uptake

Plant nitrogen uptake rates (U) are crop-specific, and can be obtained from the local Extension Service, literature, or other reputable sources. Using the accepted value for U in this equation assumes that the harvested portion of the crop is removed from the site. If plant cuttings are not removed from the area, then the amount of nitrogen removed by uptake should be offset by the amout of nitrogen returned to the soil by decomposing cutting materials. If alfalfa, or another legume, is the site’s crop, then similar considerations should be made for atmospheric nitrogen which is fixed into the soil by alfalfa. A discussion with the local agricultural extension service is recommended prior to finalizing a “U” value.

"Cn" - Nitrogen in Applied Wastewater
The total nitrogen in the applied effluent water (Cn) can be obtained from the treatment plant that is supplying the effluent. For site design, an average value can be used. For completion of the required annual balance report, the actual analytical results from Discharge Monitoring Reports shall be used.

"f" - Nitrogen lost to Denitrification and Volatilization
The amount of nitrogen lost to denitrification and volatilization varies depending upon the nitrogen characteristics of the applied wastewater and the microbial activity in the soil. Microbial denitrification, in soils with a sufficient carbon source for the biological activity, may account for as much as 15 to 25 percent of the applied nitrogen during warm, biologically active months. Volatilization of ammonia may be as much as 10 percent, depending upon the ammonia fraction in the total nitrogen applied. (Metcalf & Eddy, 1991) For arid climates, such as Nevada, the value typically used for the "f" term is 0.2.

Nitrogen Addition by Chemical Fertilizers
If the allowable reuse water application volume is limited by plant consumptive use (Worksheet 1-A), nitrogen may need to be added by commercial fertilizer. In the design of a reuse site, and preparation of an EMP, this should be estimated to provide the site operator with a guideline for fertilizer application, in addition to the nitrogen being applied via the treated effluent. **The application of fertilizer must then be incorporated into the required annual report to demonstrate that the application of commercial nitrogen and effluent nitrogen did not exceed the plant crop's uptake rate.**

Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage. Reuse permits require that the annual evaluation of the effluent application include, "the total nitrogen in the applied wastewater, nitrogen from fertilizer applications, nitrogen uptake by plant materials, evapotranspiration rate, precipitation rate, and fraction of applied nitrogen removed by denitrification and volatilization." While Worksheet 2-C does not take precipitation and evapotranspiration into account, the permittee should compare each year's P and ET rates to those that were used during the site design and EMP preparation phases to ensure that the original assumptions remain valid.

Worksheet 2-C can also be utilized as a site management tool to *estimate* the amount of commercial fertilizer which may be required in an upcoming month. However, use of the worksheet in this manner does not preclude the responsible use of good irrigation and nutrient management practices.

Worksheet 2-A

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____ Crop Type = ____________________

$$Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}$$

(A) Total Nitrogen in Percolating Water (Cp, mg/l) = ____________

(B) Annual Precipitation (P, in/yr) = ____________

(C) Annual Evapotranspiration (ET, in/yr) = ____________
(Multiply by Crop Coefficient (Kc) if value is known)

(D) (B) - (C) = ___-_________ (in/yr) (Note: In Nevada, P is less that ET; therefore a negative number is correct to use in this worksheet.)

(E) (A) x (D) = ____________

(F) Crop Nitrogen Uptake (U, lb/ac-yr) = ____________

(G) (F) x 4.4 = ____________

(H) (E) + (G) = ____________

(I) Fraction of Applied Total Nitrogen Lost to Denitrification and Volatilization (f) = ______

(J) 1- (I) = ____________

(K) Total Nitrogen in Applied Effluent (Cn, mg/l) = ____________

(L) (J) x (K) = ____________

(M) (L) - (A) = ____________

(N) (H) ÷ (M) = $Lw_{(n)}$ (inches/year) = ____________

If the Water Use Rate calculated in ("N") above is the lowest application volume calculated for the annual Consumptive Use Limit (Worksheet 1-A) or the Nitrogen Limit (This Worksheet), then fill out Worksheet 2-B to estimate the planned maximum daily flow for the site.

Worksheet 2-B

WATER REQUIREMENT DESIGN WORKSHEET:
Maximum Hydraulic Loading Rate Based On Annual Nitrogen Balance Evaluation

Page _____ of _____ Crop Type = _________________

$$Lw_{(n)} = \frac{[Cp \times (P-ET)] + (U \times 4.4)}{[(1-f) \times Cn] - Cp}$$

Monthly values for evapotranspiration are dependant on the crop type and regional area of the site, as well as the crop coefficient if known. Monthly precipitation is also regional. The values for ET and P can be obtained from the local extension service, literature, or other reputable sources. Please see the explanation in the "WTS-1B: Appendix Two" text for futher discussion of crop coefficients.

The monthly value of the crop nitrogen uptake (U) can be calculated according to the equation included on the Table. Please see the discussion in the "WTS-1B: Appendix Two" text regarding "U" values for alfalfa crops or sites that do not remove crop cuttings. If a different distribution of monthly "U" is used, due to circumstances such as germination or dormancy periods, then provide documentation explaining the difference.

To calculate the monthly value for $Lw_{(n)}$, perform the calculation for each month as outlined in Worksheet 2-A, using the monthly values for "U", "P", "ET", and "Cn", and input the result in the table below. Since this form is crop-specific, a value of zero is acceptable when the crop is not in season; however, use of a zero should be explained.

Monthly U (lb/ac-mo) = U (lb/ac-yr) x ET(in/mo) ÷ ET (total in/yr)

Million Gallons = $Lw_{(c)}$ in/mo x ________ # acres ÷ 12 in/ft x 43,560 ft^2/ac x 7.481 gallons/ft^3 ÷ 1,000,000
Per Month (ea. crop type)

MGD (Million gallons/day) = M Gallons/mo ÷ Days/mo

Month	**Days/Mo**	**P (in/mo)**	**ET (in/mo)**	**U (lb/ac-mo)**	**$Lw_{(n)}$ (in/mo)**	**M Gals/Mo**	**MGD of Reclm'd Water**
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
	Totals:					Note: The totals for P, ET and $Lw_{(n)}$ should approximate the annual values used or calculated in Worksheet 2-A	

Worksheet 2-C: *Regardless of the limiting hydraulic loading rate that was defined during the design phase, Worksheet 2-C is designed to be used to provide the Division with the required annual report of effluent and fertilizer usage.*

Effluent N Applied = ______________ x ______________ (mg/l) x 8.34 x ____________ ÷ _________ x
(lb/ac-mo) MGD Applied Effluent N Conc. # days/mo # Acres (1 -"f") (i.e. 0.2.)

Fertilizer N Applied = ________ Monthly Fertilizer used (lbs/mo) x ________ % N in Fertilizer (as a fraction) ÷ ________ acres
(lb/ac-mo)

Crop Name and Nitrogen Uptake Requirement = ________________ , ____________ (lbs/ac-yr)

Month	**Days/Mo**	**Million Gallons Applied (mo)**	**MGD of Irrigation Water Applied**	**Effluent N Concentration (mg/l)**	**Effluent N Applied (lb/ac-mo)**	**Fertilizer N Applied (lb/ac-mo)**	**Total N Applied (Effl. N + Fert. N) (lb/ac-mo)**
Jan	31						
Feb	28/29						
Mar	31						
Apr	30						
May	31						
Jun	30						
Jul	31						
Aug	31						
Sep	30						
Oct	31						
Nov	30						
Dec	31						
						Total** =	

** The Total N Applied to the crop should be less than the crop's Nitrogen Uptake Requirement. Please see your permit for directions if it is not.

APPENDIX THREE

WORKER HYGIENE FACT SHEETS

This project area uses reclaimed wastewater for irrigation. This reclaimed wastewater comes from the sewage treatment plant and meets the standards required for this level of reuse. Potential risks of disease transmission from the use of the reclaimed water is low, however, some general guidelines (listed below), should be followed protect you from becoming ill when working with reclaimed water:

1. Do not drink the reclaimed water or use the reclaimed water for washing.

2. Always wash hands and face with clean water and soap before eating, smoking, or drinking.

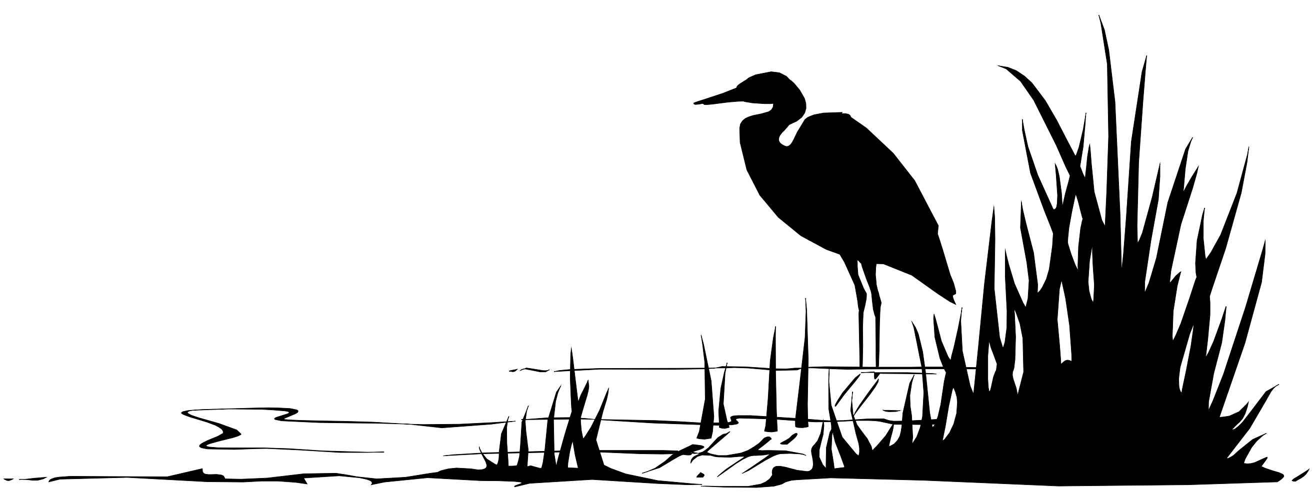
3. Wear rubber gloves when working on the irrigation system.

4. Try to keep the irrigation water off your skin and clothes as much as possible.

5. Always treat cuts immediately before continuing with work on the irrigation system.

6. Make sure the area is clear of people that may get sprayed before running the irrigation system.

7. Report any problems to your supervisor that you feel could pose a risk.

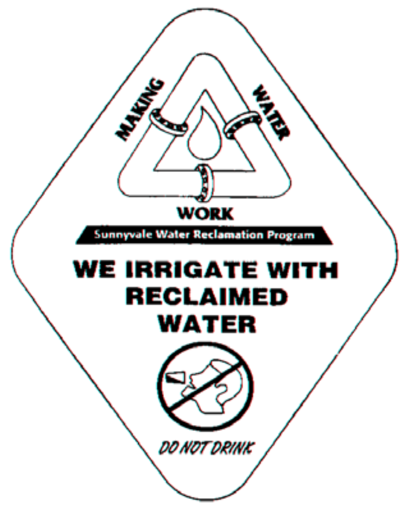


APPENDIX FOUR

PUBLIC NOTIFICATION SIGN EXAMPLES

IRRIGATION SIGN

Figure 4.3



IRRIGATION SIGN

Figure 4.4

IRRIGATION SIGN

Figure 4.5

APPENDIX FIVE

REUSE REFERENCE LISTS

Literature References For Reclaimed Water Use Management

1. "Guidelines for Using Disinfected Recycled Water", Awwa California-Nevada Section, 1997 & 1984.

2. "Guidelines for Water Reuse", U S Environmental Protection Agency, 1992 and 2004.

3. "Land Treatment of Municipal Wastewater", U S Environmental Protection Agency, 1981.

4. "Nevada Irrigation Guide", US Department of Agriculture, Soil Conservation Service, 1981.

5. <u>Wastewater Reuse For Golf Course Irrigation</u>, US Golf Association, 1994, Lewis Publishers.

6. <u>Water Reuse Manual of Practice</u>, Water Environment Federation 1989.

7. <u>Wastewater Engineering Treatment, Disposal and Reuse</u>, Metcalf & Eddy, 1991, Mcgraw-hill Publishers.

8. <u>Irrigation with Reclaimed Municipal Wastewater- A guidance manual</u>. G.S. Pettygrove and T. Asano, 1985, Lewis Publishers.

Contacts for Technical and Regulatory Guidance

1. **Nevada Division of Environmental Protection, Bureau of Water Pollution Control**
   901 South Stewart Street, Suite 4001, Carson City, NV, 89701 ....(775) 687-4670

2. **Nevada Divsion of Water Resources**
   901 South Stewart Street, Carson City, NV 89701....................................(775) 687-4380

3. **Nevada Division of Health**
   901 South Stewart Street, Carson City, NV 89701 ....(775) 687-9521

4. **Desert Research Institute**
   7010 Dandini Boulevard, Reno, NV 89506...(775) 673-7300

5. **Natural Resource Conservation Service (NRCS)**
   1528 U.S. Highway 395, Minden, NV 89410...(775) 883-2623

   5301 Longley Lane, Building F, Room 201, Reno, NV 89511 ....(775) 784-5875

6. **University of Nevada Cooperative Extension**
   2345 Redrock Street, Suite 100, Las Vegas, NV 89146-3160 ....(702) 222-3130

7. **U.S. Agriculture Department**
   920 Valley Road, Reno, NV 89512 ....(775) 784-6057

8. **Center for Urban Water Conservation - UNLV Dept. of Biology**
   Las Vegas, Nevada 89157-4004 ....(702) 895-3853

APPENDIX SIX

NEVADA ADMINISTRATIVE CODE - REUSE REGULATIONS

Use of Treated Effluent for Irrigation

Use of Treated Effluent

NAC 445A.274 Definitions. (NRS 445A.425**)** As used in NAC 445A.274 to 445A.280, inclusive, unless the context otherwise requires, the words and terms defined in NAC 445A.2741 to 445A.2748, inclusive, have the meanings ascribed to them in those sections.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2741 "Area of use" defined. (NRS 445A.425**)** "Area of use" means a site, or an area of land, where treated effluent is in use pursuant to NAC 445A.274 to 445A.280, inclusive.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2742 "Buffer zone" defined. (NRS 445A.425**)** "Buffer zone" means a bounded area adjacent to, and surrounding, an area of use, that is subject to the provisions of NAC 445A.2756.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2743 "Graywater" defined. (NRS 445A.425**)** "Graywater" has the meaning ascribed to it in NAC 444.7616.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2744 "Impoundment" defined. (NRS 445A.425**)** "Impoundment" means a lake, reservoir or lined holding basin.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2745 "Spray irrigation" defined. (NRS 445A.425**)** "Spray irrigation" means irrigation using sprinklers that are located above the ground surface.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2746 "Subsurface irrigation" defined. (NRS 445A.425**)** "Subsurface irrigation" means irrigation using an underground distribution system.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2747 "Surface irrigation" defined. (NRS 445A.425**)** "Surface irrigation" means irrigation using a flood irrigation system or a drip irrigation system. The term does not include spray irrigation.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2748 "Treated effluent" defined. (NRS 445A.425**)** "Treated effluent" means sewage that has been treated by a physical, biological or chemical process. The term does not include graywater.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2749 Limitation on meaning of "agricultural purposes." (NRS 445A.425**)** For the purposes of NAC 445A.274 to 445A.280, inclusive, the term "agricultural purposes" does not include the growing of crops for human consumption.
(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.275 General requirements and restrictions. (NRS 445A.425)

1. A person shall not use treated effluent unless:

(a) The person has:

(1) Received the approval of the Division of a plan for the management of effluent; and

(2) Obtained a permit pursuant to NAC 445A.228 to 445A.263, inclusive; and

(b) The treated effluent has received at least secondary treatment.

2. As used in this section:

(a) "Five-day inhibited biochemical oxygen demand" means the amount of dissolved oxygen required to stabilize the carbonaceous decomposable organic matter by aerobic bacterial action at 20 degrees centigrade for 5 days.

(b) "Plan for the management of effluent" means:

(1) An effluent management plan; or

(2) A site specific management plan.

(c) "Secondary treatment" means the treatment of sewage until the sewage has, calculated as a 30-day average:

(1) A 5-day inhibited biochemical oxygen demand concentration of 30 milligrams per liter or less;

(2) A total suspended solids concentration of 30 milligrams per liter or less; and

(3) A pH of 6.0 to 9.0 SU.

(Added to NAC by Environmental Comm'n, eff. 9-13-91; A by R063-04, 10-6-2004)

NAC 445A.2752 Signs: Required placement and contents. (NRS 445A.425)

1. A person using treated effluent shall post signs along the outer perimeter of the:

(a) Area of use; and

(b) Buffer zone, if any.

2. The signs must provide reasonable notice to the general public that:

(a) Treated effluent is in use; and

(b) Contact with the effluent should be avoided.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2754 Irrigation: Requirements and restrictions. (NRS 445A.425)

1. A person using treated effluent for irrigation shall not:

(a) Allow the effluent to run off the site being irrigated.

(b) Except as otherwise provided in NAC 445A.2768, use treated effluent to irrigate crops intended for human consumption.

2. A person using treated effluent for spray irrigation shall conduct the irrigation in a manner that inhibits the treated effluent spray from drifting beyond the area of use or the buffer zone, if any.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2756 Buffer zones: Size; boundaries; restriction. (NRS 445A.425)

1. Except as otherwise provided in NAC 445A.2766, 445A.2768 and 445A.2771, the Division will establish the size of a buffer zone.

2. The inner boundary of a buffer zone is determined by measuring a distance equal to the size of the buffer zone from:

(a) A boundary line of the property on which the site is located;

(b) A sign posted pursuant to NAC 445A.2752 informing the public of the presence of treated effluent; or

(c) Any point where the property is open to public access, as determined by the Division.

3. Except as otherwise provided in NAC 445A.2754, a buffer zone must be kept free of treated effluent.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.276 Reuse categories: Requirements for bacteriological quality of effluent. (NRS 445A.425)

1. Treated effluent being used for an activity approved for a reuse category must meet the following requirements for bacteriological quality for that category:

	Total Coliform	Fecal Coliform			
	c.f.u. or mpn/100 ml	c.f.u. or mpn/100ml			
Reuse Category	A	B	C	D	E
30-day geometric mean	2.2	2.2	23	200	No Limit
Maximum daily number	23	23	240	400	No Limit

2. As used in this section, "c.f.u. or mpn/100ml" means colony forming units or most probable number per 100 milliliters of the treated effluent.

(Added to NAC by Environmental Comm'n, eff. 9-13-91; A by R063-04, 10-6-2004)

NAC 445A.2762 Reuse category A: Approved uses. (NRS 445A.425) Treated effluent that meets the requirements for bacteriological quality set forth in NAC 445A.276 for reuse category A may be used for:

1. Spray irrigation of land used as a cemetery, commercial lawn, golf course, greenbelt or park even if:

(a) Public access to the area of use is not controlled; and

(b) Human contact with the treated effluent can reasonably be expected to occur.

2. An impoundment in which swimming is prohibited even if:

(a) Public access to the impoundment is not controlled; and

(b) Human contact with the treated effluent can reasonably be expected to occur.

3. Any activity approved for reuse category B, C, D or E.

4. Any other use that is approved by the Division.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2764 Reuse category B: Approved uses. (NRS 445A.425) Treated effluent that meets the requirements for bacteriological quality set forth in NAC 445A.276 for reuse category B may be used for:

1. Spray irrigation of land used as a cemetery, commercial lawn, golf course, greenbelt or park if:

(a) Public access to the area of use is controlled; and

(b) Human contact with the treated effluent cannot reasonably be expected to occur.

2. Subsurface irrigation of land used as a commercial lawn, greenbelt or park.

3. Cooling water in an industrial process.

4. Fire-fighting operations in an urban area if approved by the fire department, fire protection district or other fire-fighting agency in whose district the fire occurs.

5. Any activity approved for reuse category C, D or E.

6. Any other use that is approved by the Division.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2766 Reuse category C: Approved uses. (NRS 445A.425)

1. Treated effluent that meets the requirements for bacteriological quality set forth in NAC 445A.276 for reuse category C may be used for:

(a) Spray irrigation of land used as a cemetery, golf course or greenbelt if:

(1) Public access to the area of use is controlled;

(2) Human contact with the treated effluent does not occur; and

(3) A buffer zone of not less than 100 feet is maintained.

(b) Watering of nursery stock if public access to the area of use is controlled.

(c) Establishment, restoration or maintenance of a wetland if public access to the wetland is controlled.

(d) Washing of gravel used in concrete mixing.

(e) Feed water for a boiler.

(f) An impoundment if:

(1) Public access to the impoundment is controlled; and

(2) Human contact with the treated effluent cannot reasonably be expected to occur.

(g) Fire fighting of forest or other wildland fires if approved by the fire department, fire protection district or other fire-fighting agency in whose district the fire occurs.

(h) Any activity approved for reuse category D or E.

(i) Any other use that is approved by the Division.

2. As used in this section:

(a) "Nursery stock" has the meaning ascribed to it in NRS 555.23562.

(b) "Wetland" has the meaning ascribed to it in NRS 244.388.

(Added to NAC by Environmental Comm'n by R063-04, eff. 10-6-2004)

NAC 445A.2768 Reuse category D: Approved uses. (NRS 445A.425)

1. Treated effluent that meets the requirements for bacteriological quality set forth in NAC 445A.276 for reuse category D may be used for:

(a) Spray irrigation of land used for agricultural purposes if:

(1) Public access to the area of use is prohibited; and

(2) A buffer zone of not less than 400 feet is maintained.

(b) Surface irrigation of land used:

(1) As greenbelt if:

(I) Public access to the area of use is prohibited; and

(II) Human contact with the treated effluent does not occur.

(2) For agricultural purposes; and

(3) For the cultivation of fruit-bearing trees or nut-bearing trees.

(c) Subsurface irrigation of land used for agricultural purposes if public access is controlled.

(d) Dust control.

(e) Soil compaction.

(f) Flushing sewer lines.

(g) An impoundment if:

(1) Public access to the impoundment is prohibited;

(2) All human activities involving contact with the treated effluent are prohibited; and

(3) Human contact with the treated effluent does not occur.

(h) Any activity approved for reuse category E.

(i) Any other use approved by the Division.

2. As used in this section, “dust control” means the program required pursuant to NAC 445B.22037 to prevent controllable particulate matter from becoming airborne.

(Added to NAC by Environmental Comm’n by R063-04, eff. 10-6-2004)

NAC 445A.2771 Reuse category E: Approved uses. (NRS 445A.425**)** Treated effluent that meets the requirements for bacteriological quality set forth in NAC 445A.276 for reuse category E may be used for:

1. Spray irrigation of land used for agricultural purposes if:

(a) Public access to the area of use is prohibited; and

(b) A buffer zone of not less than 800 feet is maintained.

2. Any other use that is approved by the Division.

(Added to NAC by Environmental Comm’n by R063-04, eff. 10-6-2004)

NAC 445A.279 Determining quality of effluent: Storage reservoirs excluded from treatment process. (NRS 445A.425**)** For the purpose of determining the quality of effluent, storage reservoirs do not constitute part of the treatment process.

(Added to NAC by Environmental Comm’n, eff. 9-13-91)—(Substituted in revision for NAC 445.178)

NAC 445A.280 Waiver or modification of requirements. (NRS 445A.425**)** The Director may waive compliance with or modify any requirement of NAC 445A.274 to 445A.280, inclusive, for a specific proposed use of treated effluent upon his determination that because of the size, type or location of the proposed use, the waiver or modification is consistent with the policy set forth in NRS 445A.305.

(Added to NAC by Environmental Comm’n, eff. 9-13-91; A by R063-04, 10-6-2004)

Table 1. Climate Data Markleeville, California

MARKLEEVILLE, CALIFORNIA (045356)

Period of Record Monthly Climate Summary

Period of Record : 8/ 1/1909 to 5/31/2004

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Average Max. Temperature (F)	45.7	46.9	53.8	58.7	66.4	75.6	84.5	84.7	77.8	67.0	53.4	44.6	63.2
Average Min. Temperature (F)	17.4	19.0	23.5	27.0	33.1	38.1	43.1	42.1	35.5	28.1	21.8	16.3	28.7
Average Total Precipitation (in.)	3.72	3.14	2.10	1.29	0.99	0.60	0.39	0.46	0.47	0.93	2.11	3.01	19.20
Average Total SnowFall (in.)	21.8	19.2	13.1	5.0	1.4	0.2	0.0	0.0	0.1	0.6	5.6	16.1	83.0
Average Snow Depth (in.)	8	9	4	0	0	0	0	0	0	0	1	4	2

Percent of possible observations for period of record.
Max. Temp.: 19.3% Min. Temp.: 19.3% Precipitation: 25.2% Snowfall: 19.9% Snow Depth: 19.3%
Check Station Metadata or Metadata graphics for more detail about data completeness.

Western Regional Climate Center, wrcc@dri.edu

Table 2. STPUD Final Effluent Trends, S. Tahoe WTP

FINAL EFFLUENT
ANNUAL TRENDS

Year	<---FLOW---> Total MG	Daily MGD	COD mg/L	BOD mg/L	SS mg/L	NH3-N mg/L	NO3-N mg/L	Total-P mg/L	Cl mg/L	TDS mg/L	Turbidity NTU	Total Cl_2 mg/L	Coliforms Total	Fecal	TKN mg/L
80	1,418.20	4.32	22.0	3.0	2.0	5.5	5.75	0.40	148.0	551	0.70	2.84			
81	1,354.60	3.90	20.0	2.0	2.0	3.3	13.47	0.83	80.0	455	0.92	0.68			
82	1,807.90	5.10	23.0	4.0	4.0	3.1	7.87	0.81	88.0	410	1.84	2.62			
83	1,737.60	4.85	18.0	2.0	2.0	1.0	8.50	0.72	94.0	426	0.95	1.77			
84	1,566.70	4.33	16.0	2.0	1.0	1.6	8.24	0.39	103.0	436	0.73	1.84			
85	1,532.40	4.24	20.0	2.0	3.0	4.5	5.15	0.17	92.0	395	1.14	4.92			
86	1,660.50	4.59	17.0	2.0	2.0	5.3	4.95	0.20	82.0	341	1.02	4.91			
87	1,657.20	4.81	19.0	2.0	4.0	7.7	4.83	0.23	117.0	452	1.43	3.89			
88	1,619.90	4.42	14.0	2.0	3.0	6.6	9.29	0.12	136.0	480	1.01	2.78			
89	1,769.70	4.89	40.0	6.0	5.0	13.9	4.93	3.80	76.0	326	2.47	13.56	2.9	2.0	15.64
90	1,697.30	4.76	37.0	6.0	4.0	8.4	8.39	3.80	83.0	387	2.32	14.63	2.0	2.0	10.13
91	1,610.80	4.46	37.0	6.0	4.0	5.9	9.71	3.55	92.0	367	2.58	10.34	2.0	2.0	7.81
92	1,608.40	4.39	41.0	7.0	4.0	9.6	6.46	5.05	64.0	289	3.07	4.40	3.7	2.1	11.21
93	1,795.00	4.94	51.0	8.0	4.0	13.8	7.03	3.79	60.0	266	3.08	5.32	2.1	2.0	15.60
94	1,638.20	4.50	43.1	7.6	3.8	20.6	1.30	3.21	59.3	253	2.94	4.11	3.3	2.0	22.09
95	1,925.70	5.27	39.4	7.4	5.0	20.5	0.03	2.69	51.0	236	2.60	4.40	2.2	2.0	21.12
96	1,965.80	5.37	37.3	7.0	4.4	18.6	0.13	2.50	44.2	221	2.51	4.02	2.1	2.0	20.56
97	1,872.30	5.12	37.0	6.9	3.7	19.3	0.25	2.59	50.0	226	2.80	6.12	2.1	2.0	20.73
98	1,693.40	4.64	35.6	6.9	4.0	18.6	0.28	2.56	47.6	227	2.55	4.57	2.1	2.0	21.05
99	1,742.20	4.78	34.8	6.5	3.1	19.3	0.16	2.65	48.8	220	2.42	4.19	2.8	2.0	19.77
00	1,685.90	4.74	42.4	7.9	3.9	20.7	0.04	2.55	53.1	226	2.83	4.53	2.1	2.0	20.89
01	1,565.40	4.29	46.9	8.7	5.1	19.1	0.54	2.87	58.3	241	4.49	5.20	2.0	2.0	21.60
02	1,581.80	4.33	41.2	6.8	3.0	19.8	0.64	2.79	54.8	231	3.70	5.49	2.0	2.0	21.57
03	1,537.50	4.21	45.9	7.8	3.3	22.2	0.10	2.83	57.2	240	4.08	5.69	2.1	2.0	24.20
04	1,483.30	4.05	47.4	7.9	3.8	23.1	0.04	3.19	55.7	242	4.79	6.00	2.1	2.0	26.33
05	1,496.68	4.21	44.9	7.4	3.5	21.1	0.74	3.06	50.6	250	4.30	6.19	2.0	2.0	21.67
06	1,588.08	4.35	47.8	6.6	2.7	21.2	0.07	3.09	48.1	242	4.35	5.95	2.0	2.0	21.66
07	1,380.03	3.78	47.5	7.5	3.3	22.2	0.44	3.38	50.0	255	4.37	6.47	2.0	2.0	24.53
Permit Max			300	45	60						20		240[1]		
Permit Ave			60	30	30						10		23[2]		
Maximum	1,965.80	5.37	51.0	8.7	5.1	23.1	13.47	5.05	148.0	551	4.79	14.63	3.7	2.1	26.33
Minimum	1,354.60	3.78	14.0	2.0	1.0	1.0	0.03	0.12	44.2	220	0.70	0.68	2.0	2.0	7.81
Average	1,642.59	4.56	34.5	5.6	3.5	13.4	3.90	2.28	73.0	318	2.57	5.27	2.3	2.0	19.38
# Years	28	28	28	28	28	28	28	28	28	28	28	28	19	19	19

Appendix 2

STPU District 8361.001

Table 3.

SOUTH TAHOE PUBLIC UTILITY DISTRICT
HARVEY PLACE RESERVOIR DATA SUMMARY

From: **1989**
To: **2007**

Year	pH	Temp C	NH3 + NH4	NH3-N mg/l	Org-N mg/l	TKN mg/l	NO3-N mg/l	NO2-N mg/l	Total N mg/L	PO4-P mg/l	Total P mg/l	Alk mg/l	MBAS mg/l	D.O. mg/l	D.O. % SAT
89	8.10	13.6	8.59	0.264	1.63	10.22	4.94	0.14	15.29	1.94	2.21	70	0.040	8.64	101.02
90	8.40	14.5	6.71	1.012	4.58	11.30	5.86	0.22	17.37	2.73	3.20	72	0.080	8.51	102.85
91	7.72	13.9	2.78	0.103	1.63	4.41	9.93	0.27	14.61	2.52	2.89	53	0.060	7.23	87.49
92	7.73	14.3	4.69	0.083	1.61	6.30	8.25	0.32	14.87	3.60	3.86	61	0.070	7.30	86.26
93	7.76	12.3	7.84	0.119	1.20	9.04	5.03	0.23	14.30	2.90	3.05	70	0.060	7.49	84.49
94	7.80	11.1	15.53	0.223	1.65	16.82	2.85	0.32	19.99	3.16	3.18	118	0.080	7.25	80.39
95	7.82	13.0	16.25	0.308	2.86	18.55	0.82	0.13	19.51	2.26	2.49	119	0.060	8.11	93.85
96	7.80	13.8	14.06	0.472	1.88	15.85	1.12	0.27	17.24	2.06	2.13	116	0.060	7.44	89.74
97	7.71	12.2	12.26	0.165	0.88	12.28	1.37	0.23	13.88	1.77	2.03	100	0.030	7.48	83.93
98	7.65	11.7	13.90			15.58	1.73	0.31	17.63	2.27	2.28	110	0.070	7.83	90.18
99	7.51	12.3	14.47	0.121	1.78	15.69	1.39	0.34	17.42	2.05	2.26	106	0.060	6.63	69.93
00	7.95	12.9	15.74	0.696	2.83	18.23	0.93	0.31	19.47	2.26	2.50	110	0.070	8.29	99.53
01	7.94	12.8	15.57	0.608	2.10	17.51	1.26	0.49	19.26	2.33	2.57	107		8.36	103.10
02	7.79	13.2	12.87	0.408	2.33	15.21	2.10	0.52	17.83	2.22	2.51	99		8.64	104.13
03	7.76	12.5	15.98	0.287	2.49	18.29	1.20	0.56	20.05	2.26	2.44	113		7.31	77.82
04	7.85	11.9	17.37	0.477		19.57	1.10	0.31	20.84	2.55	2.75	116		7.52	75.17
05	7.96	11.6	15.21	0.617	1.28	16.23	1.16	0.36	17.76	2.66	2.70	130		8.63	97.22
06	7.68	11.9	14.57	0.391	1.68	16.23	0.93	0.21	17.37	2.22	2.36	127		8.37	92.53
07	8.41	12.5	16.72	1.456	17.80	19.26	0.56	0.29	20.11	2.85	3.06	151		9.65	104.52
Maximum	8.41	14.5	17.37	1.456	17.80	19.57	9.93	0.56	20.84	3.60	3.86	151	0.080	9.65	104.52
Minimum	7.51	11.1	2.78	0.083	0.88	4.41	0.56	0.13	13.88	1.77	2.03	53	0.030	6.63	69.93
Average	7.86	12.7	12.69	0.434	2.95	14.56	2.77	0.31	17.62	2.45	2.66	103	0.062	7.93	90.75
# Years	19	19	19	18	17	19	19	19	19	19	19	19	12	19	19

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Appendix 2

Table 3. cont.

SOUTH TAHOE PUBLIC UTILITY DISTRICT
HARVEY PLACE RESERVOIR DATA SUMMARY

From: **1989**
To: **2007**

Year	COD mg/l	BOD mg/l	CL- mg/l	TDS mg/l	S.S. mg/l	Turb NTU	EC umhos	Ca mg/l	Na mg/l	Mg mg/l	SAR	Water Level ft.	Flow acre-ft	% Ice Cover
89	25.3	2.95	89.2	357	21.37	18.87	635	19.58	92.91	3.26	4.88	38.05	491	5
90	32.4	4.92	93.5	355	9.33	5.82	616	16.58	86.17	3.41	5.04	40.94	303	4
91	23.9	3.82	91.7	369	20.36	5.99	595	16.36	84.27	3.55	4.91	38.50		4
92	28.0	4.25	72.0	312	7.83	3.88	496	16.17	72.67	3.28	4.31	39.08		6
93	29.1	5.92	53.2	241	29.42	5.63	413	14.86	45.49	3.26	2.71	42.48		17
94	27.8	6.01	70.2	268	7.56	3.82	548	18.50	53.25	3.86	2.94	38.43		10
95	25.1	4.70	50.8	226	7.09	3.87	482	16.33	41.25	3.53	2.41	42.54		1
96	23.7	4.53	47.3	225	4.81	3.53	462	16.42	46.42	3.58	2.70	43.75		0
97	18.6	2.93	44.5	205	7.07	5.98	415	14.76	38.00	3.38	2.28	45.44		0
98	20.6	3.53	49.6	226	5.20	3.67	461	15.00	43.35	3.31	2.64	41.92		12
99	27.7	4.19	48.8	221	11.53	5.25	450	14.40	42.08	3.42	2.59	40.74		2
00	31.9	6.21	53.6	227	16.80	3.67	466	15.73	44.55	3.53	2.68	40.98		0
01	43.8	5.79	61.3	243	26.09	7.40	490	16.17	45.83	3.68	2.67	40.93		3
02	29.7	5.23	57.5	237	9.32	4.04	428	15.43	44.84	3.51	2.68	37.39		0
03	31.3	4.75	56.8	235	8.38	4.14	484	15.30	45.20	3.53	2.71	40.90		0
04	31.3	4.53	57.9	236	5.81	4.08	504	16.02	43.46	3.69	2.54	38.15		3
05	35.9	6.81	52.7	242	11.57	4.48	447	16.42	46.39	3.50	2.70	38.66		16
06	39.9	7.35	44.3	222	17.56	12.67	397	14.49	42.35	3.29	2.60	38.80		12
07	45.3	9.14	53.3	257	13.78	7.40	515	17.07	54.08	3.80	3.08	36.81		1
Maximum	45.3	9.14	93.5	369	29.42	18.87	635	19.58	92.91	3.86	5.04	45.44	491	17
Minimum	18.6	2.93	44.3	205	4.81	3.53	397	14.40	38.00	3.26	2.28	36.81	303	0
Average	30.1	5.13	60.4	258	12.68	6.01	490	16.08	53.29	3.49	3.11	40.24	397	5
# Years	19	19	19	19	19	19	19	19	19	19	19	19	2	19

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Appendix 2

Table 3. cont.

SOUTH TAHOE PUBLIC UTILITY DISTRICT
HARVEY PLACE RESERVOIR DATA SUMMARY

From: **1989**
To: **2007**

Year	Algae	Weeds	Coliforms Total MPN	Coliforms Fecal MPN	Fecal Strep MPN	Air Temp C	SO4 mg/L	Boron mg/L	Comments
89			125	7	60	17.2			
90			275	3	17	18.2	42.78	0.32	
91			64	4	30	17.1	41.24	0.37	
92			991	94	203	16.6	35.11	0.33	
93			633	9	280	15.1	23.18	0.22	
94			505	6	422	11.4	26.83	0.26	
95			107	14	112	12.9	24.16	0.17	
96			374	11	97	16.0	19.88	0.19	
97			2	< 2	< 2	5.9	13.10	0.08	
98			192	4	56	7.5	19.25	0.14	
99			460	4	97	13.0	19.05	0.20	
00			363	6	73	15.5	19.07	0.22	
01			533	187	78	13.2	19.53	0.24	
02			128	25	178	20.3	18.20	0.22	
03			309	26	33	13.0	19.30	0.19	
04			204	20	28	12.4	17.93	0.25	
05			1,516	46	194	13.5	16.77	0.24	
06			341	53	168	14.5	14.25	0.16	
07			111	57	34	12.5	15.42	0.22	
Maximum			1,516	187	422	20.3	42.78	0.37	
Minimum			2	2	2	5.9	13.10	0.08	
Average			381	30	114	14.0	22.50	0.23	
# Years	0	0	19	19	19	19	18	18	

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Appendix 2

Table 4. Consumptive Use Calculations - Alfalfa/Flood Irrigation

Consumptive use

Crop:	Alfalfa						
Irrigation:	Flood						
	ET=crop evapotranspiration, in		(WRCC)	TDS	258	mg/l	(STPUD-HPR)
	P=precipitation, in		(WRCC)	ECW	0.490	mmhos/cm	(STPUD-HPR)
	R=net irrigation water requirement, in	R=(ET-P)/(1-LR/100)	(Metcalf and Eddy 1991)	ECE	2	mmhos/cm	alfalfa (Metcalf and Eddy 1991; USDA 1992)
	D=total irrigation requirement, in	D=R/(Eu/100)	(Metcalf and Eddy 1991)				
65	Eu=unit efficiency for distribution system, %		(Metcalf and Eddy 1991)				
5.15	LR=leaching requirement, %	LR=ECW/(5ECE-ECW)	(USDA 1992)				

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	R (in)	D=Lwc (in)	
Jan	1.44	3.72	-2.28			
Feb	1.82	3.14	-1.32			
Mar	3.76	2.10	1.66	1.75	2.69	
Apr	4.66	1.29	3.37	3.55	5.47	
May	7.22	0.99	6.23	6.57	10.11	
Jun	8.56	0.60	7.96	8.39	12.91	
Jul	9.05	0.39	8.66	9.13	14.05	
Aug	8.63	0.46	8.17	8.61	13.25	
Sep	5.81	0.47	5.34	5.63	8.66	
Oct	3.86	0.93	2.93	3.09	4.75	
Nov	1.81	2.11	-0.30			
Dec	1.27	3.01	-1.74			
Total	57.89	19.21	38.68		**71.89**	in/yr

Table 5. Nitrogen Loading Calculations - Alfalfa/Flood Irrigation

Nitrogen loading

Crop:	Alfalfa		
Irrigation:	Flood		
	Lwn=allowable hydraulic-loading rate based on annual nitrogen loading rate, in/yr		Lwn=((Cp)(P-ET)+(4.4U))/((1-f)(Cn)-(Cp))
7	Cp=total nitrogen concentration in percolating water, mg/l	(groundwater limit)	
	ET=design evapotranspiration, in/yr	(WRCC)	
	P=design precipitation, in/yr	(WRCC)	
200	U=nitrogen uptake by crop, lb/ac/yr	(Metcalf and Eddy 1991)	Assumes cuttings will be removed from site to maximize nitrogen removal
	4.4=combined conversion factor		
17.6	Cn=total nitrogen concentration in applied wastewater, mg/l	(STPUD-HPR)	
0.2	f=fraction of applied total nitrogen removed by denitrificaiton and volatilization		

	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in/yr)	P-ET (in/yr)	U (lb/ac/yr)	Lwn (in/yr)	
Total	57.89	19.21	-38.68	200	**86.05**	in/yr

Table 6. Soil Permeability Calculations - Alfalfa Flood Irrigation

Soil permeability

Crop:	Alfalfa			
Irrigation:	Flood			
	Lwn=wastewater hydraulic-loading rate based on soil permeability, in/mo		Lwp=ET-P+Wp	(Metcalf and Eddy 1991)
	ET=design evapotranspiration, in/mo	(WRCC)		
	P=design precipitation, in/mo	(WRCC)		
	Wp=design percolation rate, in/mo	4% of minimum soil permeability (2 in/hr) Assume 24h/d and 15d/mo	(Metcalf and Eddy 1991)	

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	Wp (in)	Lwp	
Jan	1.44	3.72	-2.28	28.8		
Feb	1.82	3.14	-1.32	28.8		
Mar	3.76	2.10	1.66	28.8	30.46	
Apr	4.66	1.29	3.37	28.8	32.17	
May	7.22	0.99	6.23	28.8	35.03	
Jun	8.56	0.60	7.96	28.8	36.76	
Jul	9.05	0.39	8.66	28.8	37.46	
Aug	8.63	0.46	8.17	28.8	36.97	
Sep	5.81	0.47	5.34	28.8	34.14	
Oct	3.86	0.93	2.93	28.8	31.73	
Nov	1.81	2.11	-0.30	28.8		
Dec	1.27	3.01	-1.74	28.8		
Total	57.89	19.21	38.68	345.60	**274.72**	in/yr

Table 7. Consumptive Use Calculations - Alfalfa/Flood Irrigation

Consumptive use

Crop:	Pasture Grass						
Irrigation:	Flood						
	ET=crop evapotranspiration, in		(WRCC)	TDS	258	mg/l	(STPUD-HPR)
	P=precipitation, in		(WRCC)	ECW	0.490	mmhos/cm	(STPUD-HPR)
	R=net irrigation water requirement, in	R=(ET-P)/(1-LR/100)	(Metcalf and Eddy 1991)	ECE	3.1	mmhos/cm	pasture (USDA 1992)
	D=total irrigation requirement, in	D=R/(Eu/100)	(Metcalf and Eddy 1991)				
65	Eu=unit efficiency for distribution system, %		(Metcalf and Eddy 1991)				
3.26	LR=leaching requirement, %	LR=ECW/(5ECE-ECW)	(USDA 1992)				

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	R (in)	D=Lwc (in)	
Jan	1.44	3.72	-2.28			
Feb	1.82	3.14	-1.32			
Mar	3.76	2.10	1.66	1.72	2.64	
Apr	4.66	1.29	3.37	3.48	5.36	
May	7.22	0.99	6.23	6.44	9.91	
Jun	8.56	0.60	7.96	8.23	12.66	
Jul	9.05	0.39	8.66	8.95	13.77	
Aug	8.63	0.46	8.17	8.45	12.99	
Sep	5.81	0.47	5.34	5.52	8.49	
Oct	3.86	0.93	2.93	3.03	4.66	
Nov	1.81	2.11	-0.30			
Dec	1.27	3.01	-1.74			
Total	57.89	19.21	38.68		**70.49**	in/yr

Table 8. Nitrogen Loading Calculations - Alfalfa/Flood Irrigation

Nitrogen loading

Crop:	Pasture Grass		
Irrigation:	Flood		
	Lwn=allowable hydraulic-loading rate based on annual nitrogen loading rate, in/yr		Lwn=((Cp)(P-ET)+(4.4U))/((1-f)(Cn)-(Cp))
7	Cp=total nitrogen concentration in percolating water, mg/l	(groundwater limit)	
	ET=design evapotranspiration, in/yr	(WRCC)	
	P=design precipitation, in/yr	(WRCC)	
120	U=nitrogen uptake by crop, lb/ac/yr	(Ag Source Harris analysis)	
	4.4=combined conversion factor		
17.6	Cn=total nitrogen concentration in applied wastewater, mg/l	(STPUD-HPR)	
0.2	f=fraction of applied total nitrogen removed by denitrificaiton and volatilization		

	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in/yr)	P-ET (in/yr)	U (lb/ac/yr)	Lwn (in/yr)	
Total	57.89	19.21	-38.68	120	**36.33**	in/yr

Table 9. Soil Permeability Calculations - Alfalfa Flood Irrigation

Soil permeability

Crop: Pasture Grass
Irrigation: Flood

Lwn=wastewater hydraulic-loading rate based on soil permeability, in/mo — Lwp=ET-P+Wp (Metcalf and Eddy 1991)
ET=design evapotranspiration, in/mo (WRCC)
P=design precipitation, in/mo (WRCC)
Wp=design percolation rate, in/mo — 4% of minimum soil permeability (2 in/hr) (Metcalf and Eddy 1991)
Assume 24h/d and 15d/mo

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	Wp (in)	Lwp	
Jan	1.44	3.72	-2.28	28.8		
Feb	1.82	3.14	-1.32	28.8		
Mar	3.76	2.10	1.66	28.8	30.46	
Apr	4.66	1.29	3.37	28.8	32.17	
May	7.22	0.99	6.23	28.8	35.03	
Jun	8.56	0.60	7.96	28.8	36.76	
Jul	9.05	0.39	8.66	28.8	37.46	
Aug	8.63	0.46	8.17	28.8	36.97	
Sep	5.81	0.47	5.34	28.8	34.14	
Oct	3.86	0.93	2.93	28.8	31.73	
Nov	1.81	2.11	-0.30	28.8		
Dec	1.27	3.01	-1.74	28.8		
Total	57.89	19.21	38.68	345.60	**274.72**	in/yr

Table 10. Consumptive Use Calculations - Alfalfa/Flood Irrigation

Consumptive use

Crop:	Alfalfa						
Irrigation:	Spray						
	ET=crop evapotranspiration, in		(WRCC)	TDS	258	mg/l	(STPUD)
	P=precipitation, in		(WRCC)	ECW	0.490	mmhos/cm	(STPUD)
	R=net irrigation water requirement, in	R=(ET-P)/(1-LR/100)	(Metcalf and Eddy 1991)	ECE	2	mmhos/cm	alfalfa (Metcalf and Eddy 1991; USDA 1992)
	D=total irrigation requirement, in	D=R/(Eu/100)	(Metcalf and Eddy 1991)				
70	Eu=unit efficiency for distribution system, %		(Metcalf and Eddy 1991)				
5.15	LR=leaching requirement, %	LR=ECW/(5ECE-ECW)	(USDA 1992)				

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	R (in)	D=Lwc (in)	
Jan	1.44	3.72	-2.28			
Feb	1.82	3.14	-1.32			
Mar	3.76	2.10	1.66	1.75	2.50	
Apr	4.66	1.29	3.37	3.55	5.08	
May	7.22	0.99	6.23	6.57	9.38	
Jun	8.56	0.60	7.96	8.39	11.99	
Jul	9.05	0.39	8.66	9.13	13.04	
Aug	8.63	0.46	8.17	8.61	12.31	
Sep	5.81	0.47	5.34	5.63	8.04	
Oct	3.86	0.93	2.93	3.09	4.41	
Nov	1.81	2.11	-0.30			
Dec	1.27	3.01	-1.74			
Total	57.89	19.21	38.68		**66.75**	in/yr

Table 11. Nitrogen Loading Calculations - Alfalfa/Flood Irrigation

Nitrogen loading

Crop:	Alfalfa		
Irrigation:	Spray		
	Lwn=allowable hydraulic-loading rate based on annual nitrogen loading rate, in/yr		Lwn=((Cp)(P-ET)+(4.4U))/((1-f)(Cn)-(Cp))
7	Cp=total nitrogen concentration in percolating water, mg/l	(groundwater limit)	
	ET=design evapotranspiration, in/yr	(WRCC)	
	P=design precipitation, in/yr	(WRCC)	
200	U=nitrogen uptake by crop, lb/ac/yr	(Metcalf and Eddy 1991)	Assumes cuttings will be removed from site to maximize nitrogen removal
	4.4=combined conversion factor		
17.6	Cn=total nitrogen concentration in applied wastewater, mg/l	(STPUD-HPR)	
0.2	f=fraction of applied total nitrogen removed by denitrificaiton and volatilization		

	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in/yr)	P-ET (in/yr)	U (lb/ac/yr)	Lwn (in/yr)	
Total	57.89	19.21	-38.68	200	**86.05**	in/yr

Table 12. Soil Permeability Calculations - Alfalfa Flood Irrigation

Soil permeability

Crop: Alfalfa

Irrigation: Spray

Lwn=wastewater hydraulic-loading rate based on soil permeability, in/mo — Lwp=ET-P+Wp (Metcalf and Eddy 1991)

ET=design evapotranspiration, in/mo (WRCC)

P=design precipitation, in/mo (WRCC)

Wp=design percolation rate, in/mo — 4% of minimum soil permeability (2 in/hr) (Metcalf and Eddy 1991)

Assume 24h/d and 15d/mo

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	Wp (in)	Lwp	
Jan	1.44	3.72	-2.28	28.8		
Feb	1.82	3.14	-1.32	28.8		
Mar	3.76	2.10	1.66	28.8	30.46	
Apr	4.66	1.29	3.37	28.8	32.17	
May	7.22	0.99	6.23	28.8	35.03	
Jun	8.56	0.60	7.96	28.8	36.76	
Jul	9.05	0.39	8.66	28.8	37.46	
Aug	8.63	0.46	8.17	28.8	36.97	
Sep	5.81	0.47	5.34	28.8	34.14	
Oct	3.86	0.93	2.93	28.8	31.73	
Nov	1.81	2.11	-0.30	28.8		
Dec	1.27	3.01	-1.74	28.8		
Total	57.89	19.21	38.68	345.60	**274.72**	in/yr

Table 13. Consumptive Use Calculations - Alfalfa/Flood Irrigation

Consumptive use

Crop:	Pasture Grass						
Irrigation:	Spray						
	ET=crop evapotranspiration, in		(WRCC)	TDS	258	mg/l	(STPUD-HPR)
	P=precipitation, in		(WRCC)	ECW	0.490	mmhos/cm	(STPUD-HPR)
	R=net irrigation water requirement, in	R=(ET-P)/(1-LR/100)	(Metcalf and Eddy 1991)	ECE	3.1	mmhos/cm	pasture (USDA 1992)
	D=total irrigation requirement, in	D=R/(Eu/100)	(Metcalf and Eddy 1991)				
70	Eu=unit efficiency for distribution system, %		(Metcalf and Eddy 1991)				
3.26	LR=leaching requirement, %	LR=ECW/(5ECE-ECW)	(USDA 1992)				

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	R (in)	D=Lwc (in)	
Jan	1.44	3.72	-2.28			
Feb	1.82	3.14	-1.32			
Mar	3.76	2.10	1.66	1.72	2.45	
Apr	4.66	1.29	3.37	3.48	4.98	
May	7.22	0.99	6.23	6.44	9.20	
Jun	8.56	0.60	7.96	8.23	11.76	
Jul	9.05	0.39	8.66	8.95	12.79	
Aug	8.63	0.46	8.17	8.45	12.07	
Sep	5.81	0.47	5.34	5.52	7.89	
Oct	3.86	0.93	2.93	3.03	4.33	
Nov	1.81	2.11	-0.30			
Dec	1.27	3.01	-1.74			
Total	57.89	19.21	38.68		**65.45**	in/yr

Table 14. Nitrogen Loading Calculations - Pasture Grass/Spray Irrigation

Calculations - Alfalfa/Flood Irrigation

Nitrogen loading

Crop:	Pasture Grass		
Irrigation:	Spray		
	Lwn=allowable hydraulic-loading rate based on annual nitrogen loading rate, in/yr		Lwn=((Cp)(P-ET)+(4.4U))/((1-f)(Cn)-(Cp))
7	Cp=total nitrogen concentration in percolating water, mg/l	(groundwater limit)	
	ET=design evapotranspiration, in/yr	(WRCC)	
	P=design precipitation, in/yr	(WRCC)	
123	U=nitrogen uptake by crop, lb/ac/yr	(Ag Source Harris analysis)	
	4.4=combined conversion factor		
17.6	Cn=total nitrogen concentration in applied wastewater, mg/l	(STPUD-HPR)	
0.2	f=fraction of applied total nitrogen removed by denitrificaiton and volatilization		

	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in/yr)	P-ET (in/yr)	U (lb/ac/yr)	Lwn (in/yr)	
Total	57.89	19.21	-38.68	123	**38.20**	in/yr

Table 15. Soil Permeability Calculations - Pasture Grass/Spray Irrigation

Table 4. Soil Permeability Calculations - Alfalfa Flood Irrigation

Crop: Pasture Grass
Irrigation: Spray

Lwn=wastewater hydraulic-loading rate based on soil permeability, in/mo — Lwp=ET-P+Wp (Metcalf and Eddy 1991)
ET=design evapotranspiration, in/mo (WRCC)
P=design precipitation, in/mo (WRCC)
Wp=design percolation rate, in/mo — 4% of minimum soil permeability (2 in/hr) (Metcalf and Eddy 1991)
Assume 24h/d and 15d/mo

Month	Markleeville Avg Monthly Evapotranspiration ET (in)	Markleeville Avg Monthly Precipitation P (in)	ET-P (in)	Wp (in)	Lwp	
Jan	1.44	3.72	-2.28	28.8		
Feb	1.82	3.14	-1.32	28.8		
Mar	3.76	2.10	1.66	28.8	30.46	
Apr	4.66	1.29	3.37	28.8	32.17	
May	7.22	0.99	6.23	28.8	35.03	
Jun	8.56	0.60	7.96	28.8	36.76	
Jul	9.05	0.39	8.66	28.8	37.46	
Aug	8.63	0.46	8.17	28.8	36.97	
Sep	5.81	0.47	5.34	28.8	34.14	
Oct	3.86	0.93	2.93	28.8	31.73	
Nov	1.81	2.11	-0.30	28.8		
Dec	1.27	3.01	-1.74	28.8		
Total	57.89	19.21	38.68	345.60	**274.72**	in/yr

APPENDIX 3
DVR SOIL SAMPLE LABORATORY ANALYSIS

PLEASE REFER TO FIGURE 2 FOR SOIL SAMPLE LOCATIONS

AgSource
Harris Laboratories
A Division of Cooperative Resources International

300 Speedway Circle, Suite 2
Lincoln, NE 68502
(402) 476-0300

Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448530 - 448536

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
DP11 A	2.6	2	15		87	198	1321	2	2.1				
DP12 A	1.7	2	16		97	245	1645	1	1.1				
DP13 A	0.8	2	19		91	308	1848	1	0.4				
DP14 A	0.7	2	18		66	234	1437	1	0.3				
DP21 B	1.4	7	19		121	131	1133	3	1.4				
DP22 B	0.9	3	21		95	154	1198	1	0.5				
DP23 B	0.8	4	22		73	119	904	4	0.7				
Average	1.3	3	19		90	198	1355	2	0.9				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	%K	%Mg	%Ca	%Na	%H	Total CEC
						ACTUAL % OF TOTAL CEC					
DP11	5.4	6.5	---	0.22	35	1.5	11.3	45.1	1.0	41.0	14.6
DP12	5.8	7.1	---	0.19	35	2.0	16.6	67.0	1.2	13.0	12.3
DP13	6.1	7.3	---	0.19	30	1.8	19.8	71.2	1.0	6.2	13.0
DP14	6.2	7.4	---	0.16	23	1.7	19.9	73.3	1.0	4.1	9.8
DP21	5.4	7.2	---	0.16	9	3.7	13.1	68.2	0.5	14.4	8.3
DP22	6.4	7.3	---	0.14	11	2.9	15.3	71.6	0.6	9.6	8.4
DP23	5.1	7.3	---	0.13	12	2.9	15.1	69.0	0.8	12.2	6.6
Average	5.9	7.2	---	0.17	22	2.3	16.3	66.9	1.0	13.5	10.1

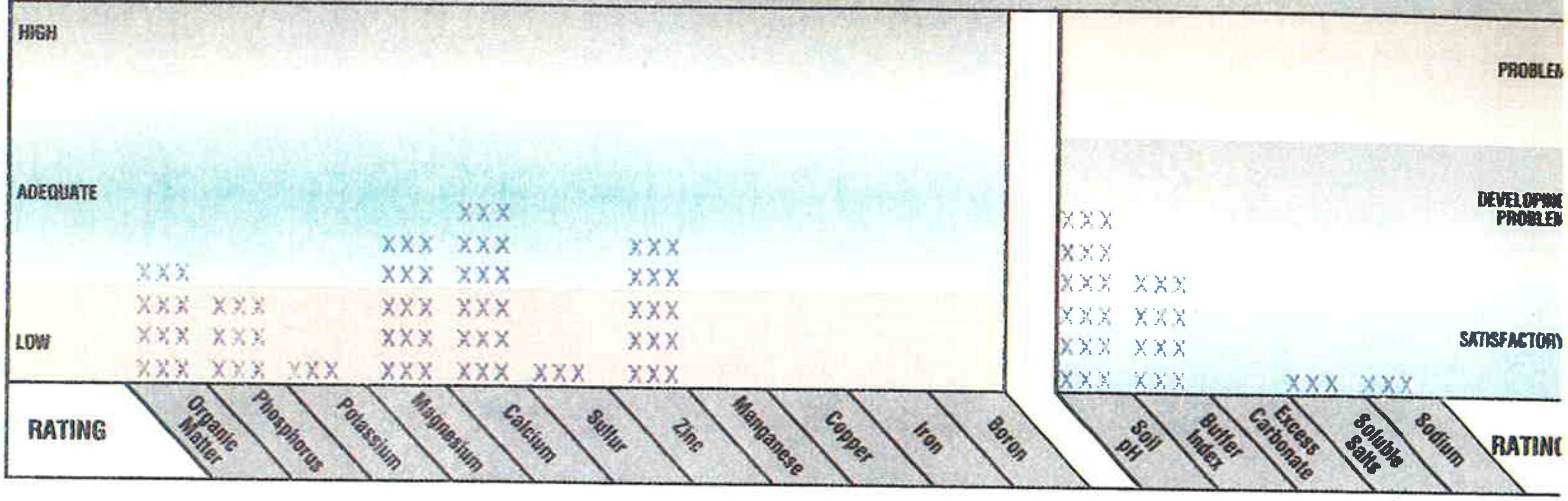
Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
DP11 A	PASTURE	3.5	LIME 5640	115	50	110	15	20.0	0				
DP12 A	PASTURE	3.5	LIME 650	115	50	95	0	25.0	0				
DP13 A	PASTURE	3.5	LIME 330	115	45	110	0	25.0	5.0				
DP14 A	PASTURE	3.5	LIME 120	115	45	140	0	25.0	5.0				
DP21 B	PASTURE	3.5	LIME 350	105	45	40	15	20.0	0				
DP22 B	PASTURE	3.5	LIME 200	115	45	95	15	25.0	4.5				
DP23 B	PASTURE	3.5	LIME 170	110	45	125	15	20.0	3.5				
Average	PASTURE	3.5 Bu	LIME 450	113	45	105	15	25.0	1.5				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P205 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID	DP11	DP12	DP13	DP14	DP21	DP22	DP23
BULK DENSITY	1.3	1.4	1.3	1.3	1.4	1.5	1.6
CONVERSION FCTR	2.0	2.1	2.0	2.0	2.1	2.2	2.3

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

Harris Laboratories
A Division of AgSource Cooperative Services

300 Speedway Circle Suite 2
Lincoln, NE 68502

Tel: 402-476-0300
Fax: 402-476-0302

Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805388	448530 to 448536

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448530

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.08 MEQ/L NA. 0.64 MEQ/L CA 0.24 MEQ/L MG 0.14 MEQ/L
SOIL PH 5.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 50.6 SODIUM ABSORPTION RATIO 1.47

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 14.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.08 MEQ/L NA. 0.64 MEQ/L CA 0.24 MEQ/L MG 0.14 MEQ/L
SOIL PH 5.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 50.6 SODIUM ABSORPTION RATIO 1.47

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448531

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.47 MEQ/L NA. 0.91 MEQ/L CA 0.33 MEQ/L MG 0.42 MEQ/L
SOIL PH 5.8 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.49

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 12.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.47 MEQ/L NA. 0.91 MEQ/L CA 0.33 MEQ/L MG 0.42 MEQ/L
SOIL PH 5.8 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.49

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448532

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.31 MEQ/L NA. 0.64 MEQ/L CA 0.23 MEQ/L MG 0.28 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.10 MMHOS/CM
PERCENT SATURATION 48.2 SODIUM ABSORPTION RATIO 1.27

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 14.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.31 MEQ/L NA. 0.64 MEQ/L CA 0.23 MEQ/L MG 0.28 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.10 MMHOS/CM
PERCENT SATURATION 48.2 SODIUM ABSORPTION RATIO 1.27

Harris Laboratories
A Division of AgSource Cooperative Services

300 Speedway Circle Suite 2
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Tel: 402-476-0300
Fax: 402-476-0302

Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805388	448530 to 448536

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448533

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.57 MEQ/L NA. 1.07 MEQ/L CA 0.54 MEQ/L MG 0.67 MEQ/L
SOIL PH 6.2 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 45.5 SODIUM ABSORPTION RATIO 1.38

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 12.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.57 MEQ/L NA. 1.07 MEQ/L CA 0.54 MEQ/L MG 0.67 MEQ/L
SOIL PH 6.2 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 45.5 SODIUM ABSORPTION RATIO 1.38

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448534

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.08 MEQ/L NA. 0.49 MEQ/L CA 0.60 MEQ/L MG 0.29 MEQ/L
SOIL PH 5.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.17 MMHOS/CM
PERCENT SATURATION 42.7 SODIUM ABSORPTION RATIO 0.73

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 83.2 % SILT 12.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.08 MEQ/L NA. 0.49 MEQ/L CA 0.60 MEQ/L MG 0.29 MEQ/L
SOIL PH 5.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.17 MMHOS/CM
PERCENT SATURATION 42.7 SODIUM ABSORPTION RATIO 0.73

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448535

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.07 MEQ/L NA. 0.50 MEQ/L CA 0.42 MEQ/L MG 0.21 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 42.6 SODIUM ABSORPTION RATIO 0.89

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 85.2 % SILT 12.8 % CLAY 2.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.07 MEQ/L NA. 0.50 MEQ/L CA 0.42 MEQ/L MG 0.21 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 42.6 SODIUM ABSORPTION RATIO 0.89

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805388	448530 to 448536

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448536

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.12 MEQ/L   NA.   0.56 MEQ/L   CA  0.47 MEQ/L   MG     0.26 MEQ/L
SOIL PH 6.1 UNITS    K     0.10 MEQ/L   B    0.1 PPM    ECE    0.15 MMHOS/CM
       PERCENT SATURATION 37.4     SODIUM ABSORPTION RATIO    0.93

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  87.2    % SILT  10.8    % CLAY   2.0
** SOIL TEXTURE IS SAND
```

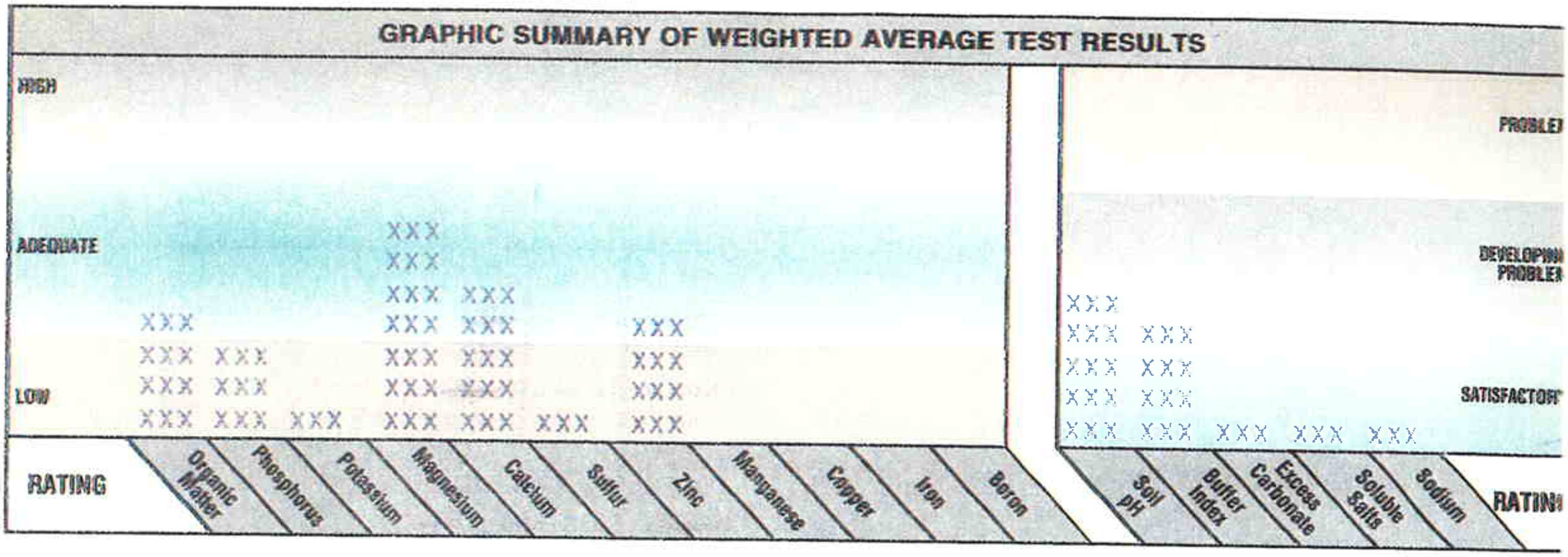

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.12 MEQ/L   NA.   0.56 MEQ/L   CA  0.47 MEQ/L   MG     0.26 MEQ/L
SOIL PH 6.1 UNITS    K     0.10 MEQ/L   B    0.1 PPM    ECE    0.15 MMHOS/CM
       PERCENT SATURATION 37.4     SODIUM ABSORPTION RATIO    0.93
```

Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
2A1	PASTURE	3.5	LIME 380	100	65	155	15	25.0	4.0				
2A2	PASTURE	3.5		110	65	160	15	25.0	5.0				
2A3	PASTURE	3.5		115	60	165	15	15.0	5.0				
2A4	PASTURE	3.5	LIME 560	115	60	145	15	20.0	3.5				
7A1	PASTURE	3.5		115	55	135	0	25.0	2.0				
7A2	PASTURE	3.5		115	45	100	0	25.0	4.5				
7A3	PASTURE	3.5		115	40	110	0	20.0	5.0				
7A4	PASTURE	3.5	LIME 450	110	40	110	0	25.0	5.0				
7B1	PASTURE	3.5	LIME 9420	115	50	50	15	20.0	2.0				
7C1	PASTURE	3.5	LIME 3120	110	60	165	0	25.0	2.5				
Average	PASTURE	3.5 Bu	LIME 890	112	50	135	0	25.0	4.0				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P2O5 39, K2O 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID 2A1 2A2 2A3 2A4 7A1 7A2 7A3 7A4 7
BULK DENSITY 1.4 1.4 1.4 1.3 1.4 1.4 1.3 1.4 1.4 1.1
CONVERSION FCTR 2.2 2.1 2.2 2.0 2.1 2.1 2.0 2.1 2.2 1.6
TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

Submitted By
Wood Rodgers, Inc.
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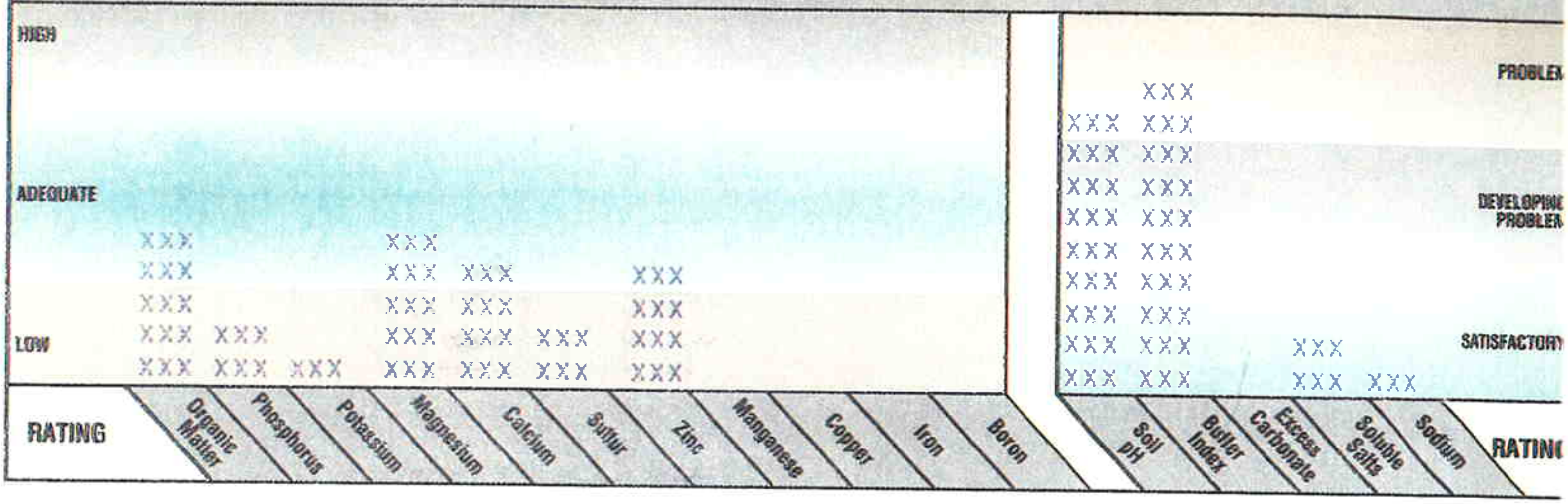
Submitted For
SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE									
				N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
702	PASTURE	3.5	LIME 8160	110	55	155	15	20.0	2.5				
703	PASTURE	3.5	LIME 5640	110	60	155	15	15.0	3.5				
Average	PASTURE	3.5 Bu	LIME 6900	110	55	155	15	20.0	3.0				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P205 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

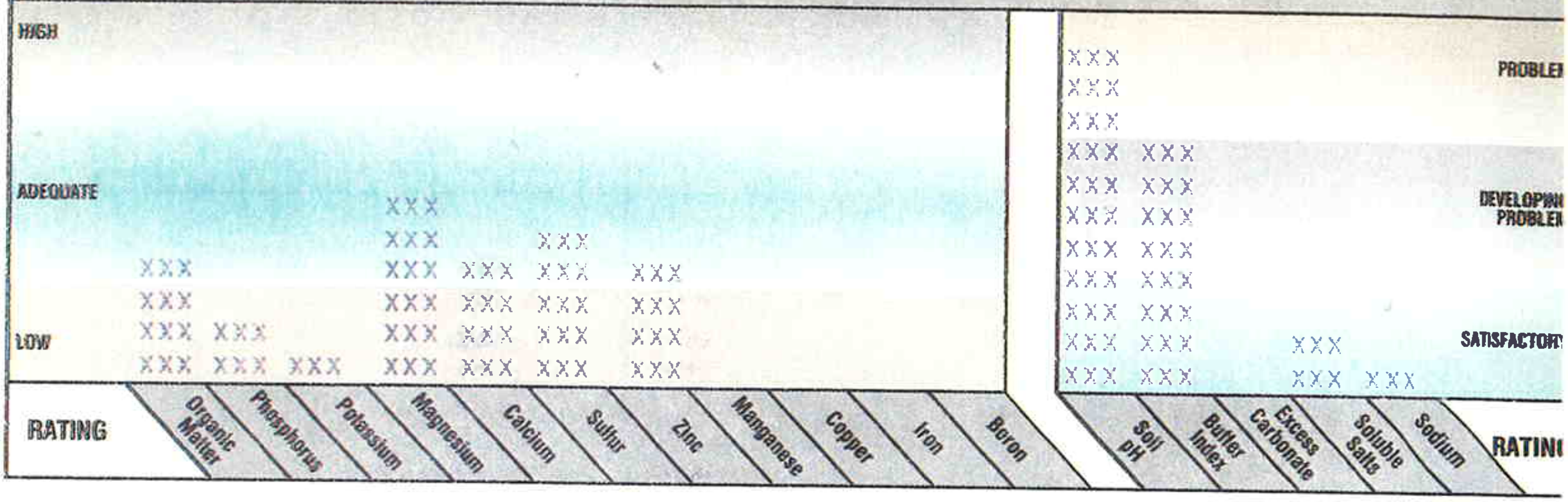
SAMPLE ID	702	703
BULK DENSITY	1.2	1.2
CONVERSION FCTR	1.8	1.8

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For
SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
1A1	PASTURE	3.5	LIME 720	115	55	130	0	15.0	0				
1A2	PASTURE	3.5	LIME 8160	115	55	50	0	5.0	2.5				
1A3	PASTURE	3.5	LIME 3120	115	60	75	0	0	5.0				
1A4	PASTURE	3.5	LIME 8160	115	65	80	0	0	5.0				
Average	PASTURE	3.5 Bu	LIME 4690	115	60	85	0	0	3.5				

PLANT FOOD NEED IN LBS. PER ACRE

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P2O5 39, K2O 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID	1A1	1A2	1A3	1A4
BULK DENSITY	1.3	1.3	1.3	1.2
CONVERSION FCTR	1.9	2.0	1.9	1.8

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

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Submitted By	Submitted For
Wood Rodgers, Inc 575 Double Eagle Court Reno NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
25-Sep-2008	< 3 DAYS	09-Oct-08	448547 - 448556

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
2A1	1.3	11	5		54	177	1338	2	0.6				
2A2	0.7	4	5		46	166	968	1	0.4				
2A3	0.4	2	7		39	129	674	5	0.3				
2A4	1.1	2	8		61	176	898	3	0.7				
7A1	1.1	2	13		76	330	1709	1	0.9				
7A2	0.9	2	21		97	343	1674	2	0.5				
7A3	0.9	2	27		90	357	1601	3	0.4				
7A4	0.9	6	28		91	328	1466	2	0.4				
7B1	1.4	3	16		116	133	834	2	0.9				
7C1	3.7	4	8		46	240	1584	1	0.8				
Average	1.2	4	14		72	238	1277	2	0.6				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	ACTUAL % OF TOTAL CEC %K	%Mg	%Ca	%Na	%H	Total CEC
2A1	5.8	7.2	---	0.19	18	1.4	15.4	69.8	0.8	12.5	9.6
2A2	6.6	--------	VL	0.13	20	1.8	21.5	75.3	1.4	0.0	6.4
2A3	6.8	--------	VL	0.12	25	2.1	23.1	72.4	2.3	0.0	4.7
2A4	5.5	7.0	---	0.16	46	1.9	17.6	54.0	2.4	24.1	8.3
7A1	6.5	--------	VL	0.19	48	1.7	23.5	73.0	1.8	0.0	11.7
7A2	6.7	--------	VL	0.18	26	2.1	24.7	72.2	1.0	0.0	11.6
7A3	6.6	--------	VL	0.18	19	2.0	26.3	70.9	0.7	0.0	11.3
7A4	6.0	7.2	---	0.19	18	2.0	23.4	63.6	0.7	10.3	11.7
7B1	5.1	6.2	---	0.21	20	2.0	7.6	28.4	0.6	61.4	14.7
7C1	5.4	6.7	---	0.23	50	0.8	14.0	55.6	1.5	28.1	14.3
Average	6.1	6.9	VL	0.18	29	1.7	17.9	57.6	1.1	21.7	11.1

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Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
25-Sep-2008	< 3 DAYS	09-Oct-08	448557 - 448558

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
~~702~~	2.2	5	13		56	216	1332	2	0.8				
~~703~~	1.1	5	9		54	219	1214	5	0.7				
Average	1.7	5	11		55	218	1273	4	0.8				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	%K	%Mg	%Ca	%Na	%H	Total CEC
702	5.4	6.3	--	0.25	35	0.9	10.7	39.7	0.9	47.7	16.8
703	5.6	6.5	--	0.23	23	1.0	12.9	42.9	0.7	42.5	14.1
Average	5.5	6.4	--	0.24	29	0.9	11.7	41.2	0.8	45.3	15.4

(%K to %H: ACTUAL % OF TOTAL CEC)

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Submitted By
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Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
25-Sep-2008	< 3 DAYS	09-Oct-08	448559 - 448562

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
1A1	1.4	3	12		74	249	1236	5	1.3				
1A2	1.1	2	10		119	298	1518	10	0.8				
1A3	1.2	2	8		108	321	1501	19	0.3				
1A4	1.3	2	5		109	412	1955	14	0.4				
Average	1.3	2	9		103	320	1553	12	0.7				

SUMMARY OF ANALYTICAL RESULTS

CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	ACTUAL % OF TOTAL CEC %K	%Mg	%Ca	%Na	%H	Total CEC
1A1	5.6	7.0	--	0.18	20	1.8	19.7	58.7	0.8	19.0	10.5
1A2	4.8	6.3	--	0.27	25	1.7	13.4	41.1	0.6	43.3	18.5
1A3	4.7	6.7	--	0.26	21	1.9	18.4	51.6	0.6	27.5	14.5
1A4	5.0	6.3	--	0.32	24	1.3	15.9	45.3	0.5	37.1	21.6
Average	5.0	6.6	--	0.26	23	1.6	16.6	48.4	0.6	32.7	16.0

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448547 2A1

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.13 MEQ/L   NA.   0.75 MEQ/L   CA  1.04 MEQ/L   MG      0.57 MEQ/L
SOIL PH 5.8 UNITS      K      0.10 MEQ/L   B    0.1 PPM   ECE     0.27 MMHOS/CM
       PERCENT SATURATION 50.0        SODIUM ABSORPTION RATIO    0.84

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  79.2    % SILT  14.8    % CLAY   6.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.13 MEQ/L   NA.   0.75 MEQ/L   CA  1.04 MEQ/L   MG      0.57 MEQ/L
SOIL PH 5.8 UNITS      K      0.10 MEQ/L   B    0.1 PPM   ECE     0.27 MMHOS/CM
       PERCENT SATURATION 50.0        SODIUM ABSORPTION RATIO    0.84
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448548 2A2

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.20 MEQ/L   NA.   0.86 MEQ/L   CA  0.68 MEQ/L   MG      0.40 MEQ/L
SOIL PH 6.6 UNITS      K      0.10 MEQ/L   B    0.1 PPM   ECE     0.23 MMHOS/CM
       PERCENT SATURATION 42.4        SODIUM ABSORPTION RATIO    1.17

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  81.2    % SILT  12.8    % CLAY   6.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.20 MEQ/L   NA.   0.86 MEQ/L   CA  0.68 MEQ/L   MG      0.40 MEQ/L
SOIL PH 6.6 UNITS      K      0.10 MEQ/L   B    0.1 PPM   ECE     0.23 MMHOS/CM
       PERCENT SATURATION 42.4        SODIUM ABSORPTION RATIO    1.17
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448549 2B3

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.73 MEQ/L   NA.   1.22 MEQ/L   CA  0.55 MEQ/L   MG      0.61 MEQ/L
SOIL PH 6.8 UNITS      K      0.13 MEQ/L   B    0.1 PPM   ECE     0.20 MMHOS/CM
       PERCENT SATURATION 42.7        SODIUM ABSORPTION RATIO    1.60

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  85.2    % SILT  10.8    % CLAY   4.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.73 MEQ/L   NA.   1.22 MEQ/L   CA  0.55 MEQ/L   MG      0.61 MEQ/L
SOIL PH 6.8 UNITS      K      0.13 MEQ/L   B    0.1 PPM   ECE     0.20 MMHOS/CM
       PERCENT SATURATION 42.7        SODIUM ABSORPTION RATIO    1.60
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448547

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.13 MEQ/L   NA.   0.75 MEQ/L   CA  1.04 MEQ/L   MG    0.57 MEQ/L
SOIL PH 5.8 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.27 MMHOS/CM
      PERCENT SATURATION 50.0       SODIUM ABSORPTION RATIO    0.84

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  79.2    % SILT  14.8    % CLAY   6.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.13 MEQ/L   NA.   0.75 MEQ/L   CA  1.04 MEQ/L   MG    0.57 MEQ/L
SOIL PH 5.8 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.27 MMHOS/CM
      PERCENT SATURATION 50.0       SODIUM ABSORPTION RATIO    0.84
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448548

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.20 MEQ/L   NA.   0.86 MEQ/L   CA  0.68 MEQ/L   MG    0.40 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.23 MMHOS/CM
      PERCENT SATURATION 42.4       SODIUM ABSORPTION RATIO    1.17

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  81.2    % SILT  12.8    % CLAY   6.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.20 MEQ/L   NA.   0.86 MEQ/L   CA  0.68 MEQ/L   MG    0.40 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.23 MMHOS/CM
      PERCENT SATURATION 42.4       SODIUM ABSORPTION RATIO    1.17
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448549

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.73 MEQ/L   NA.   1.22 MEQ/L   CA  0.55 MEQ/L   MG    0.61 MEQ/L
SOIL PH 6.8 UNITS    K     0.13 MEQ/L   B   0.1 PPM   ECE    0.20 MMHOS/CM
      PERCENT SATURATION 42.7       SODIUM ABSORPTION RATIO    1.60

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  85.2    % SILT  10.8    % CLAY   4.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.73 MEQ/L   NA.   1.22 MEQ/L   CA  0.55 MEQ/L   MG    0.61 MEQ/L
SOIL PH 6.8 UNITS    K     0.13 MEQ/L   B   0.1 PPM   ECE    0.20 MMHOS/CM
      PERCENT SATURATION 42.7       SODIUM ABSORPTION RATIO    1.60
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448550

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.19 MEQ/L   NA.   0.78 MEQ/L   CA  0.11 MEQ/L   MG    0.10 MEQ/L
SOIL PH 5.5 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.11 MMHOS/CM
     PERCENT SATURATION 39.5      SODIUM ABSORPTION RATIO    2.41

************************** RESULTS OF SPECIAL TESTS ***************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  77.2    % SILT  14.8    % CLAY   8.0
** SOIL TEXTURE IS SANDY LOAM
```



```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.19 MEQ/L   NA.   0.78 MEQ/L   CA  0.11 MEQ/L   MG    0.10 MEQ/L
SOIL PH 5.5 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.11 MMHOS/CM
     PERCENT SATURATION 39.5      SODIUM ABSORPTION RATIO    2.41
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448551

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.56 MEQ/L   NA.   0.91 MEQ/L   CA  0.46 MEQ/L   MG    0.26 MEQ/L
SOIL PH 6.5 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.20 MMHOS/CM
     PERCENT SATURATION 43.5      SODIUM ABSORPTION RATIO    1.52

************************** RESULTS OF SPECIAL TESTS ***************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  77.2    % SILT  12.0    % CLAY  10.8
** SOIL TEXTURE IS SANDY LOAM
```



```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.56 MEQ/L   NA.   0.91 MEQ/L   CA  0.46 MEQ/L   MG    0.26 MEQ/L
SOIL PH 6.5 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.20 MMHOS/CM
     PERCENT SATURATION 43.5      SODIUM ABSORPTION RATIO    1.52
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448552 742

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.16 MEQ/L   NA.   0.62 MEQ/L   CA  0.34 MEQ/L   MG    0.23 MEQ/L
SOIL PH 6.7 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.14 MMHOS/CM
     PERCENT SATURATION 40.0      SODIUM ABSORPTION RATIO    1.16

************************** RESULTS OF SPECIAL TESTS ***************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  71.2    % SILT  14.0    % CLAY  14.8
** SOIL TEXTURE IS SANDY LOAM
```



```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.16 MEQ/L   NA.   0.62 MEQ/L   CA  0.34 MEQ/L   MG    0.23 MEQ/L
SOIL PH 6.7 UNITS    K     0.10 MEQ/L   B    0.1 PPM   ECE    0.14 MMHOS/CM
     PERCENT SATURATION 40.0      SODIUM ABSORPTION RATIO    1.16
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448550

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.78 MEQ/L CA 0.11 MEQ/L MG 0.10 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.11 MMHOS/CM
PERCENT SATURATION 39.5 SODIUM ABSORPTION RATIO 2.41

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 14.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.78 MEQ/L CA 0.11 MEQ/L MG 0.10 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.11 MMHOS/CM
PERCENT SATURATION 39.5 SODIUM ABSORPTION RATIO 2.41

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448551

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.56 MEQ/L NA. 0.91 MEQ/L CA 0.46 MEQ/L MG 0.26 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.20 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.52

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 12.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.56 MEQ/L NA. 0.91 MEQ/L CA 0.46 MEQ/L MG 0.26 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.20 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.52

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448552

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.16 MEQ/L NA. 0.62 MEQ/L CA 0.34 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.7 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 40.0 SODIUM ABSORPTION RATIO 1.16

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 71.2 % SILT 14.0 % CLAY 14.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.16 MEQ/L NA. 0.62 MEQ/L CA 0.34 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.7 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 40.0 SODIUM ABSORPTION RATIO 1.16

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448553

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.14 MEQ/L   NA.   0.69 MEQ/L   CA  0.38 MEQ/L   MG     0.26 MEQ/L
SOIL PH 6.6 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.14 MMHOS/CM
       PERCENT SATURATION 44.7      SODIUM ABSORPTION RATIO    1.22

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  75.2    % SILT  16.8    % CLAY   8.0
** SOIL TEXTURE IS SANDY LOAM
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.14 MEQ/L   NA.   0.69 MEQ/L   CA  0.38 MEQ/L   MG     0.26 MEQ/L
SOIL PH 6.6 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.14 MMHOS/CM
       PERCENT SATURATION 44.7      SODIUM ABSORPTION RATIO    1.22
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SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448554

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.19 MEQ/L   NA.   0.69 MEQ/L   CA  0.35 MEQ/L   MG     0.25 MEQ/L
SOIL PH 6.0 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.13 MMHOS/CM
       PERCENT SATURATION 41.6      SODIUM ABSORPTION RATIO    1.26

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  75.2    % SILT  14.0    % CLAY  10.8
** SOIL TEXTURE IS SANDY LOAM
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.19 MEQ/L   NA.   0.69 MEQ/L   CA  0.35 MEQ/L   MG     0.25 MEQ/L
SOIL PH 6.0 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.13 MMHOS/CM
       PERCENT SATURATION 41.6      SODIUM ABSORPTION RATIO    1.26
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448555

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.22 MEQ/L   NA.   0.67 MEQ/L   CA  0.26 MEQ/L   MG     0.15 MEQ/L
SOIL PH 5.1 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.13 MMHOS/CM
       PERCENT SATURATION 41.7      SODIUM ABSORPTION RATIO    1.48

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS    % SAND  73.2    % SILT  18.8    % CLAY   8.0
** SOIL TEXTURE IS SANDY LOAM
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.22 MEQ/L   NA.   0.67 MEQ/L   CA  0.26 MEQ/L   MG     0.15 MEQ/L
SOIL PH 5.1 UNITS    K      0.10 MEQ/L   B    0.1 PPM   ECE     0.13 MMHOS/CM
       PERCENT SATURATION 41.7      SODIUM ABSORPTION RATIO    1.48
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448553

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.14 MEQ/L NA. 0.69 MEQ/L CA 0.38 MEQ/L MG 0.26 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 44.7 SODIUM ABSORPTION RATIO 1.22

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 16.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.14 MEQ/L NA. 0.69 MEQ/L CA 0.38 MEQ/L MG 0.26 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 44.7 SODIUM ABSORPTION RATIO 1.22

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448554

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.69 MEQ/L CA 0.35 MEQ/L MG 0.25 MEQ/L
SOIL PH 6.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 41.6 SODIUM ABSORPTION RATIO 1.26

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 14.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.69 MEQ/L CA 0.35 MEQ/L MG 0.25 MEQ/L
SOIL PH 6.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 41.6 SODIUM ABSORPTION RATIO 1.26

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448555

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.22 MEQ/L NA. 0.67 MEQ/L CA 0.26 MEQ/L MG 0.15 MEQ/L
SOIL PH 5.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 41.7 SODIUM ABSORPTION RATIO 1.48

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 73.2 % SILT 18.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.22 MEQ/L NA. 0.67 MEQ/L CA 0.26 MEQ/L MG 0.15 MEQ/L
SOIL PH 5.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 41.7 SODIUM ABSORPTION RATIO 1.48

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448556

7(?)

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.84 MEQ/L   NA.   0.93 MEQ/L   CA  0.44 MEQ/L   MG    0.50 MEQ/L
SOIL PH 5.4 UNITS    K     0.11 MEQ/L   B   0.1 PPM   ECE    0.14 MMHOS/CM
       PERCENT SATURATION 46.0      SODIUM ABSORPTION RATIO   1.36

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  63.2    % SILT  24.0    % CLAY  12.8
** SOIL TEXTURE IS SANDY LOAM
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.84 MEQ/L   NA.   0.93 MEQ/L   CA  0.44 MEQ/L   MG    0.50 MEQ/L
SOIL PH 5.4 UNITS    K     0.11 MEQ/L   B   0.1 PPM   ECE    0.14 MMHOS/CM
       PERCENT SATURATION 46.0      SODIUM ABSORPTION RATIO   1.36
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	25-Sep-2008 Information Sheet No. 805390	448547 to 448556

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448556

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.84 MEQ/L NA. 0.93 MEQ/L CA 0.44 MEQ/L MG 0.50 MEQ/L
SOIL PH 5.4 UNITS K 0.11 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 1.36

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 63.2 % SILT 24.0 % CLAY 12.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.84 MEQ/L NA. 0.93 MEQ/L CA 0.44 MEQ/L MG 0.50 MEQ/L
SOIL PH 5.4 UNITS K 0.11 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 1.36

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Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448498 - 448507

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
2B1	1.6	4	8		85	178	1245	2	0.9				
2B2	0.8	3	6		91	230	1278	1	0.5				
2B3	0.8	2	4		74	274	1459	1	0.6				
2B4	0.8	2	5		72	241	1284	1	0.3				
9A1	1.0	2		8	54	139	1283	1	0.9				
9A2	0.8	2		8	43	132	1038	2	0.6				
9A3	1.1	2	29		96	324	1804	1	0.4				
9A4	1.0	2	25		113	394	1736	1	0.4				
9B1	1.6	4	27		65	267	1632	4	0.9				
9B2	1.5	26	24		113	168	1147	6	1.6				
Average	1.1	5	16	8	81	235	1391	2	0.7				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	ACTUAL % OF TOTAL CEC %K	%Mg	%Ca	%Na	%H	Total CEC
2B1	6.3	7.1	--	0.17	29	2.3	15.4	64.5	1.3	16.6	9.7
2B2	6.4	7.3	--	0.17	35	2.5	20.2	67.3	1.6	8.4	9.5
2B3	6.5	--------	VL	0.17	40	1.9	23.0	73.4	1.7	0.0	9.9
2B4	6.5	--------	VL	0.14	22	2.1	23.1	73.7	1.1	0.0	8.7
9A1	7.2	--------	VL	0.20	122	1.7	14.1	77.8	6.4	0.0	8.2
9A2	7.3	--------	VL	0.16	73	1.6	16.4	77.3	4.7	0.0	6.7
9A3	6.6	--------	VL	0.21	63	2.0	22.1	73.7	2.2	0.0	12.2
9A4	6.9	--------	VL	0.19	28	2.3	26.5	70.1	1.0	0.0	12.4
9B1	6.9	--------	VL	0.23	87	1.5	20.4	74.7	3.5	0.0	10.9
9B2	5.4	7.1	--	0.27	30	3.2	15.3	62.6	1.4	17.5	9.2
Average	6.6	7.2	VL	0.19	53	1.9	18.3	65.1	2.2	12.5	10.7

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A Division of Cooperative Resources International

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(402) 476-0300

Submitted By	Submitted For
Wood Rodgers, Inc.	SOUTH TAHOE PUD
379 Double Eagle Court	1275 MEADOWCREST
Reno NV 89521	CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448508 - 448508

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
983	1.5	6	10		175	467	1981	5	0.9				
Average	1.5	6	10		175	467	1981	5	0.9				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	%K	%Mg	%Ca	%Na	%H	Total CEC
983	6.7	-------	VL	0.24	36	3.1	27.0	68.8	1.1	0.0	14.4
Average	6.7	----	VL	0.24	36	3.1	27.0	68.8	1.1	0.0	14.4

(%K through %H: ACTUAL % OF TOTAL CEC)

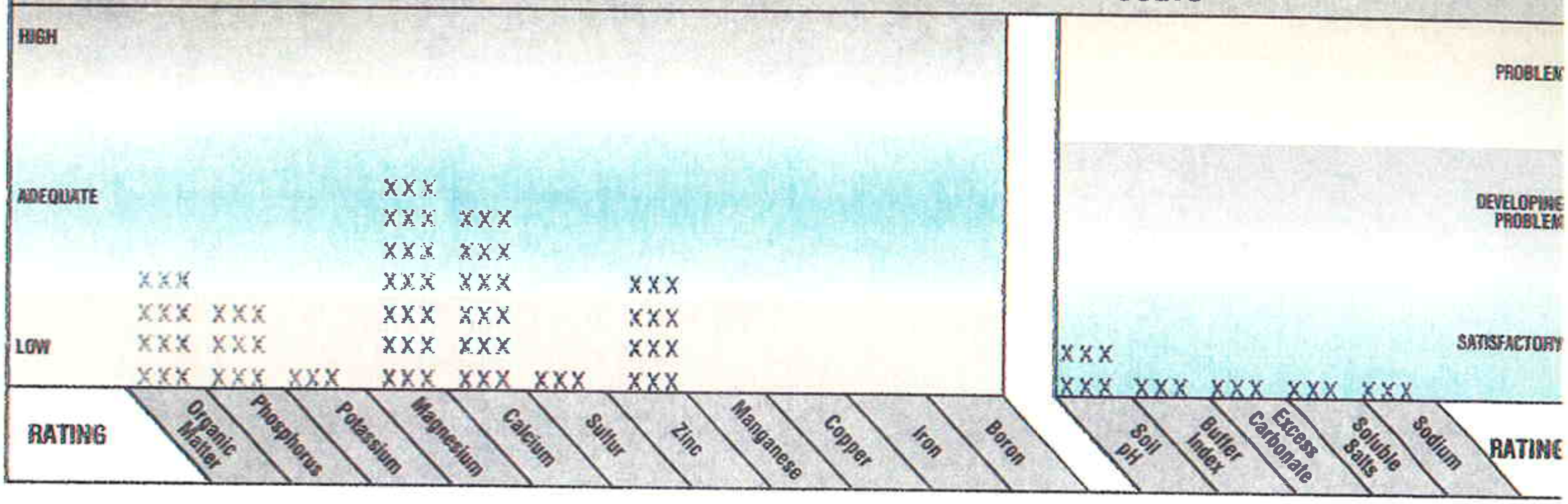
Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
2B1	PASTURE	3. 5	LIME 470	110	60	110	15	25.	02. 0				
2B2	PASTURE	3. 5	LIME 230	115	65	105	0	25.	04. 5				
2B3	PASTURE	3. 5		115	65	135	0	25.	04. 0				
2B4	PASTURE	3. 5		115	65	135	0	25.	05. 0				
9A1	PASTURE	3. 5	GYPSUM 200	115	50	150	15	25.	02. 0				
9A2	PASTURE	3. 5		115	50	160	15	25.	04. 0				
9A3	PASTURE	3. 5		115	40	100	0	25.	05. 0				
9A4	PASTURE	3. 5		115	40	70	0	25.	05. 0				
9B1	PASTURE	3. 5		110	40	145	0	20.	02. 0				
9B2	PASTURE	3. 5	LIME 520	75	40	60	15	15. 0	0				
Average	PASTURE	3. 5 Bu		110	50	120	0	25. 0	3. 5				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P2O5 39, K2O 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID	2B1	2B2	2B3	2B4	9A1	9A2	9A3	9A4	9
BULK DENSITY	1. 5	1. 5	1. 5	1. 4	1. 5	1. 5	1. 3	1. 3	1. 5	1. 4
CONVERSION FCTR	2. 2	2. 2	2. 2	2. 1	2. 3	2. 3	2. 0	2. 0	2. 2	2. 1

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

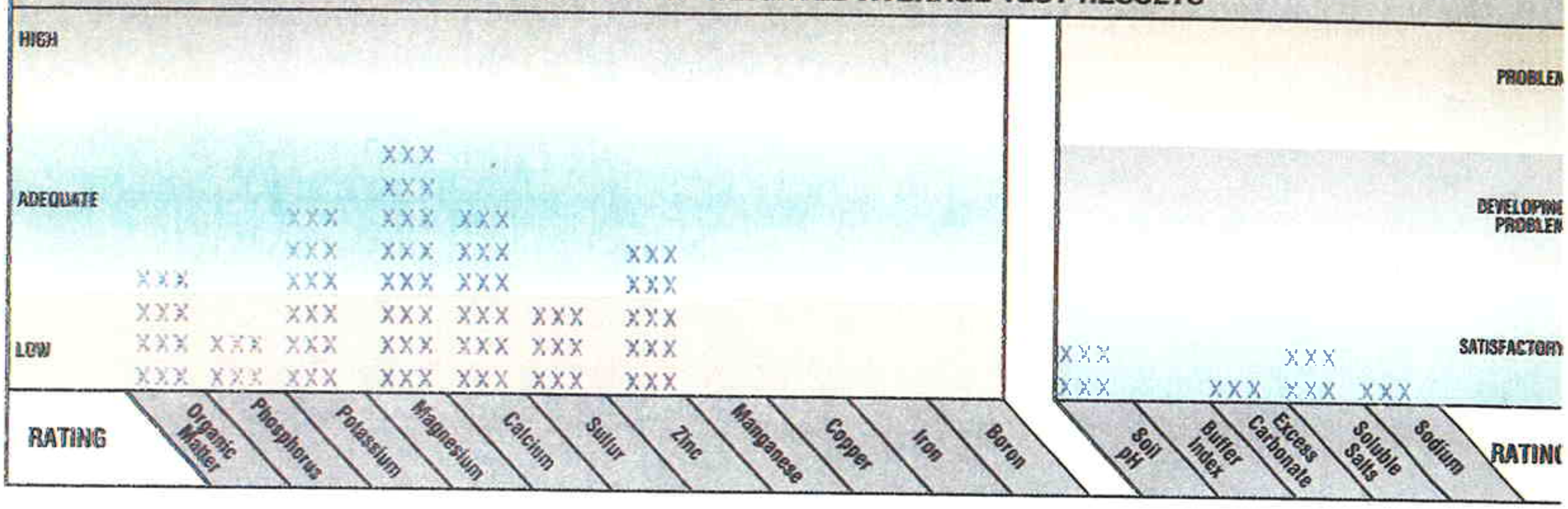
Submitted By

Wood Rodgers, Inc.
975 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
9B3	PASTURE	3. 5		110	55	0	0	15. 0	2. 0				
Average	PASTURE	3. 5 Bu		110	55	0	0	15. 0	2. 0				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE; N 123, P205 37, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID 9B3
BULK DENSITY 1. 4
CONVERSION FCTR 2. 0

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

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Submitted By
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Reno, NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported
24-Sep-2008

Information Sheet No.
805383

Laboratory Nos.
448498 to 448507

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448498

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.28 MEQ/L NA. 0.33 MEQ/L CA 0.44 MEQ/L MG 0.27 MEQ/L
SOIL PH 6.3 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.55

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 16.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.28 MEQ/L NA. 0.33 MEQ/L CA 0.44 MEQ/L MG 0.27 MEQ/L
SOIL PH 6.3 UNITS K 0.12 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.55

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448499

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.34 MEQ/L NA. 0.22 MEQ/L CA 0.26 MEQ/L MG 0.15 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.49

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 77.2 % SILT 10.0 % CLAY 12.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.34 MEQ/L NA. 0.22 MEQ/L CA 0.26 MEQ/L MG 0.15 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.49

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448500

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.17 MEQ/L NA. 0.24 MEQ/L CA 0.29 MEQ/L MG 0.14 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 38.5 SODIUM ABSORPTION RATIO 0.52

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 71.2 % SILT 14.0 % CLAY 14.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.17 MEQ/L NA. 0.24 MEQ/L CA 0.29 MEQ/L MG 0.14 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 38.5 SODIUM ABSORPTION RATIO 0.52

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805383	448498 to 448507

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448501

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.24 MEQ/L  NA.  0.45 MEQ/L  CA  0.22 MEQ/L  MG  0.16 MEQ/L
SOIL PH 6.5 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.13 MMHOS/CM
PERCENT SATURATION 39.5  SODIUM ABSORPTION RATIO  1.03

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS  % SAND  83.2  % SILT  6.0  % CLAY  10.8
** SOIL TEXTURE IS LOAMY SAND
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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.24 MEQ/L  NA.  0.45 MEQ/L  CA  0.22 MEQ/L  MG  0.16 MEQ/L
SOIL PH 6.5 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.13 MMHOS/CM
PERCENT SATURATION 39.5  SODIUM ABSORPTION RATIO  1.03
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SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448502

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.38 MEQ/L  NA.  1.12 MEQ/L  CA  0.26 MEQ/L  MG  0.13 MEQ/L
SOIL PH 7.2 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.19 MMHOS/CM
PERCENT SATURATION 40.0  SODIUM ABSORPTION RATIO  2.54

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS  % SAND  85.2  % SILT  14.8  % CLAY  0.0
** SOIL TEXTURE IS SAND
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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.38 MEQ/L  NA.  1.12 MEQ/L  CA  0.26 MEQ/L  MG  0.13 MEQ/L
SOIL PH 7.2 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.19 MMHOS/CM
PERCENT SATURATION 40.0  SODIUM ABSORPTION RATIO  2.54
```


SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448503

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.13 MEQ/L  NA.  0.83 MEQ/L  CA  0.24 MEQ/L  MG  0.21 MEQ/L
SOIL PH 7.3 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.13 MMHOS/CM
PERCENT SATURATION 36.9  SODIUM ABSORPTION RATIO  1.75

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS  % SAND  83.2  % SILT  14.8  % CLAY  2.0
** SOIL TEXTURE IS LOAMY SAND
```


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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE  0.13 MEQ/L  NA.  0.83 MEQ/L  CA  0.24 MEQ/L  MG  0.21 MEQ/L
SOIL PH 7.3 UNITS  K  0.10 MEQ/L  B  0.1 PPM  ECE  0.13 MMHOS/CM
PERCENT SATURATION 36.9  SODIUM ABSORPTION RATIO  1.75
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805383	448498 to 448507

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448504

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.42 MEQ/L NA. 0.56 MEQ/L CA 0.34 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 42.9 SODIUM ABSORPTION RATIO 1.05

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 57.2 % SILT 28.0 % CLAY 14.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.42 MEQ/L NA. 0.56 MEQ/L CA 0.34 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 42.9 SODIUM ABSORPTION RATIO 1.05

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448505

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.47 MEQ/L NA. 0.64 MEQ/L CA 0.36 MEQ/L MG 0.30 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 48.1 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 63.2 % SILT 22.0 % CLAY 14.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.47 MEQ/L NA. 0.64 MEQ/L CA 0.36 MEQ/L MG 0.30 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 48.1 SODIUM ABSORPTION RATIO 1.11

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448506

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 1.11 MEQ/L NA. 1.64 MEQ/L CA 0.91 MEQ/L MG 0.53 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.41 MMHOS/CM
PERCENT SATURATION 40.8 SODIUM ABSORPTION RATIO 1.93

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 79.2 % SILT 14.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 1.11 MEQ/L NA. 1.64 MEQ/L CA 0.91 MEQ/L MG 0.53 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.41 MMHOS/CM
PERCENT SATURATION 40.8 SODIUM ABSORPTION RATIO 1.93

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805383	448498 to 448507

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448507

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.49 MEQ/L   NA.   1.35 MEQ/L   CA  2.30 MEQ/L   MG     1.11 MEQ/L
SOIL PH 5.4 UNITS    K     0.17 MEQ/L   B   0.1 PPM   ECE    0.67 MMHOS/CM
       PERCENT SATURATION 39.8     SODIUM ABSORPTION RATIO   1.03

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  81.2    % SILT  10.8    % CLAY   8.0
** SOIL TEXTURE IS LOAMY SAND
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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.49 MEQ/L   NA.   1.35 MEQ/L   CA  2.30 MEQ/L   MG     1.11 MEQ/L
SOIL PH 5.4 UNITS    K     0.17 MEQ/L   B   0.1 PPM   ECE    0.67 MMHOS/CM
       PERCENT SATURATION 39.8     SODIUM ABSORPTION RATIO   1.03
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805384	448508 to 448508

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448508

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.26 MEQ/L   NA.   0.81 MEQ/L   CA  0.72 MEQ/L   MG      0.49 MEQ/L
SOIL PH 6.7 UNITS     K      0.14 MEQ/L   B    0.1 PPM    ECE     0.29 MMHOS/CM
       PERCENT SATURATION 51.9      SODIUM ABSORPTION RATIO    1.04

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  59.2    % SILT  24.0    % CLAY  16.8
** SOIL TEXTURE IS SANDY LOAM
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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.26 MEQ/L   NA.   0.81 MEQ/L   CA  0.72 MEQ/L   MG      0.49 MEQ/L
SOIL PH 6.7 UNITS     K      0.14 MEQ/L   B    0.1 PPM    ECE     0.29 MMHOS/CM
       PERCENT SATURATION 51.9      SODIUM ABSORPTION RATIO    1.04
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Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	02-Oct-08	448509 -- 448518

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
4A1	1.8	8	16		63	263	1217	5	1.3				
4A2	1.1	2	12		64	283	1114	1	0.4				
4A3	0.9	2	9		70	281	1082	2	0.3				
4B1	1.6	4	10		240	153	1394	1	0.9				
4B2	1.1	3	15		77	190	1561	1	0.4				
4B3	1.2	2	14		91	363	1885	1	0.6				
4B4	0.8	2	12		75	260	1327	1	0.2				
1B1	1.4	3	18		102	153	1250	1	1.3				
1B2	1.0	2	29		104	154	1178	1	0.7				
1B3	0.9	2	26		104	168	1167	1	0.4				
Average	1.2	3	16		99	227	1318	2	0.7				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	ACTUAL % OF TOTAL CEC %K	%Mg	%Ca	%Na	%H	Total CEC
4A1	5.8	7.2	---	0.20	33	1.7	22.4	62.2	1.5	12.3	9.8
4A2	6.3	7.3	---	0.15	24	1.8	26.2	61.9	1.2	8.9	9.0
4A3	6.5-------		VL	0.14	24	2.2	29.1	67.3	1.3	0.0	8.0
4B1	6.4	7.3	---	0.16	23	6.3	13.1	71.4	1.0	8.2	9.8
4B2	7.0-------		VL	0.18	47	2.0	16.2	79.7	2.1	0.0	9.8
4B3	6.5-------		VL	0.20	43	1.8	23.5	73.3	1.5	0.0	12.9
4B4	6.9-------		VL	0.15	22	2.1	23.8	73.0	1.1	0.0	9.1
1B1	5.8	7.2	---	0.15	13	2.9	14.1	69.1	0.6	13.3	9.0
1B2	6.1	7.1	---	0.14	16	2.9	14.1	64.7	0.8	17.6	9.1
1B3	6.6-------		VL	0.13	17	3.5	18.5	77.0	1.0	0.0	7.6
Average	6.4	7.2	VL	0.16	26	2.5	19.0	66.1	1.1	11.2	10.0

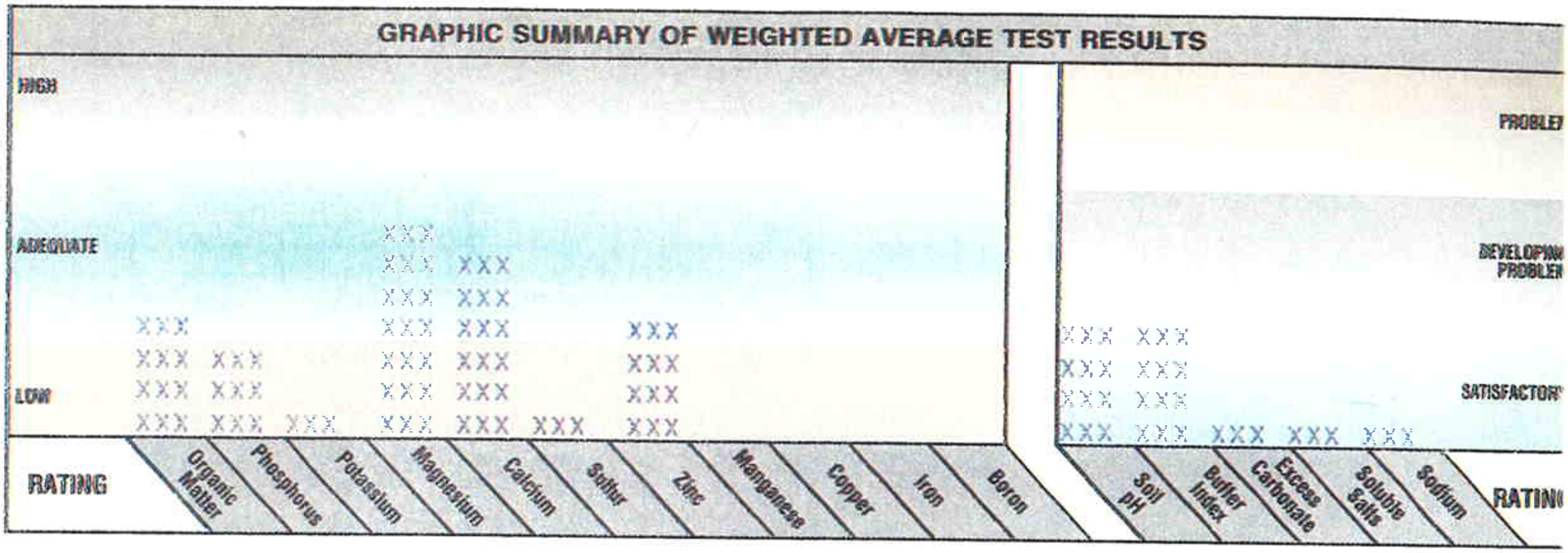
Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE									
				N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
4A1	PASTURE	3.5	LIME 390	105	50	145	0	15.0	0				
4A2	PASTURE	3.5	LIME 220	115	55	145	0	25.0	5.0				
4A3	PASTURE	3.5		115	60	140	0	25.0	5.0				
4B1	PASTURE	3.5	LIME 240	110	55	0	15	25.0	2.0				
4B2	PASTURE	3.5		115	50	125	15	25.0	5.0				
4B3	PASTURE	3.5		115	50	110	0	25.0	4.0				
4B4	PASTURE	3.5		115	55	130	0	25.0	5.5				
1B1	PASTURE	3.5	LIME 360	115	45	80	15	25.0	0				
1B2	PASTURE	3.5	LIME 460	115	40	75	15	25.0	3.5				
1B3	PASTURE	3.5		115	40	75	15	25.0	5.0				
Average	PASTURE	3.5 Bu	LIME 340	114	50	90	0	25.0	3.5				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE; N 123, P205 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID	4A1	4A2	4A3	4B1	4B2	4B3	4B4	1B1	1
BULK DENSITY	1.3	1.4	1.5	1.3	1.3	1.3	1.3	1.4	1.4	1.4
CONVERSION FCTR	2.0	2.1	2.2	2.0	1.9	1.9	1.9	2.1	2.2	2.2

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805385	448509 to 448518

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448509

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.35 MEQ/L NA. 0.83 MEQ/L CA 0.65 MEQ/L MG 0.46 MEQ/L
SOIL PH 5.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.27 MMHOS/CM
PERCENT SATURATION 47.1 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 73.2 % SILT 18.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.35 MEQ/L NA. 0.83 MEQ/L CA 0.65 MEQ/L MG 0.46 MEQ/L
SOIL PH 5.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.27 MMHOS/CM
PERCENT SATURATION 47.1 SODIUM ABSORPTION RATIO 1.11

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448510

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.23 MEQ/L NA. 0.59 MEQ/L CA 0.32 MEQ/L MG 0.25 MEQ/L
SOIL PH 6.3 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 49.4 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 73.2 % SILT 14.0 % CLAY 12.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.23 MEQ/L NA. 0.59 MEQ/L CA 0.32 MEQ/L MG 0.25 MEQ/L
SOIL PH 6.3 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.15 MMHOS/CM
PERCENT SATURATION 49.4 SODIUM ABSORPTION RATIO 1.11

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448511

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.56 MEQ/L NA. 0.59 MEQ/L CA 0.31 MEQ/L MG 0.36 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 39.2 SODIUM ABSORPTION RATIO 1.02

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 14.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.56 MEQ/L NA. 0.59 MEQ/L CA 0.31 MEQ/L MG 0.36 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.14 MMHOS/CM
PERCENT SATURATION 39.2 SODIUM ABSORPTION RATIO 1.02

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805385	448509 to 448518

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448512

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.32 MEQ/L NA. 0.66 MEQ/L CA 0.50 MEQ/L MG 0.21 MEQ/L
SOIL PH 6.4 UNITS K 0.22 MEQ/L B 0.1 PPM ECE 0.20 MMHOS/CM
PERCENT SATURATION 44.9 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 20.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.32 MEQ/L NA. 0.66 MEQ/L CA 0.50 MEQ/L MG 0.21 MEQ/L
SOIL PH 6.4 UNITS K 0.22 MEQ/L B 0.1 PPM ECE 0.20 MMHOS/CM
PERCENT SATURATION 44.9 SODIUM ABSORPTION RATIO 1.11

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448513

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.34 MEQ/L NA. 0.82 MEQ/L CA 0.27 MEQ/L MG 0.18 MEQ/L
SOIL PH 7.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 41.8 SODIUM ABSORPTION RATIO 1.73

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 71.2 % SILT 18.0 % CLAY 10.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.34 MEQ/L NA. 0.82 MEQ/L CA 0.27 MEQ/L MG 0.18 MEQ/L
SOIL PH 7.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 41.8 SODIUM ABSORPTION RATIO 1.73

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448514

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.29 MEQ/L NA. 0.78 MEQ/L CA 0.29 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 1.53

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 65.2 % SILT 22.0 % CLAY 12.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.29 MEQ/L NA. 0.78 MEQ/L CA 0.29 MEQ/L MG 0.23 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 1.53

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805385	448509 to 448518

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448515

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.30 MEQ/L NA. 0.63 MEQ/L CA 0.23 MEQ/L MG 0.20 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 45.8 SODIUM ABSORPTION RATIO 1.36

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 75.2 % SILT 16.8 % CLAY 8.0
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.30 MEQ/L NA. 0.63 MEQ/L CA 0.23 MEQ/L MG 0.20 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 45.8 SODIUM ABSORPTION RATIO 1.36

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448516

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.21 MEQ/L NA. 0.48 MEQ/L CA 0.34 MEQ/L MG 0.20 MEQ/L
SOIL PH 5.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 42.1 SODIUM ABSORPTION RATIO 0.92

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 79.2 % SILT 14.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.21 MEQ/L NA. 0.48 MEQ/L CA 0.34 MEQ/L MG 0.20 MEQ/L
SOIL PH 5.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 42.1 SODIUM ABSORPTION RATIO 0.92

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448517

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.48 MEQ/L CA 0.29 MEQ/L MG 0.19 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.98

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 81.2 % SILT 12.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.48 MEQ/L CA 0.29 MEQ/L MG 0.19 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 45.7 SODIUM ABSORPTION RATIO 0.98

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805385	448509 to 448518

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448518

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.34 MEQ/L   NA.   0.50 MEQ/L   CA  0.31 MEQ/L   MG     0.19 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.12 MMHOS/CM
       PERCENT SATURATION 37.2     SODIUM ABSORPTION RATIO   1.00

************************** RESULTS OF SPECIAL TESTS ***************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  79.2    % SILT  12.8    % CLAY   8.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.34 MEQ/L   NA.   0.50 MEQ/L   CA  0.31 MEQ/L   MG     0.19 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.12 MMHOS/CM
       PERCENT SATURATION 37.2     SODIUM ABSORPTION RATIO   1.00
```

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Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448537 - 448546

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
6A1	1.6	3	12		108	114	787	3	0.9				
6A2	1.4	4	17		74	116	852	1	0.8				
6A3	1.0	2	29		94	133	908	3	0.7				
6A4	0.9	4	14		79	106	775	1	0.3				
6A5	1.4	4	32		162	135	1285	2	1.3				
6B1	1.8	6	33		128	107	1306	1	1.4				
6B2	2.4	21	28		79	114	1161	8	1.8				
6B3	1.5	17	24		82	86	837	6	1.1				
6B4	0.9	12	36		93	91	772	4	0.6				
6B5	0.6	7	25		53	106	687	4	0.5				
Average	1.4	8	25		95	111	937	3	0.9				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

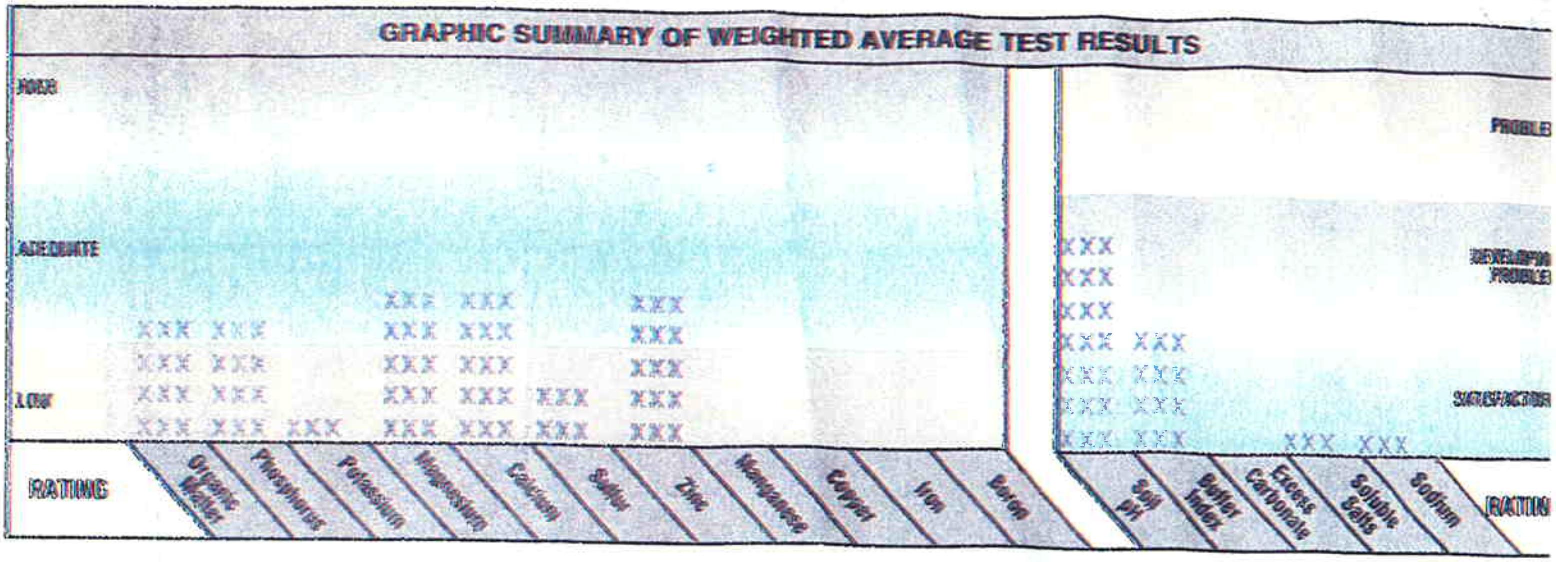
Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	%K	%Mg	%Ca	%Na	%H	Total CEC
						ACTUAL % OF TOTAL CEC					
6A1	6.0	7.0	--	0.13	11	3.8	13.2	54.6	0.7	27.7	7.2
6A2	6.2	7.0	--	0.13	10	2.5	13.0	57.1	0.6	26.8	7.5
6A3	6.4	7.2	--	0.13	15	3.4	15.5	63.5	0.9	16.8	7.2
6A4	6.2	7.2	--	0.12	12	3.3	14.2	62.4	0.8	19.3	6.2
6A5	6.3	7.4	--	0.14	7	4.9	13.4	76.5	0.4	4.8	8.4
6B1	6.1	7.3	--	0.15	7	3.8	10.4	76.1	0.4	9.3	8.6
6B2	5.0	6.8	--	0.25	10	2.0	9.5	58.0	0.4	30.0	10.0
6B3	4.8	7.1	--	0.19	7	3.1	10.6	62.1	0.5	23.7	6.7
6B4	5.5	7.3	--	0.15	7	4.2	13.3	67.9	0.5	14.1	5.7
6B5	5.4	7.3	--	0.13	10	2.6	16.7	64.8	0.8	15.1	5.3
Average	5.8	7.2	--	0.15	10	3.4	12.7	64.6	0.6	18.7	7.3

Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED N	P_2O_5	K_2O	IN LBS. PER ACRE MgO	S	Zn	Mn	Cu	Fe	B
6A1	PASTURE	3.5	LIME 460	115	55	65	15	20.0	2.0				
6A2	PASTURE	3.5	LIME 460	110	50	125	15	25.0	2.5				
6A3	PASTURE	3.5	LIME 260	115	40	95	15	20.0	3.5				
6A4	PASTURE	3.5	LIME 230	110	50	115	15	25.0	5.0				
6A6	PASTURE	3.5	LIME 100	110	30	0	15	25.0	0				
6B1	PASTURE	3.5	LIME 220	110	30	20	15	25.0	0				
6B2	PASTURE	3.5	LIME 1080	85	40	120	15	5.0	0				
6B3	PASTURE	3.5	LIME 430	90	40	110	15	15.0	0				
6B4	PASTURE	3.5	LIME 160	100	30	95	15	20.0	4.0				
6B5	PASTURE	3.5	LIME 150	105	40	150	15	20.0	4.5				
Average	PASTURE	3.5 Bu	LIME 330	105	40	90	15	20.0	1.5				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 120, P2O5 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID 6A1 6A2 6A3 6A4 6A6 6B1 6B2 6B3
BULK DENSITY 1.3 1.4 1.5 1.4 1.5 1.4 1.4 1.5 1.5 1.5
CONVERSION FCTR 2.0 2.1 2.3 2.2 2.3 2.2 2.1 2.3 2.3 2.2
TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805389	448537 to 448546

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448537

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.15 MEQ/L NA. 0.28 MEQ/L CA 0.35 MEQ/L MG 0.22 MEQ/L
SOIL PH 6.0 UNITS K 0.11 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 52.0 SODIUM ABSORPTION RATIO 0.52

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 89.2 % SILT 8.8 % CLAY 2.0
** SOIL TEXTURE IS SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.15 MEQ/L NA. 0.28 MEQ/L CA 0.35 MEQ/L MG 0.22 MEQ/L
SOIL PH 6.0 UNITS K 0.11 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 52.0 SODIUM ABSORPTION RATIO 0.52

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448538

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.38 MEQ/L CA 0.27 MEQ/L MG 0.18 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.8 SODIUM ABSORPTION RATIO 0.80

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 87.2 % SILT 8.8 % CLAY 4.0
** SOIL TEXTURE IS SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.38 MEQ/L CA 0.27 MEQ/L MG 0.18 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.8 SODIUM ABSORPTION RATIO 0.80

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448539

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.51 MEQ/L NA. 0.68 MEQ/L CA 0.38 MEQ/L MG 0.37 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 41.9 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 85.2 % SILT 8.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.51 MEQ/L NA. 0.68 MEQ/L CA 0.38 MEQ/L MG 0.37 MEQ/L
SOIL PH 6.4 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 41.9 SODIUM ABSORPTION RATIO 1.11

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805389	448537 to 448546

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448540

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.11 MEQ/L NA. 0.39 MEQ/L CA 0.35 MEQ/L MG 0.18 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 0.76

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 85.2 % SILT 8.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.11 MEQ/L NA. 0.39 MEQ/L CA 0.35 MEQ/L MG 0.18 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 0.76

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448541

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.12 MEQ/L NA. 0.50 MEQ/L CA 0.78 MEQ/L MG 0.32 MEQ/L
SOIL PH 6.3 UNITS K 0.13 MEQ/L B 0.1 PPM ECE 0.18 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 0.67

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 79.2 % SILT 16.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.12 MEQ/L NA. 0.50 MEQ/L CA 0.78 MEQ/L MG 0.32 MEQ/L
SOIL PH 6.3 UNITS K 0.13 MEQ/L B 0.1 PPM ECE 0.18 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 0.67

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448542

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.34 MEQ/L CA 0.87 MEQ/L MG 0.31 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.19 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 0.44

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 79.2 % SILT 16.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.34 MEQ/L CA 0.87 MEQ/L MG 0.31 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.19 MMHOS/CM
PERCENT SATURATION 43.0 SODIUM ABSORPTION RATIO 0.44

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805389	448537 to 448546

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448543

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.11 MEQ/L NA. 0.87 MEQ/L CA 2.04 MEQ/L MG 0.80 MEQ/L
SOIL PH 5.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.40 MMHOS/CM
PERCENT SATURATION 44.4 SODIUM ABSORPTION RATIO 0.73

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 85.2 % SILT 12.8 % CLAY 2.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.11 MEQ/L NA. 0.87 MEQ/L CA 2.04 MEQ/L MG 0.80 MEQ/L
SOIL PH 5.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.40 MMHOS/CM
PERCENT SATURATION 44.4 SODIUM ABSORPTION RATIO 0.73

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448544

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.09 MEQ/L NA. 0.57 MEQ/L CA 1.45 MEQ/L MG 0.60 MEQ/L
SOIL PH 4.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.31 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 0.56

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 87.2 % SILT 10.8 % CLAY 2.0
** SOIL TEXTURE IS SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.09 MEQ/L NA. 0.57 MEQ/L CA 1.45 MEQ/L MG 0.60 MEQ/L
SOIL PH 4.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.31 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 0.56

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448545

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.07 MEQ/L NA. 0.57 MEQ/L CA 1.23 MEQ/L MG 0.54 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.28 MMHOS/CM
PERCENT SATURATION 37.5 SODIUM ABSORPTION RATIO 0.61

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 83.2 % SILT 10.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.07 MEQ/L NA. 0.57 MEQ/L CA 1.23 MEQ/L MG 0.54 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.28 MMHOS/CM
PERCENT SATURATION 37.5 SODIUM ABSORPTION RATIO 0.61

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805389	448537 to 448546

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448546

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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.17 MEQ/L   NA.   0.78 MEQ/L   CA  0.90 MEQ/L   MG     0.48 MEQ/L
SOIL PH 5.4 UNITS     K     0.10 MEQ/L   B    0.1 PPM    ECE    0.23 MMHOS/CM
       PERCENT SATURATION 38.4      SODIUM ABSORPTION RATIO    0.94

************************** RESULTS OF SPECIAL TESTS *****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  87.2    % SILT   8.8    % CLAY   4.0
** SOIL TEXTURE IS SAND
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***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.17 MEQ/L   NA.   0.78 MEQ/L   CA  0.90 MEQ/L   MG     0.48 MEQ/L
SOIL PH 5.4 UNITS     K     0.10 MEQ/L   B    0.1 PPM    ECE    0.23 MMHOS/CM
       PERCENT SATURATION 38.4      SODIUM ABSORPTION RATIO    0.94
```

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Submitted By
Wood Rodgers, Inc.
575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448519 - 448528

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm IF pH <7.1	Phosphorus ppm IF pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
6C1	1.6	2	16		126	117	846	3	1.0				
6C2	1.8	3	22		99	124	840	1	0.6				
6C3	0.7	2	19		86	113	657	3	0.4				
6C4	0.7	2	20		82	131	929	5	0.7				
8A1	3.8	5	39		115	614	3462	2	1.3				
8A2	2.7	3	18		120	777	4128	2	0.7				
8A3	0.8	3	14		46	480	2112	1	0.5				
3A1	1.6	5	11		119	172	1167	1	1.0				
3A2	1.4	3	14		161	192	1152	4	0.3				
3A3	1.0	2	16		118	145	881	6	0.3				
Average	1.6	3	19		107	287	1617	3	0.7				

SUMMARY OF ANALYTICAL RESULTS / CATION EXCHANGE CAPACITY

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm	ACTUAL % OF TOTAL CEC %K	%Mg	%Ca	%Na	%H	Total CEC
6C1	6.2	7.2	--	0.15	45	4.7	14.1	61.1	2.8	17.3	6.9
6C2	6.2	7.2	--	0.13	23	3.7	15.2	61.9	1.5	17.7	6.8
6C3	6.6	--------	VL	0.11	21	4.9	20.7	72.4	2.0	0.0	4.5
6C4	6.8	--------	VL	0.13	23	2.5	18.1	76.8	1.7	0.0	6.0
8A1	7.0	--------	VL	0.35	80	1.3	22.2	75.0	1.5	0.0	23.1
8A2	6.9	--------	VL	0.39	80	1.1	23.3	74.3	1.3	0.0	27.8
8A3	6.5	--------	VL	0.22	36	0.8	27.0	71.2	1.1	0.0	14.8
3A1	5.5	7.0	--	0.17	21	3.2	14.8	60.4	0.9	20.7	9.7
3A2	6.1	7.1	--	0.17	25	4.4	16.9	60.7	1.1	16.9	9.5
3A3	6.6	--------	VL	0.13	19	5.0	20.1	73.4	1.4	0.0	6.0
Average	6.4	7.1	VL	0.20	37	2.2	19.2	65.2	1.3	12.1	12.4

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Submitted By
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575 Double Eagle Court

Reno NV 89521

Submitted For
SOUTH TAHOE PUD
1275 MEADOWCREST
CA 96150

Date Reported	Laboratory Turnaround	Samples Will Be Stored Until	Laboratory Sample Number
24-Sep-2008	< 3 DAYS	08-Oct-08	448529 - 448529

SUMMARY REPORT OF ANALYTICAL RESULTS

Sample Number	% Organic Matter	Nitrate N ppm	Phosphorus ppm P pH <7.1	Phosphorus ppm P pH >7.1	Potassium ppm	Magnesium ppm	Calcium ppm	Sulfur ppm	Zinc ppm	Manganese ppm	Copper ppm	Iron ppm	Boron ppm
3A4	0.8	3	14		84	115	769	3	0.3				
Average	0.8	3	14		84	115	769	3	0.3				

SUMMARY OF ANALYTICAL RESULTS

Sample Number	Soil pH	Buffer Index	Excess Carbonate	Soluble Salts mmhos/cm	Sodium ppm
3A4	6.3	7.4	---	0.12	18
Average	6.3	7.4	---	0.12	18

CATION EXCHANGE CAPACITY

ACTUAL % OF TOTAL CEC

	%K	%Mg	%Ca	%Na	%H	Total CEC
3A4	3.9	17.4	69.9	1.4	7.3	5.5
Average	3.9	17.4	69.9	1.4	7.3	5.5

Submitted By
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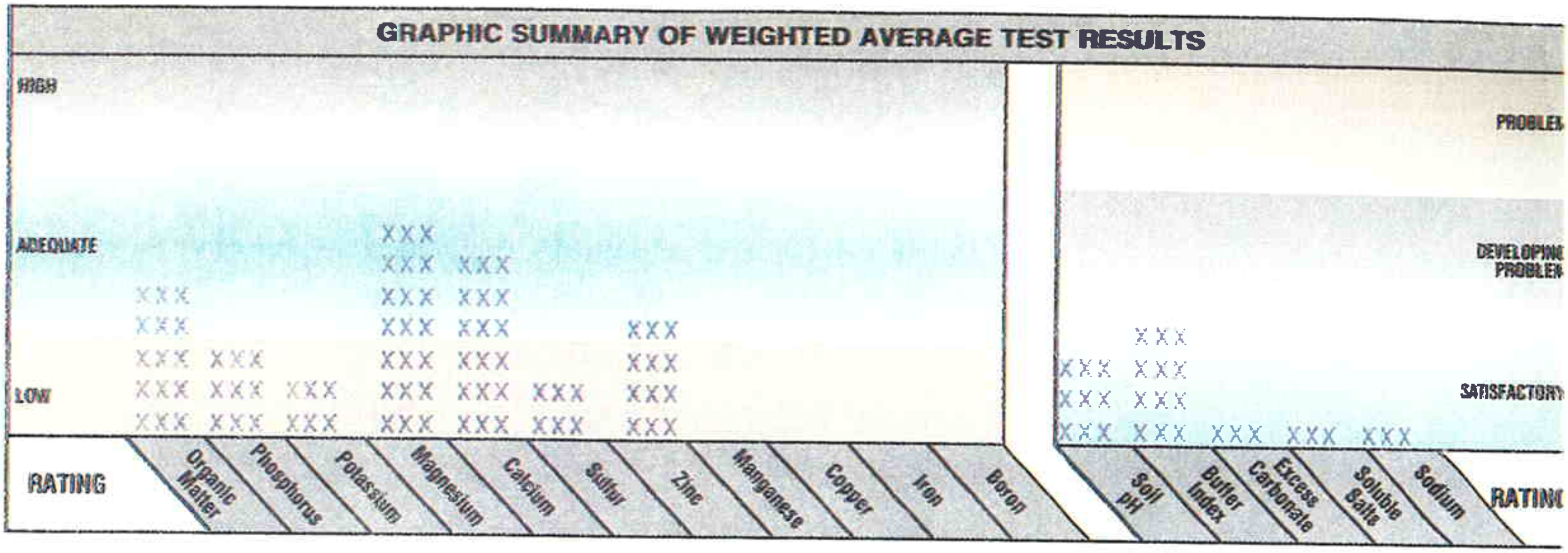
Reno NV 89521

Submitted For
SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
				PLANT FOOD NEED IN LBS. PER ACRE									
6C1	PASTURE	3.5	LIME 260	115	50	25	15	20.0	0				
6C2	PASTURE	3.5	LIME 250	115	45	85	15	25.0	4.0				
6C3	PASTURE	3.5		115	45	105	15	20.0	5.0				
6C4	PASTURE	3.5		115	45	115	15	15.0	3.5				
8A1	PASTURE	3.5		110	30	75	0	20.0	0				
8A2	PASTURE	3.5		115	50	75	0	15.0	3.5				
8A3	PASTURE	3.5		115	50	175	0	25.0	4.5				
3A1	PASTURE	3.5	LIME 680	110	55	45	15	25.0	0				
3A2	PASTURE	3.5	LIME 480	115	50	0	15	20.0	5.0				
3A3	PASTURE	3.5		115	50	45	15	15.0	5.0				
Average	PASTURE	3.5 Bu	LIME 550	114	45	75	0	20.0	3.5				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P205 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID 6C1 6C2 6C3 6C4 8A1 8A2 8A3 3A1

BULK DENSITY 1.3 1.4 1.4 1.5 1.1 1.1 1.3 1.3 1.4 1.3

CONVERSION FCTR 2.0 2.2 2.2 2.2 1.7 1.7 2.0 2.0 2.2 2.0

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

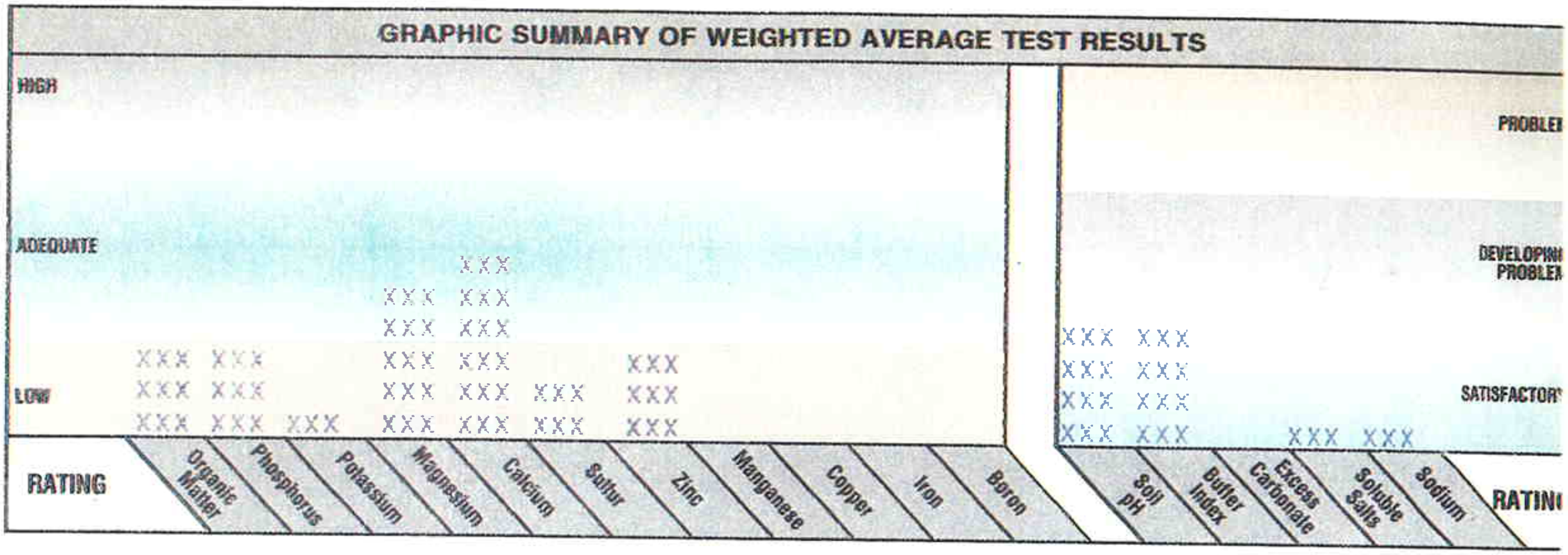
Submitted By

Wood Rodgers, Inc.
575 Double Eagle Court
Reno NV 89521

Submitted For

SOUTH TAHOE PUD
CA 96150

GRAPHIC SUMMARY OF WEIGHTED AVERAGE TEST RESULTS



SUMMARY OF SOIL FERTILITY AND PLANT NUTRIENT GUIDELINES

Sample Number			L=Lime G=Gypsum S=Sulfur	PLANT FOOD NEED IN LBS. PER ACRE N	P_2O_5	K_2O	MgO	S	Zn	Mn	Cu	Fe	B
3A4	PASTURE	3.5	LIME 70	115	50	110	15	20.0	5.0				
Average	PASTURE	3.5 Bu	LIME 70	115	50	110	15	20.0	5.0				

SPECIAL COMMENTS

CROP REMOVAL RATE FOR ABOVE: N 123, P205 39, K20 105, IN POUNDS/ACRE.

THE BULK DENSITY OF THE SOIL DETERMINES THE FACTOR WHICH CONVERTS PPM INTO LBS/ACRE. BELOW ARE LISTED THE BULK DENSITIES AND CONVERSION FACTORS:

SAMPLE ID 3A4
BULK DENSITY 1.4
CONVERSION FCTR 2.1

TO INCREASE EFFICIENCY, NITROGEN SHOULD BE SPLIT INTO MULTIPLE APPLICATIONS.

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805386	448519 to 448528

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448519

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.40 MEQ/L NA. 0.99 MEQ/L CA 0.24 MEQ/L MG 0.12 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 58.7 SODIUM ABSORPTION RATIO 2.33

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 83.2 % SILT 12.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.40 MEQ/L NA. 0.99 MEQ/L CA 0.24 MEQ/L MG 0.12 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.16 MMHOS/CM
PERCENT SATURATION 58.7 SODIUM ABSORPTION RATIO 2.33

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448520

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.60 MEQ/L CA 0.25 MEQ/L MG 0.15 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.7 SODIUM ABSORPTION RATIO 1.34

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 81.2 % SILT 12.8 % CLAY 6.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.19 MEQ/L NA. 0.60 MEQ/L CA 0.25 MEQ/L MG 0.15 MEQ/L
SOIL PH 6.2 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.12 MMHOS/CM
PERCENT SATURATION 43.7 SODIUM ABSORPTION RATIO 1.34

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448521

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.49 MEQ/L CA 0.20 MEQ/L MG 0.12 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.11 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 1.23

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 89.2 % SILT 6.8 % CLAY 4.0
** SOIL TEXTURE IS SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.49 MEQ/L CA 0.20 MEQ/L MG 0.12 MEQ/L
SOIL PH 6.6 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.11 MMHOS/CM
PERCENT SATURATION 46.0 SODIUM ABSORPTION RATIO 1.23

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805386	448519 to 448528

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448522

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.57 MEQ/L CA 0.70 MEQ/L MG 0.37 MEQ/L
SOIL PH 6.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.19 MMHOS/CM
PERCENT SATURATION 54.1 SODIUM ABSORPTION RATIO 0.78

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 87.2 % SILT 10.8 % CLAY 2.0
** SOIL TEXTURE IS SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.10 MEQ/L NA. 0.57 MEQ/L CA 0.70 MEQ/L MG 0.37 MEQ/L
SOIL PH 6.8 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.19 MMHOS/CM
PERCENT SATURATION 54.1 SODIUM ABSORPTION RATIO 0.78

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448523

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.37 MEQ/L NA. 1.00 MEQ/L CA 0.99 MEQ/L MG 0.60 MEQ/L
SOIL PH 7.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.31 MMHOS/CM
PERCENT SATURATION 63.5 SODIUM ABSORPTION RATIO 1.12

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 37.2 % SILT 40.0 % CLAY 22.8
** SOIL TEXTURE IS LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.37 MEQ/L NA. 1.00 MEQ/L CA 0.99 MEQ/L MG 0.60 MEQ/L
SOIL PH 7.0 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.31 MMHOS/CM
PERCENT SATURATION 63.5 SODIUM ABSORPTION RATIO 1.12

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448524

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.25 MEQ/L NA. 0.95 MEQ/L CA 0.78 MEQ/L MG 0.49 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.25 MMHOS/CM
PERCENT SATURATION 70.2 SODIUM ABSORPTION RATIO 1.19

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 41.2 % SILT 30.0 % CLAY 28.8
** SOIL TEXTURE IS CLAY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.25 MEQ/L NA. 0.95 MEQ/L CA 0.78 MEQ/L MG 0.49 MEQ/L
SOIL PH 6.9 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.25 MMHOS/CM
PERCENT SATURATION 70.2 SODIUM ABSORPTION RATIO 1.19

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805386	448519 to 448528

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448525

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.48 MEQ/L NA. 0.98 MEQ/L CA 0.79 MEQ/L MG 0.61 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.26 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.17

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 67.2 % SILT 18.0 % CLAY 14.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.48 MEQ/L NA. 0.98 MEQ/L CA 0.79 MEQ/L MG 0.61 MEQ/L
SOIL PH 6.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.26 MMHOS/CM
PERCENT SATURATION 43.5 SODIUM ABSORPTION RATIO 1.17

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448526

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.14 MEQ/L NA. 0.69 MEQ/L CA 0.50 MEQ/L MG 0.27 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.17 MMHOS/CM
PERCENT SATURATION 52.6 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 79.2 % SILT 16.8 % CLAY 4.0
** SOIL TEXTURE IS LOAMY SAND

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.14 MEQ/L NA. 0.69 MEQ/L CA 0.50 MEQ/L MG 0.27 MEQ/L
SOIL PH 5.5 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.17 MMHOS/CM
PERCENT SATURATION 52.6 SODIUM ABSORPTION RATIO 1.11

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448527

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.69 MEQ/L NA. 0.59 MEQ/L CA 0.29 MEQ/L MG 0.28 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 43.7 SODIUM ABSORPTION RATIO 1.11

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS % SAND 69.2 % SILT 14.0 % CLAY 16.8
** SOIL TEXTURE IS SANDY LOAM

***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE 0.69 MEQ/L NA. 0.59 MEQ/L CA 0.29 MEQ/L MG 0.28 MEQ/L
SOIL PH 6.1 UNITS K 0.10 MEQ/L B 0.1 PPM ECE 0.13 MMHOS/CM
PERCENT SATURATION 43.7 SODIUM ABSORPTION RATIO 1.11

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805386	448519 to 448528

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448528

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.14 MEQ/L   NA.   0.47 MEQ/L   CA  0.19 MEQ/L   MG     0.11 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.09 MMHOS/CM
       PERCENT SATURATION 48.2     SODIUM ABSORPTION RATIO    1.21

************************** RESULTS OF SPECIAL TESTS ****************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  75.2    % SILT  14.0    % CLAY  10.8
** SOIL TEXTURE IS SANDY LOAM
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.14 MEQ/L   NA.   0.47 MEQ/L   CA  0.19 MEQ/L   MG     0.11 MEQ/L
SOIL PH 6.6 UNITS    K     0.10 MEQ/L   B   0.1 PPM   ECE    0.09 MMHOS/CM
       PERCENT SATURATION 48.2     SODIUM ABSORPTION RATIO    1.21
```

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Submitted By	Submitted For	Date Reported	Laboratory Nos.
Wood Rodgers, Inc. 575 Double Eagle Court Reno, NV 89521	SOUTH TAHOE PUD 1275 MEADOWCREST CA 96150	24-Sep-2008 Information Sheet No. 805387	448529 to 448529

SPECIAL TESTS / COMMENTS

SPECIAL TEST RESULTS FOR LABORATORY NUMBER 448529

```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.08 MEQ/L   NA.   0.41 MEQ/L   CA  0.19 MEQ/L   MG     0.11 MEQ/L
SOIL PH 6.3 UNITS    K     0.10 MEQ/L   B    0.1 PPM    ECE    0.12 MMHOS/CM
       PERCENT SATURATION 47.6     SODIUM ABSORPTION RATIO    1.06

************************** RESULTS OF SPECIAL TESTS ***************************
** MOLYBDENUM ----- PPM
** PARTICLE SIZE ANALYSIS   % SAND  83.2    % SILT  10.8    % CLAY   6.0
** SOIL TEXTURE IS LOAMY SAND
```


```
***************ANALYTICAL RESULTS ON A SATURATED PASTE EXTRACT***************
CHLORIDE   0.08 MEQ/L   NA.   0.41 MEQ/L   CA  0.19 MEQ/L   MG     0.11 MEQ/L
SOIL PH 6.3 UNITS    K     0.10 MEQ/L   B    0.1 PPM    ECE    0.12 MMHOS/CM
       PERCENT SATURATION 47.6     SODIUM ABSORPTION RATIO    1.06
```

APPENDIX 4
ASSIMILATION CAPACITY TECHNICAL REPORT

DIAMOND VALLEY RANCH

ASSIMILATION CAPACITY

TECHNICAL REPORT

Prepared For

South Tahoe Public Utilities District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150-7401

Prepared By

WOOD RODGERS

Wood Rodgers, Inc.
123 W. Nye Lane, Suite 121
Carson City, Nevada 89706

January 2009

TABLE OF CONTENTS

1.0 INTRODUCTION

Lahontan Regional Water Quality Control Board (Lahontan) informed the South Tahoe Public Utilities District (STPUD) that an Assimilative Capacity Model must be completed as an element of the South Tahoe Public Utilities District Diamond Valley Ranch Nutrient Management Plan (NMP). As such, Wood Rodgers Inc. was directed by STPUD to prepare the model.

In their Assimilative Capacity Staff Report, Lahontan defines assimilative capacity as "the ability of a [ground] water body to receive and accommodate natural and anthropogenic sources of pollutants (from point and non-point sources), while maintaining water quality standards that are protective of the beneficial uses of the water resource." Specifically, it is the ability of the receiving groundwater to absorb nutrients without excessively taxing the receiving water. Several factors can affect the assimilative capacity of a groundwater basin, including input nutrients/contaminants to the existing systems such as with treated wastewater, soil type, and background groundwater chemistry.

This technical report was prepared at the request of STPUD and is intended to outline the procedure used to address the assimilative capacity of the groundwater at the Diamond Valley Ranch (DVR).

2.0 REGULATORY REQUIREMENTS

At present there are no regulatory requirements for users to prepare either Nutrient Management Plans or Assimilation Capacity models for the reuse of treated wastewater for agricultural irrigation. However, the State Water Quality Control Board is in the process of developing such regulations and associated requirements for planning and reporting.

STPUD and Wood Rodgers were provided with the "Staff Report: Assimilative Capacity Workshop" (Lahontan) as a means to prepare the requested Assimilation Capacity Model. The staff report did not provide guidance on how to develop the model, nor did it outline Lahontan's requirements for model variables.

The goal of the Assimilative Capacity Workshop, was to give the board "a better understanding of the factors that should be evaluated in making decisions within the context of Resolution No. 68-16" (Lahontan). This resolution, entitled *Statement of Policy with Respect to Maintaining High Quality of Waters in California*, is commonly referred to as the Nondegradation Policy and it was adopted in 1968. As a result, Lahontan established a non-degradation objective in their Basin Plan.

The factors that Lahontan must consider when adopting water quality objectives are listed in the Porter-Cologne Water Quality Control Act and they were summarized in the staff report. The factors include: past, present, and probable future beneficial uses of the water; environmental characteristics of the hydrographic unit under consideration and its water quality; water quality conditions that could reasonably be achieved through the coordinated control of all factors which affect water quality in the area; economic considerations; the need for developing housing in the region; and, the need to develop and use recycled water.

The purpose of developing the model was to determine (1) whether irrigating with reclaimed water would degrade the receiving groundwater, and (2) how many years it would take to exceed a specific threshold if degradation was in fact observed.

3.0 METHODS

In order to develop the requested model, water quality data for three reclaimed water irrigation locations in Carson Valley, Nevada, were collected from the Nevada Department of Environmental Protection (NDEP). Wood Rodgers had copies of an approved Effluent Management Plan (EMP) for each of these sites in, so the corresponding Discharge Monitoring Report (DMR) data was requested. For each site, the initial total nitrogen concentration of the applied reclaimed water was noted and quarterly water quality data (nitrate concentration) from on-site monitoring wells was examined. The applied reclaimed water flow rate was also noted.

The intent of examining the existing data was to determine whether a degradation of the groundwater was occurring as a result of the reclaimed water irrigation. This method was the best possible approach since it utilized site-specific, empirical data. A predictive model, developed from various assumptions, would not provide the same level of confidence as the actual site data.

4.0 ANALYSIS

The data was evaluated for the three locations, but the data was limited. The nitrate concentration of the groundwater at the Park Land and Cattle Company Property (Table 1) did not increase above the permitted maximum as a result of reclaimed water irrigation. The recorded groundwater nitrate concentrations appeared to fluctuate randomly from quarter to quarter and the concentrations of nitrate in the groundwater did not appear to be related to the concentration of total nitrogen in the applied reclaimed water.

Table 1. DMR data for Park Land and Cattle Co. Property, Permit NEV2003500

			Monitoring Well Nitrate (mg/L); max allowed by permit is 7 mg/L				
Quarter-Year	Effluent Applied (MGD)	Max Effluent Total N (mg/L)	MW#2	MW#3	MW#4	MW#7	MW#10
1-2007	1.48	0.52	0.1	0.05	0.05	0.73	Not drilled
2-2007	No data from NDEP						
3-2007	0.73	19	0.12	0.05	0.05	1.4	0.05
4-2007	0	n/a	0.1	0.05	0.05	1.8	0.05
1-2008	0	n/a	0.19	0.15	0.05	1.4	0.5
2-2008	0	n/a	1.3	0.05	0.05	2.4	0.05

Data from the other two sites was also evaluated. There was no reclaimed water irrigation reported on the DMRs, so the determination of a possible relationship could not be completed.

We can only hypothesize, at this point, based on the Park Land and Cattle Data, that there is no cumulative effect. There were only two quarters where effluent was used (the actual flows of 0.73 MGD and 1.48 MGD were recorded on the DMR) and no significant increase in groundwater nitrate concentration was observed over a six-quarter period.

If requested by Lahontan, future work could occur directly with NDEP. Information could be provided as to which site(s) had the longest history/duration of effluent irrigation and a similar analysis on that data could be undertaken since it would be more representative of the long-term. Additionally, since baseline data already exist for the DVR, post-irrigation empirical data could be collected and evaluated in order to verify that there is no cumulative effect as Wood Rodgers initially hypothesized.

5.0 FINDINGS

Because no trend could be observed that correlated the concentration of nitrate in the receiving groundwater to the concentration of nitrate in the applied reclaimed water, the type of predictive model requested by Lahontan could not be created. As a result, the methods required for an Effluent Management Plan, as outlined in Metcalf and Eddy (1991), were used to determine the maximum amount of reclaimed water that could be applied as irrigation on the Diamond Valley Ranch.

The "nitrogen loading" determination (Metcalf and Eddy 1991) accomplishes the same goal as an assimilation capacity model, but in a different manner. It is a better method because the "nitrogen loading" determination allows one to precisely determine the amount of reclaimed water that can be applied, given the nitrogen concentration of the reclaimed water, the threshold nitrate concentration for the receiving water, the specific crop (alfalfa fixes nitrogen and more reclaimed water can be applied compared to pasture grass), and the climate conditions (evapotranspiration and precipitation).

In order to determine the maximum allowable application rate, three distinct irrigation balances are required (plant consumptive use, nitrogen loading, and soil permeability) to be calculated in order to determine the limiting hydraulic loading rate. The assumed beneficial use of the groundwater is drinking water supply; therefore the maximum allowable nitrate concentration should be 10 mg/l, which is the current MCL for nitrate. As is common practice in developing a Nevada (EMP), a "red-flag" threshold level of 7 mg/l was set to insure that the receiving groundwater resource would not be excessively degraded to a point where it was no longer useable. A lower number could be used if an additional factor of safety was desired. This work is detailed in the Diamond Valley Ranch Nutrient Management Plan.

Because no cumulative effect was observed in the recorded data, Wood Rodgers has concluded that the assimilative capacity of receiving waters will not be impacted when irrigated with current STPUD recycled water, and a predictive degradation model would not be necessary. The accepted practice of using the three distinct irrigation balances to determine the limiting hydraulic loading rate is adequate because of the "nitrogen loading" determination, which allows the reuser to set the threshold and calculate the total amount of reclaimed water that can be applied before they theoretically reach that specified threshold number.

It is our professional opinion that the only way to truly observe the presence or absence of cumulative effects is to determine the existing (pre-irrigation) baseline concentrations of nutrients in the groundwater (which STPUD already has collected), begin irrigating, monitor the groundwater for specific nutrients, and compare post-irrigation concentrations to pre-irrigation concentrations to determine if a trend exists. Continued monitoring while irrigating allows the reuser to track their site-specific effects and modify their irrigation plan as needed.

6.0 REFERENCES

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Metcalf and Eddy (1991) *Wastewater Engineering: Treatment, Disposal, and Reuse*

Nevada Department of Environmental Protection (no date) "WTS-1B: General Criteria for Preparing an Effluent Management Plan"

Appendix G - USGS Misc Inventory Series Map I-1424

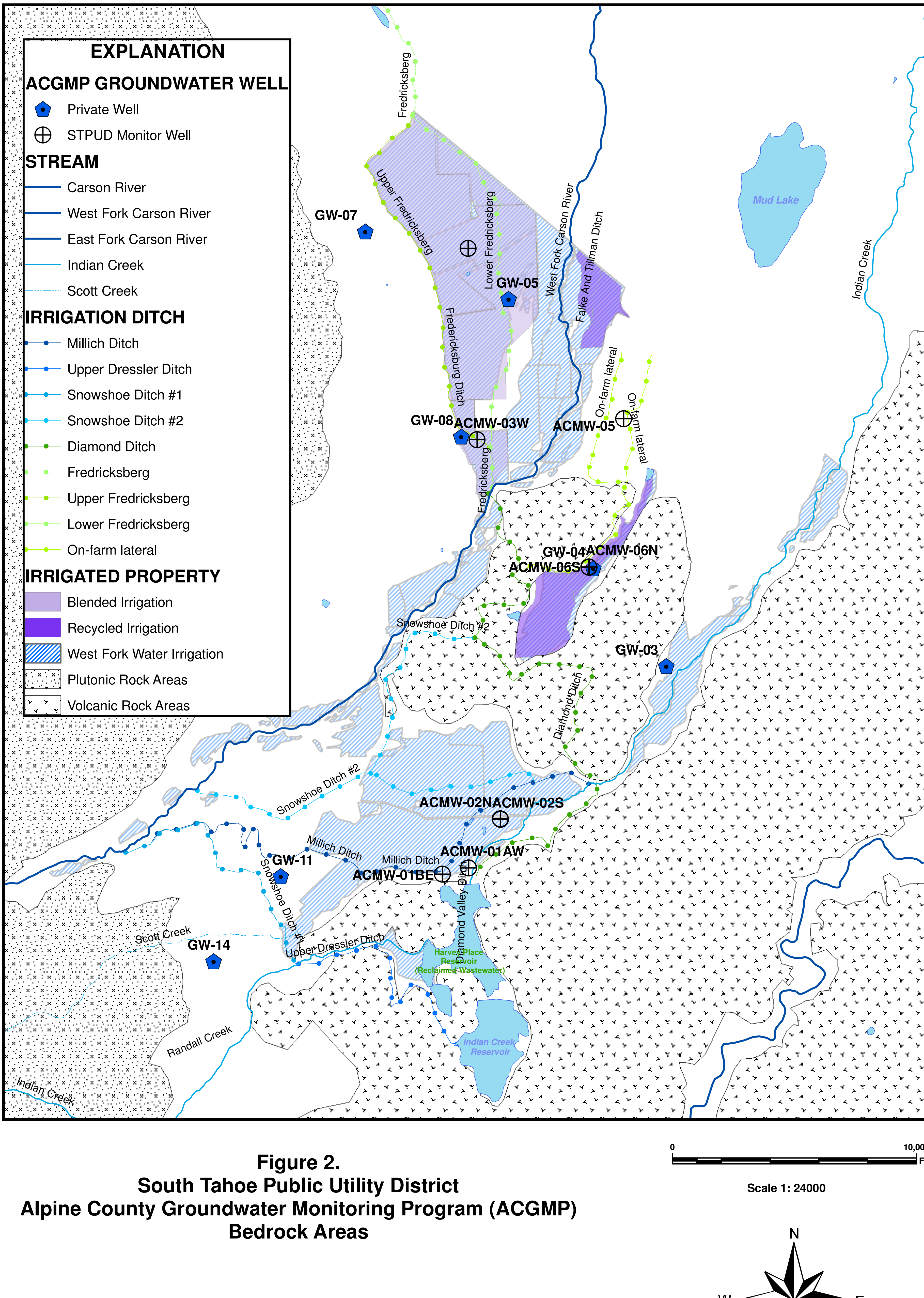

Figure 2.
South Tahoe Public Utility District
Alpine County Groundwater Monitoring Program (ACGMP)
Bedrock Areas

Appendix H - South Tahoe Public Utility District Wastewater Monitoring Report

Investigation of Increasing Nitrate to Groundwater in Alpine County, California

David McGraw

November 2006

Publication No. 41228

Prepared by
Division of Hydrologic Sciences, Desert Research Institute,
Nevada System of Higher Education

Prepared for
Alpine County, California

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INTRODUCTION

This project is part of an overall effort to evaluate the water quality in Alpine County, California, specifically as it relates to the South Tahoe Public Utility District's (STPUD) treated effluent program.

In 2004, the Desert Research Institute (DRI) performed a study (DRI, 2004) that identified several wells with increasing nitrate concentrations. Nitrate in drinking water has been linked with methemoglobinemia (blue baby disease) in infants and chronic toxicity in adults, and pose a possible cancer risk (Shearer, *et al*, 1972; National Academy of Sciences, 1977; National Academy of Sciences, 1978). Several wells in Alpine County are approaching the current drinking water standard for nitrate of 10 mg/l as nitrogen.

Alpine County is interested in knowing the reason for the nitrate increase in these wells. Some potential sources of nitrate:

- Atmospheric deposition through dryfall, rainfall, and snowfall;
- Dissolution of nitrogen-bearing minerals;
- Animal waste;
- Fertilizer;
- Decomposing plant material;
- Human waste from septic systems;
- Human waste from treated wastewater effluent;

Alpine County is in the Sierra Nevada mountain Range in Northern California, south of Lake Tahoe, and bordering Nevada (Figure 1). Elevations range from over 10,000 ft (3050 m) to below 5,000 ft (1500 m) at the Nevada border. All surface water from to the treated effluent program drain northwest into the Carson River system. The West Fork of the Carson River and Indian Creek originate at high elevation where discharge is primarily snowmelt. The lower elevations support alfalfa crops and livestock. A complex series of ditches provides irrigation water for these ranches. These ditches carry water from natural streams as well as from the treated effluent from South Lake Tahoe.

GOAL

The over-arching goal of the monitoring program in Alpine County is to identify the source, or sources, of nitrogen contamination in these wells. Because identifying the sources with a high degree of confidence is an expensive, multi-step process, Alpine County, STPUD, and DRI decided to perform site visits and conduct interviews with well owners to determine if there are simple or likely reasons for the increasing trend in nitrate. The purpose of these site visits and interviews was to: 1) assess the quality of well construction; 2) speak with the well owners about typical land-use practices, including agricultural practices and septic system maintenance; 3) gather historical information about each well; and 4) to make recommendations for each well. This report is a summary of the information gathered from the site visits and interviews.

RESULTS

Reconnaissance

On July 5, 2006, DRI personnel accompanied STPUD on their groundwater sampling run. They visited each site to survey the landscape, take photographs of the well, and document the land uses in the area. If the well owner was home, they spoke with him/her to ask questions about the history of the well and land-use practices in the surrounding area. The following is a summary of the visit.

Six Alpine County wells have increasing nitrate concentrations. They are: GW-04, GW-05, GW-07, GW-08, GW-11, and ACMW-04W (Figure 1).

Summary for GW-04

Site Visit

As shown below in Figure 2, nitrate in GW-04 is increasing very slowly and there is little reason for concern. From 1994 to 1997, however, irrigation and grazing were allowed to occur next to the well. All recent measurements show nitrate levels below 1 mg/l, well below the nitrate drinking water standard of 10 mg/l. In spite of that fact, DRI spoke with the well owner by phone to gather data, followed by a site visit.

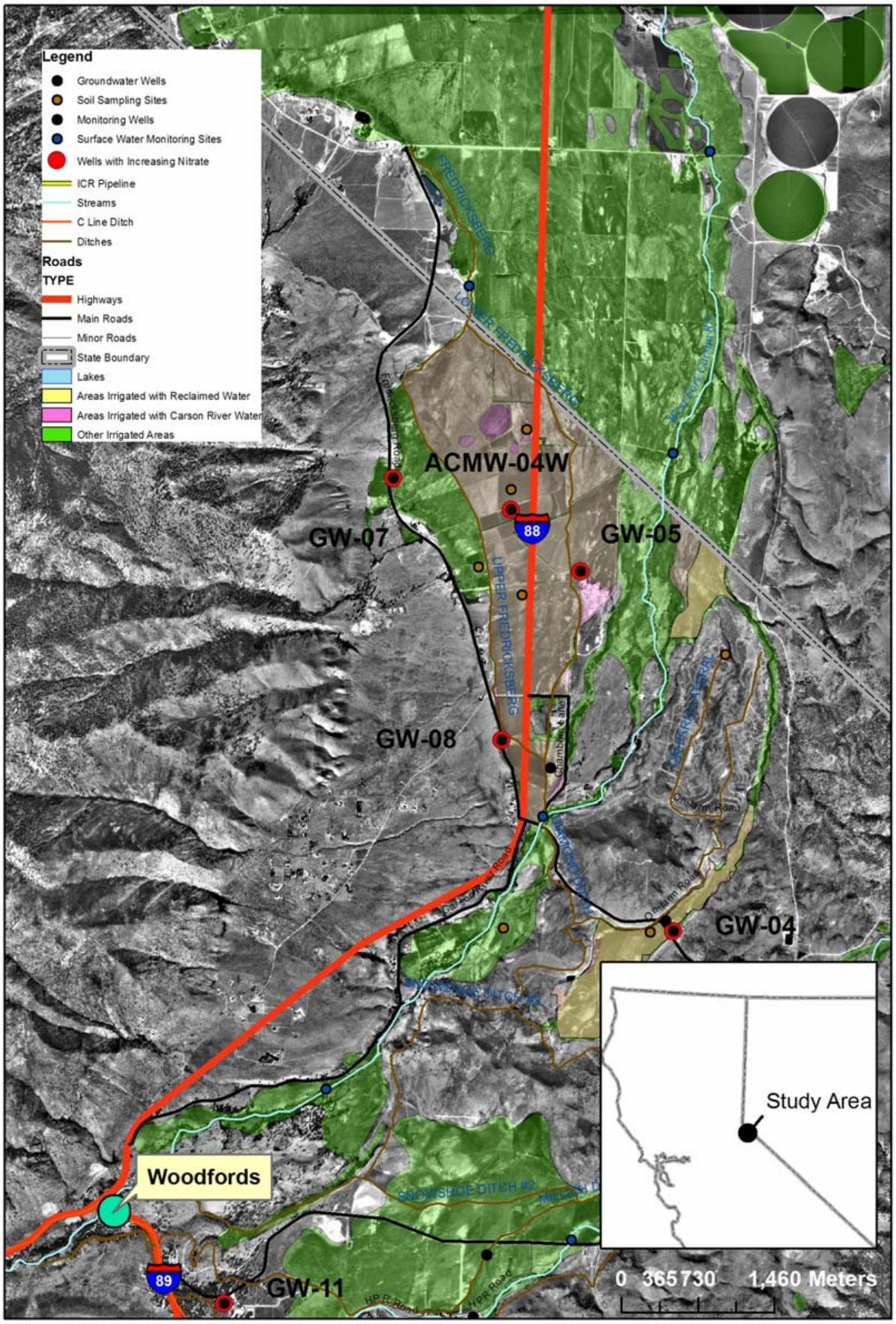

Figure 1. Location Map of wells with increasing nitrate concentrations.

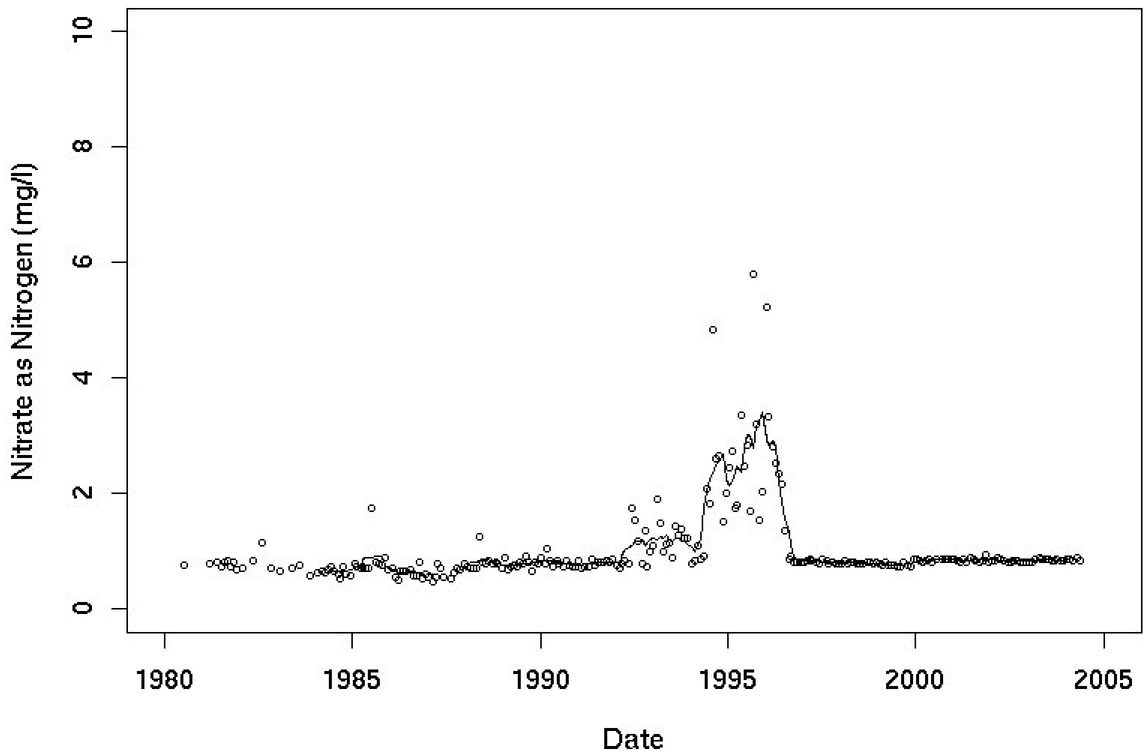

Figure 2. GW-04: Nitrate trend.

The well is directly behind the garage and is usually covered with a trash can to prevent freezing. The well was drilled in 1969 by Kawtcheck Drilling in Gardnerville, Nevada. There does not appear to be a surface seal. Grass is growing around the well and cattle are allowed to graze that area very rarely. The septic tank and leach field are approximately 300 feet north of the buildings (Figure 3). Groundwater flow in that area is generally south to north. A ditch carrying treated effluent (Figure 4) runs approximately 20 feet from the well.

Figure 3. GW-04: Septic tank and leach field.

Figure 4. GW-04: Effluent ditch.

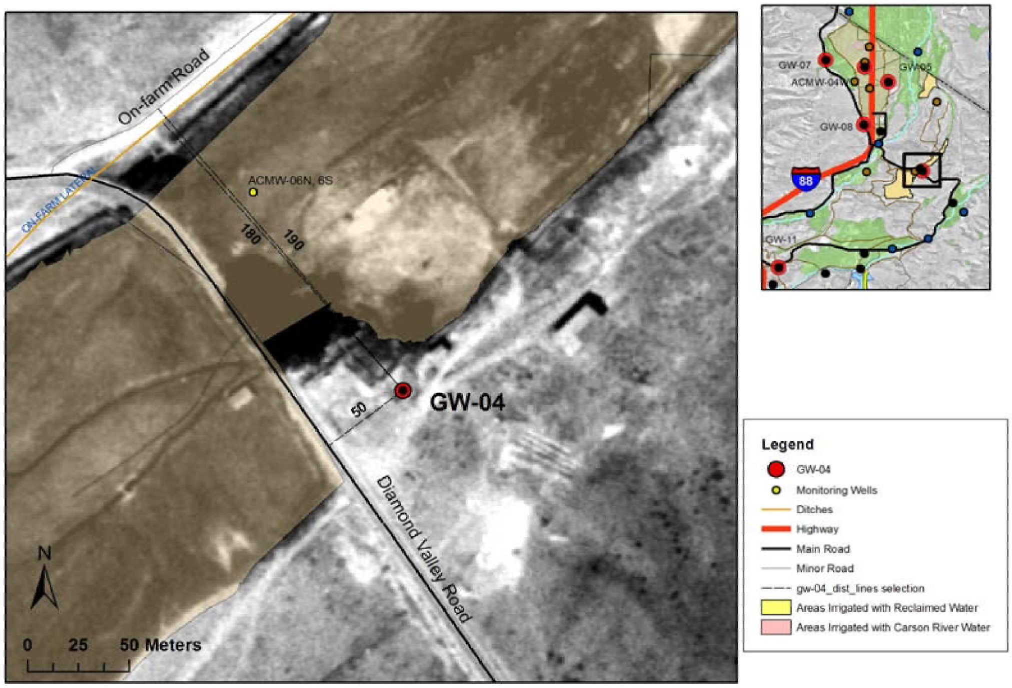

Figure 5. GW-04: Aerial photograph of property.

<u>Recommendation</u>

Though the increase in nitrate is statistically significant, it is increasing slowly and levels are well below the drinking water standard of 10 mg/l. However, there was a dramatic increase in nitrate concentration between 1994 and 1997. The well owner revealed that during that period, irrigation and grazing was allowed to occur next to the well. Since stopping that practice in 1998 the concentrations decreased significantly. Therefore, we recommend that the well owner refrain from irrigating or allowing cattle to graze near the well.

Summary for GW-05

<u>Site Visit</u>

Nitrate in well GW-05 has been increasing steadily since the mid-1980s (Figure 6). Recent concentrations are approximately 3.5 mg/l. The well is in the front yard (Figure 7). The owner stated that the well was drilled sometime before 1900. Drilling techniques are unknown, but there is no surface seal and the owners believe it is about 65 feet deep. A small ditch that carries treated effluent runs within two feet of the well. For many years, the yard and garden were flood-irrigated with this treated effluent from the ditch. Approximately eight years ago, the owners switched to a sprinkler system using water from the well, and the ditch is no longer used. The property has two septic tanks, one behind the main house and one behind the bunkhouse. Each is downgradient of the well.

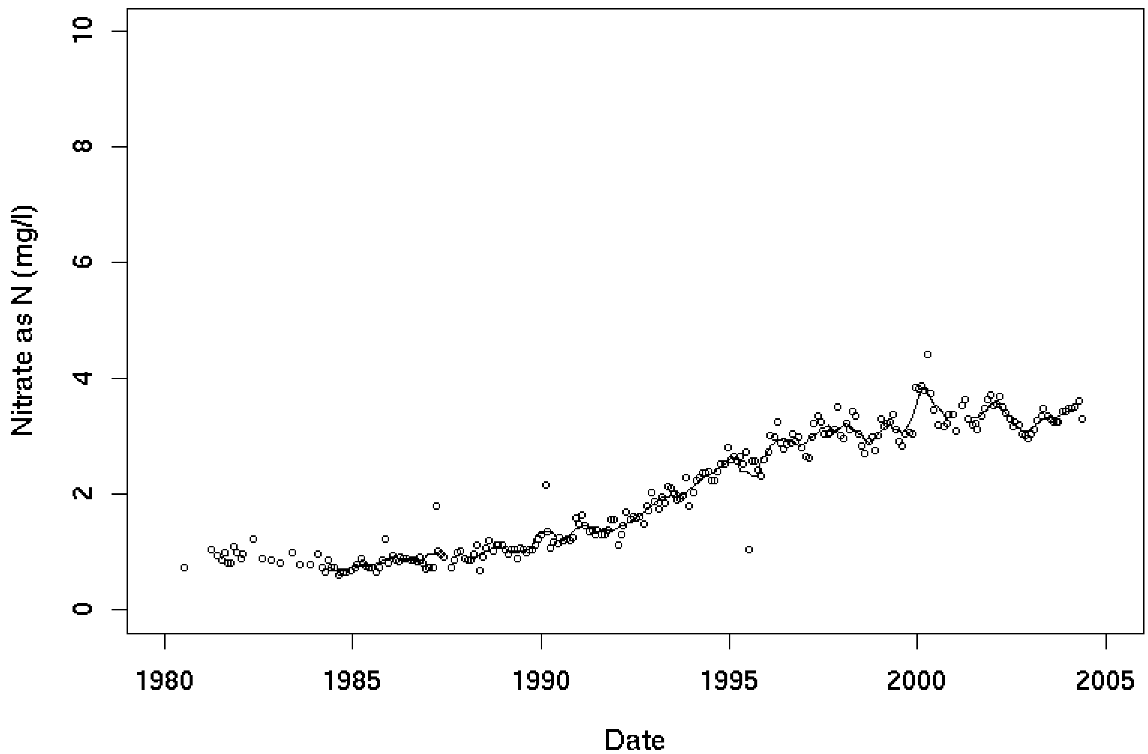

Figure 6. GW-05: Nitrate trend.

Figure 7. GW-05: Pump.

Irrigation and grazing occurs in all fields surrounding the property. Also, as shown in Figure 8, the Fredericksberg Ditch runs within 300 feet of the well. This is an unlined ditch, and seepage to the aquifer is likely to occur. As a result, it is possible the shallow well draws effluent from the ditch.

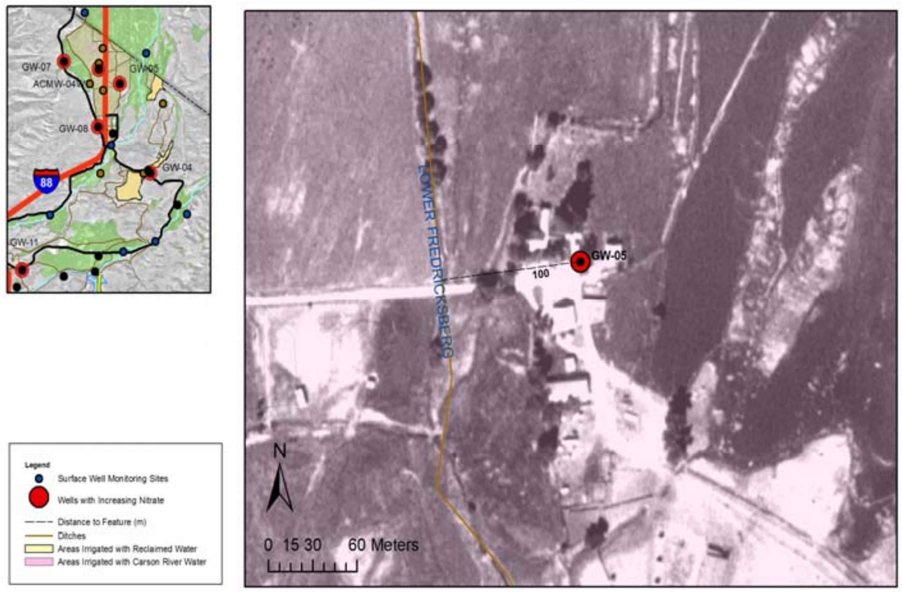

Figure 8. GW-05: Aerial photograph of property.

Recommendation

It is likely that some portion of water in this well is treated effluent that is recharging the shallow aquifer in the vicinity of the well, thereby allowing delivery of this contaminated water from the well to the household. Further evidence is that nitrate levels are higher in the summer months when lawn irrigation is occurring.

We recommend two options: 1) that the existing well be abandoned and a new, properly constructed well with a surface seal be drilled with adequate setback distances from septic leach fields and effluent ditches; or 2) because it appears that nitrate concentrations are leveling off to less than four mg/l (well below the drinking water standard of ten mg/l), continue monitoring until concentrations rise.

Summary for GW-07

Site Visit

The local groundwater flow direction in the aquifer beneath the property is likely west to east. Samples from the well show large fluctuations in nitrate levels, as well as a general increase over the past 20 years (Figure 9). Also, the high values associated with the wide fluctuations usually occur in the winter months. The well was drilled in the 1930s, does not have a surface seal, and is approximately 60 feet deep. Water from the well is used solely for domestic purposes. There is a submersible pump in the well that was replaced approximately five years ago. The septic tank is directly behind (east of) the house with a leach field approximately 150 feet farther east. The well is approximately 200 feet from the septic tank. The septic tank was replaced approximately seven years ago (though the property owner was not sure) and was pumped approximately four years ago. Examination of the trend shows a decrease in both nitrate levels and in the magnitude of the fluctuation approximately eight years ago. This is followed by a gradual increase in levels and fluctuation six years after installing the new tank.

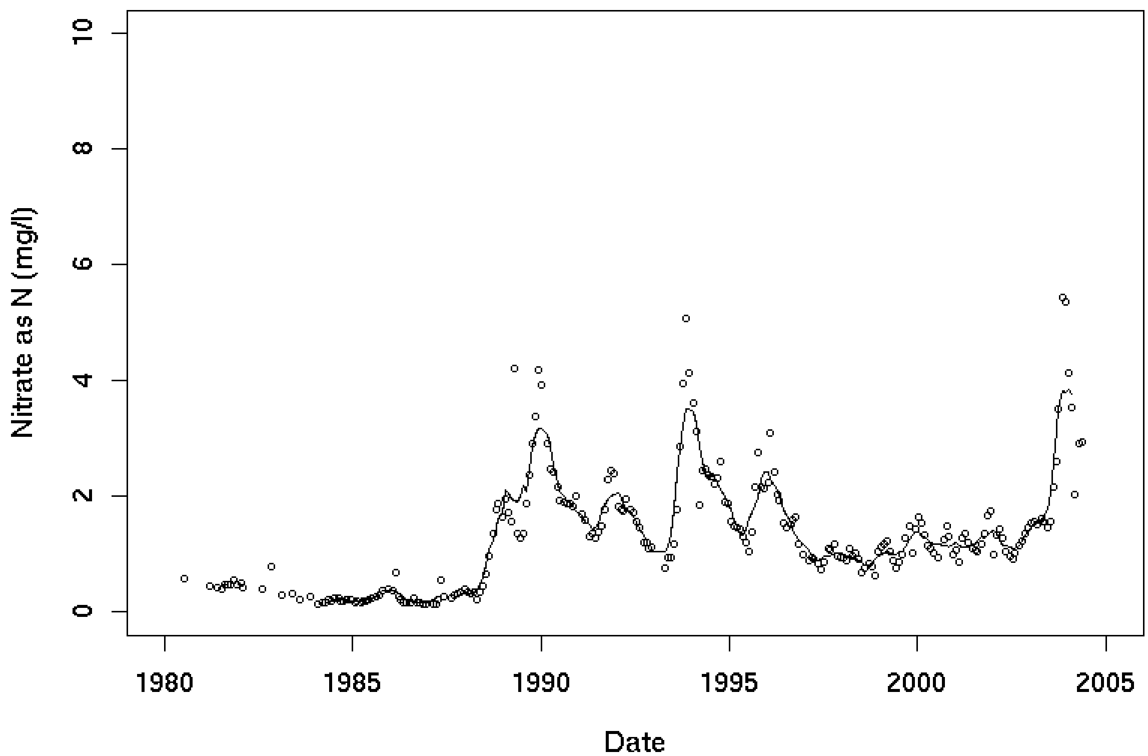

Figure 9. GW-07: Nitrate trend.

The surrounding fields (Figure 10) are irrigated with a blend of treated effluent and Carson River water, with the portion of effluent in the blend a function of the previous winter's snowpack. Cattle and horses are allowed to graze the fields.

Figure 10. GW-07: Irrigated area.

Given the scenario described above, the following facts were observed: 1) the septic tank is near the well; 2) higher levels of nitrate occur during the wet season (winter); 3) replacement of the tank appears to result in decreasing nitrate levels and fluctuations; and 4) six years after replacing the tank the nitrate concentrations and fluctuations start to increase. Also, STPUD reports coliform spikes in the winter at this well.

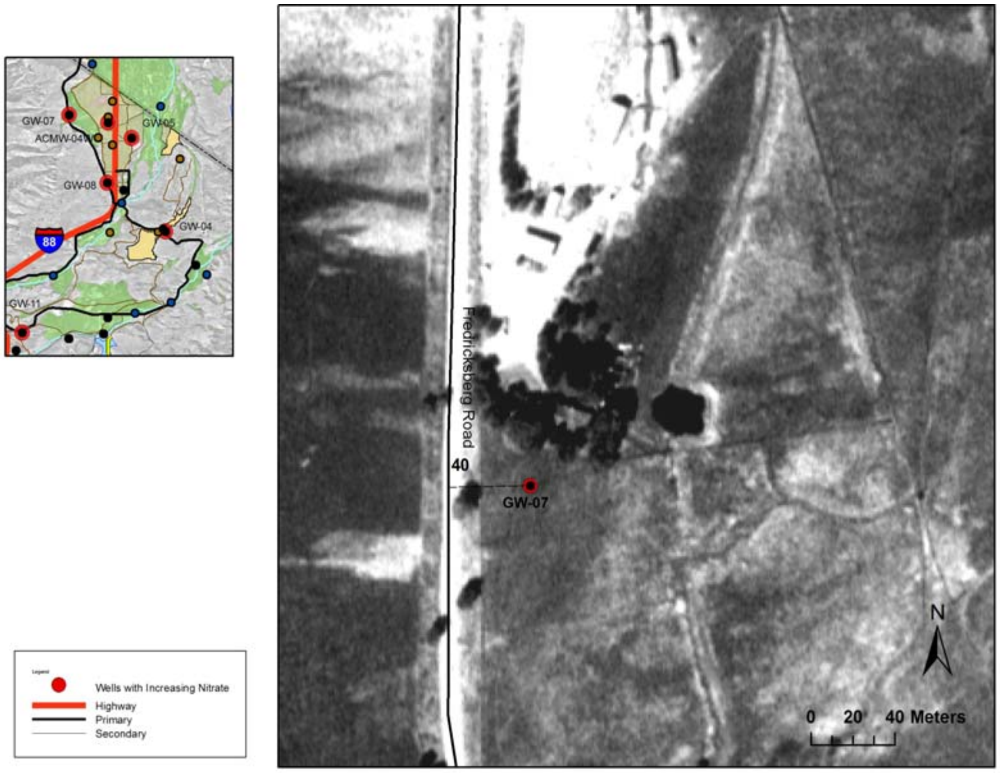

Figure 11. GW-07: Aerial photograph of property.

<u>Recommendation</u>

It is likely the septic system on the property is discharging untreated waste, resulting in nitrate and coliform contamination of the aquifer. It is therefore recommended that regular and frequent (every two to three years) pumping of the septic tank is conducted to prevent contamination of the well. The Environmental Protection Agency recommends that septic tanks be pumped every three to five years to properly maintain the system (EPA, 2005).

Summary for GW-08

<u>Site Visit</u>

Nitrate in GW-08 has been increasing steadily since 1987 with a short period of decrease from 1997 to 2000 (Figure 12). As with GW-07, nitrate levels are higher in the winter months than in the summer. Concentrations were above 8 mg/l in 1996 and 2002.

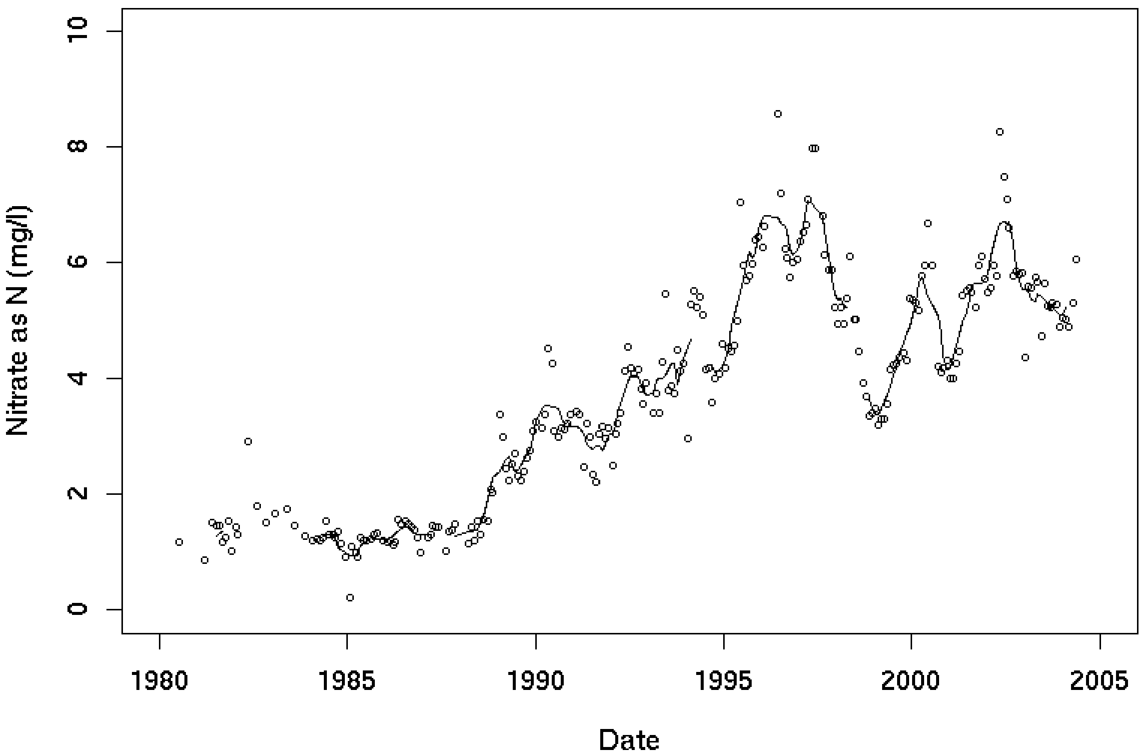

Figure 12. GW-08: Nitrate trend.

GW-08 sits at the base of the Carson Range, with groundwater likely moving from west to east. The Fredricksberg Ditch runs approximately 200 ft. east of the property (Figure 13). Both the tenants on the property and the property owner confirm the groundwater table is very close to the surface, at times resulting in ponding in the driveway. The well is approximately 100 ft. south of the living area (Figure 14) and is used for domestic purposes. The owner remembers that a new well drilled by Kawcheck drilling in Gardnerville about 20 years ago. During the site visit, the well was not located, but its location was confirmed by the owner. It is likely that a well drilled by a drilling company has a surface seal.

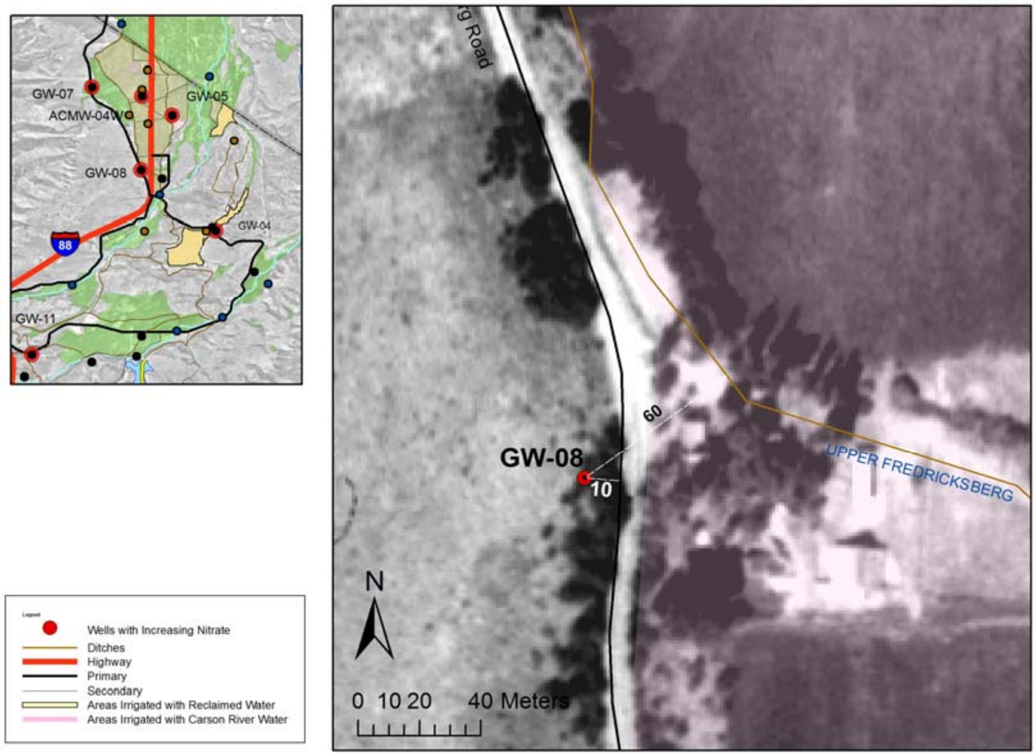

Figure 13. GW-08: Aerial photograph of property.

Figure 14. GW-08: Approximate location of well.

The septic tank is directly beneath the driveway and was last pumped about seven or eight years ago, according to the owner. The decrease in nitrate levels started about nine years ago. The septic tank has not been pumped since. Nitrate levels began increasing approximately three years after it was last pumped and continue to increase. It is possible the capacity of the septic tank is exceeded after three years of use (EPA, 2005). Neither the tenant nor the owner knew where the leach field was for the septic system.

All fields are irrigated with a blend of treated effluent and Carson River water.

Recommendation

It is likely the septic system is discharging untreated waste and contaminating groundwater. The shallow groundwater table (sometimes a few feet below the surface) is probably in direct contact with the overflowing septic effluent. Also, the concentration of nitrate being consumed by the tenants is getting close to the drinking water standards.

It is therefore recommended that regular and frequent (every two to three years) pumping of the septic tank be conducted to prevent overflow and contamination of the well. An engineered leach system may be required to properly dispose of septic effluent.

Summary for GW-11

Site Visit

Figure15 shows nitrate in well GW-11 increasing very slowly since 1993. Also, concentrations are much lower than the drinking water standard and not a cause for concern.

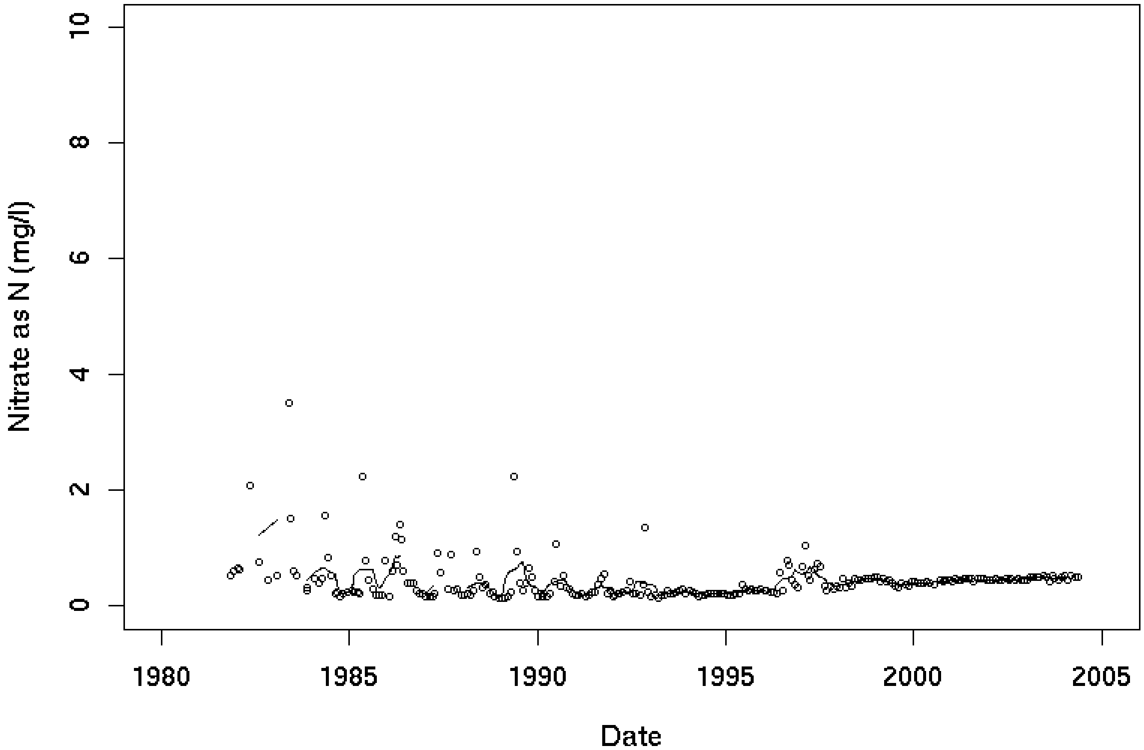

Figure 15. GW-11: Nitrate trend.

GW-11 is sampled from the spigot near the entrance to the school (Figure 16). Water from the well is used for all school activities and irrigation of the playing fields (Figure 17). Approximately eight years ago, a new 600-ft. well was drilled (Figure 18). The previous well was 150 ft. deep. The septic tank is approximately 200 to 300 ft. away from the well and is pumped yearly.

Figure 16. GW-11: Sampling location.

Figure 17. GW-11: Irrigated area.

Figure 18. GW-11: New well.

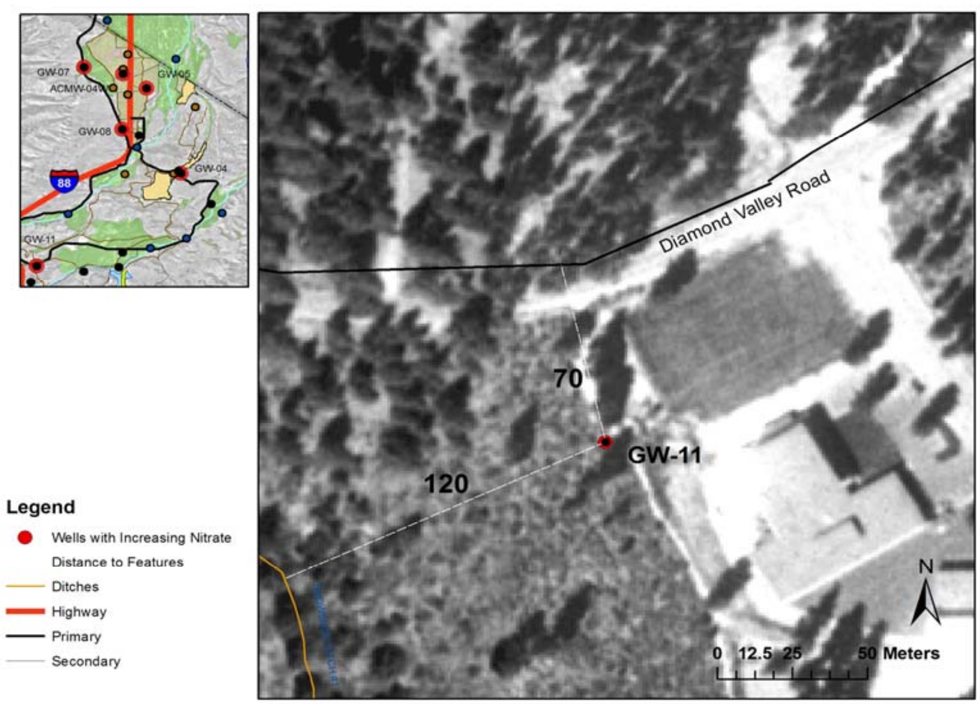

Figure 19. GW-11: Aerial photograph of property.

Recommendation

Though the concentration of nitrate in GW-11 is increasing, it is doing so very slowly. Also, concentrations are currently around 0.5 mg/l. Therefore, no action is needed.

Summary for ACMW-04W

Site Visit

Figure 20 shows nitrate in well ACMW-04W increasing rapidly from 1988 to about 1996. After 1996 the concentrations decreased steadily. Present values are around 2 mg/l. The well appears to be well constructed and has a surface seal (Figure 21).

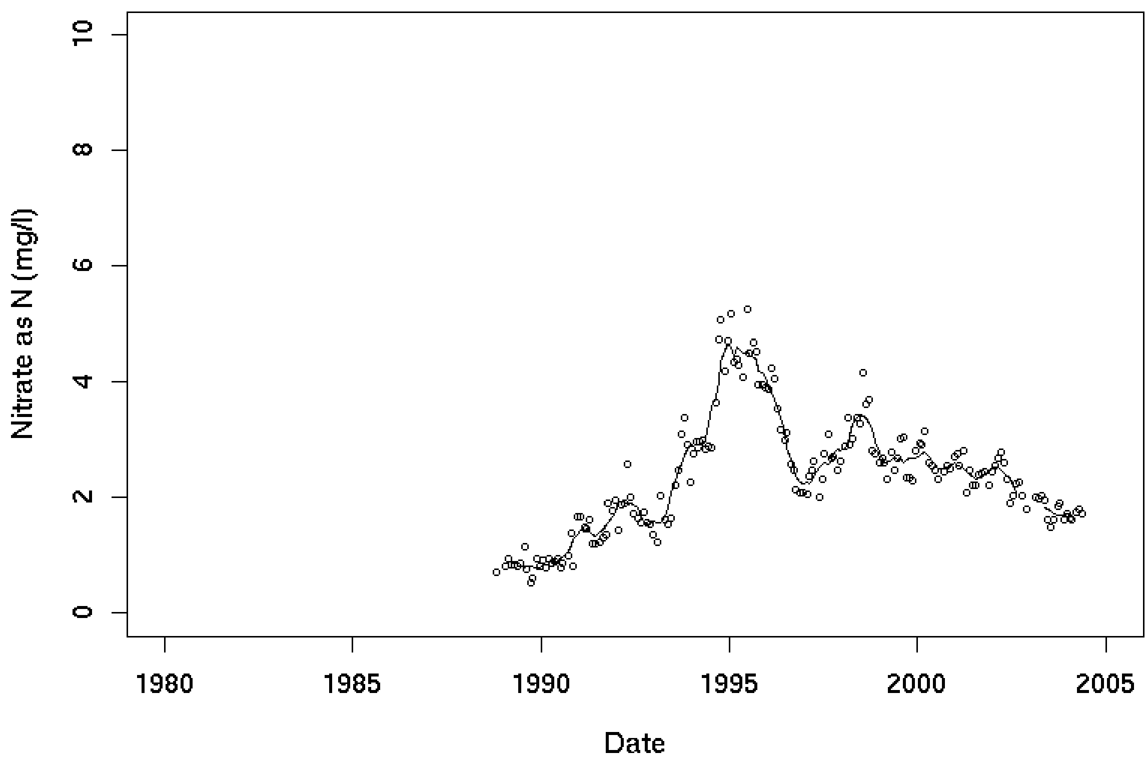

Figure 20. ACMW-04W: Nitrate trend.

Figure 21. ACMW-04W: Location

Recommendation

Because the concentration of nitrate has been decreasing consistently over the last 10 years, and levels are well below the drinking water standard of 10 mg/l, no action is needed.

SUMMARY OF RECOMMENDATIONS

- GW-04: Continue to restrict irrigation and grazing near the well.
- GW-05: Abandon the existing well and construct a new one with a surface seal, or continue monitoring until concentrations rise again.
- GW-07: Pump septic tank every two to three years.
- GW-08: Pump septic tank every two to three years and consider an engineered leach system because of high (near-surface) groundwater table.
- GW-11: No action.
- ACMW-04W: No action.
- Continue monitoring in all wells.

ACKNOWLEDGEMENTS

The author thanks Dave Decker, Marjory Jones, Alan McKay, and Rina Schumer for reviewing this document.

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Appendix I-a - Investigations of Increasing Nitrate to Groundwater in Alpine County, CA

SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WASTEWATER MONITORING PROGRAM EVALUATION REPORT

ALPINE COUNTY, CALIFORNIA

OCTOBER 2008

PREPARED FOR:

MARKLEEVILLE, CALIFORNIA

PREPARED BY:

ALISTO ENGINEERING GROUP

WALNUT CREEK, CALIFORNIA

South Tahoe Public Utility District
Recycled Wastewater Monitoring Program
Evaluation Report

Prepared for:

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October 2008

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1.0 INTRODUCTION

In September 2007, Alpine County retained Alisto Engineering Group to review and evaluate the effectiveness of the recycled wastewater monitoring program of South Tahoe Public Utility District (STPUD) within Alpine County. The location of the project study area is shown on Figure 1.

1.1 Project Objectives

The objective of the study is to evaluate and determine the adequacy of the monitoring program in collecting data to assess the impact of using recycled wastewater for pasture crop irrigation on surface water, groundwater, and soil resources in Alpine County. The study is intended to modify/develop a monitoring program that will be effective in verifying and determining the impact of recycled wastewater application on regional and local groundwater quality within the land application area. As specified by Alpine County, the study includes developing recommendations for appropriate modifications to the existing monitoring network, including the proposed locations and standard construction of replacement or new groundwater monitoring wells to effectively evaluate the impact of recycled wastewater discharge on groundwater quality within the existing and future land application areas.

1.2 Scope of Work

The agreed scope of work for the evaluation of existing groundwater monitoring program included performing the following tasks in accordance with the protocol and procedures recommended by the various federal, state and local regulatory agencies, as well as generally accepted professional standards.

1. Collecting and compiling available reports and monitoring data pertinent to the recycled wastewater application program, including but not limited to: regional and site geology and hydrology, groundwater level measurements, current and proposed application areas, construction and boring logs for existing groundwater monitoring wells, and surveyed location of the monitoring wells.
2. Reviewing available data to determine the adequacy and effectiveness of the monitoring program in assessing the impact of recycled wastewater application at the existing and proposed irrigation areas focusing on the hydrogeology and groundwater flow patterns within the application areas rather than water quality impact.
3. Visual observing current and future wastewater application areas and inspecting the existing monitoring wells and potential locations for replacement and additional groundwater monitoring wells to determine site condition, accessibility, utility interferences, and other drilling constraints.
4. Surveying the existing groundwater monitoring wells by a licensed surveyor for horizontal and vertical controls (x, y, z coordinates) in reference to an established benchmark for use in evaluating and interpreting groundwater flow patterns and gradient.

5. Monitoring the water level at existing monitoring wells for four consecutive quarters to evaluate seasonal changes in groundwater level and prepare potentiometric surface map for interpretation of groundwater flow patterns during each monitoring event within the project or land application area.
6. Evaluating historical and recent water level data for use in interpreting groundwater flow direction and pattern and the hydrogeologic characteristics of the project area relative to the recycled wastewater monitoring program.
7. Determining the need for and location of additional monitoring points to effectively evaluate the impact of recycled wastewater application on groundwater and surface water quality.
8. Preparing this technical report to present the results of water level monitoring and evaluation of the recycled wastewater monitoring program, including recommended modifications to the existing monitoring network and specifications for construction of replacement or additional monitoring wells.

The results of the data compilation and interpretation of groundwater monitoring data are presented in this report in both tabular and graphical formats such as groundwater potentiometric contour maps and the proposed locations for replacement and additional monitoring wells are shown on maps.

1.3 Project Background

Since the late 1960's, treated wastewater from STPUD has been exported and recycled for use as supplemental irrigation water in portions of Diamond Valley, Dutch Valley, and Wade Valley in Alpine County. Based on recommendations of an independent study by the US Department of Agriculture in 1980, the STPUD implemented a monitoring program to collect background groundwater and soil quality data at designated stations in 1981. Subsequently, the California Regional Water Control Board (RWQCB), Lahontan Region adopted the groundwater monitoring program as part of the RWQCB Order issued to STPUD in 1984.

In 1988, the STPUD installed nine shallow groundwater monitoring wells that were later included as part of the monitoring program. Five ditch monitoring stations were added into the monitoring program in 2003 as part of the agreement between the primary effluent users in California, primary tail-water users in Nevada and the Nevada Division of Environmental Protection (NDEP).

The RWQCB previously established the Waste Discharge Requirements (WDRs) for the STPUD wastewater treatment and discharge facility under Order No. 6-79-43, which was adopted on December 6, 1979. Subsequent updates to the WDRs included Order No. 6-84-24, adopted on February 9, 1984, Order No. 6-90-14, adopted on February 8, 1990, and Order No. 6-95-65 adopted on June 8, 1995.

In 2004, the RWQCB adopted Revised Order No. R6T-2004-0010 as an update to the WDR for the STPUD Wastewater Recycling Plant in South Lake Tahoe, El Dorado County and the wastewater application areas in Alpine County. Under Order No. R6T-2004-0010, the STPUD

Wastewater Recycling Plant and delivery system, Harvey Place Reservoir, and the Alpine County recycled wastewater conveyance system are referred to as the "Facility".

Treated wastewater from the STPUD Wastewater Recycling Plant is conveyed through an effluent export system to Harvey Place Reservoir, a man-made reservoir located between Diamond Valley Road and Indian Creek Reservoir approximately three miles southwest of Woodfords, California in Alpine County. Recycled wastewater is temporarily stored in Harvey Place Reservoir, which has a nominal capacity of approximately 3,800 acre-feet, before being discharged or released to a series of lined and unlined ditches that run through Diamond Valley, Wade Valley, and Carson Valley for delivery to various land application areas for pasture crop irrigation.

Treated wastewater is stored in Harvey Place Reservoir during the defined non-growing season (October 15 through April 1) and then released to the Diamond Ditch and Fredericksburg Ditch for conveyance to Alpine County Ranch Irrigation Systems where wastewater is used for irrigation of alfalfa and livestock grazing pastures. The Alpine County Ranch Irrigation Systems are operated under separate regulatory requirements for each individual user of recycled wastewater as stipulated by the RWQCB in the WDR. The RWQCB has authorized the use of recycled wastewater on approximately 2,000 acres in Wade Valley and Carson Valley in Alpine County.

Use of recycled wastewater is restricted by the Board Order to irrigation of seed and fiber crops, and fodder crops for non-milking animals. The Order also prohibits the use of recycled wastewater for crop irrigation within 100 feet of an active domestic water supply well and the spray irrigation within 100 feet of a residence, school or public place to prevent public exposure to the recycled wastewater.

1.4 Facility Description

The STPUD facility permitted under the current RWQCB Order consists of a secondary wastewater treatment plant followed by filtration and disinfection, a 58 million-gallon emergency retention basin, an approximately 25-mile wastewater effluent delivery system, the man-made recycled wastewater reservoir and conveyance system. Raw wastewater is treated through a series of processes consisting of screening, grit removal, primary clarification, activated sludge treatment, secondary clarification, mixed media filtration and chlorination. The wastewater treatment plant has a dry-weather design capacity of 7.7 million gallons per day (mgd) based on annual peak-day flow.

Wastewater effluent from the treatment plant is pumped over Luther Pass through a force main and then flows by gravity to Harvey Place Reservoir in Alpine County. This export system is required to comply with applicable sections of the California Water Code that require the transport of all waste including wastewater effluent within the Lake Tahoe Basin to be transported out of the watershed.

The only authorized wastewater disposal areas within Alpine County for the STPUD wastewater effluent are Harvey Place Reservoir, Diamond Ditch, Fredericksburg Ditches and the irrigated land under a separate recycled water use regulations. As set forth in the 2004

RWQCB Order, STPUD is responsible for compliance with the monitoring and reporting program of the WDR.

1.5 Monitoring and Reporting Requirements

The Monitoring and Reporting Program (MRP) of the RWQCB Order consists of nine areas of monitoring and analysis, of which only three are pertinent to the recycled wastewater application in Alpine County: surface water, groundwater, and soil monitoring.

The Alpine County groundwater monitoring program of the MRP stipulates that groundwater samples be collected monthly from 16 wells consisting of seven private water supply wells and eight groundwater monitoring wells. Samples of groundwater are to be collected from the upper three feet of the first groundwater encountered in each well and analyzed for the parameters listed in the MRP. The results of the monitoring and sampling program are required to be submitted to the RWQCB on a quarterly basis with an annual report submitted by June 15 of each year.

2.0 ENVIRONMENTAL SETTING

The environmental characteristics of the project study area pertinent to land application of recycled wastewater and evaluation of the effectiveness of the existing groundwater monitoring program are described in this section.

2.1 Climate

Alpine County, encompassing approximately 740 square miles in area, has a wide range of microclimates. The county extends from the central crest of the Sierra Nevada Mountains eastward to the eastern slope of the Sierra Nevada. The eastern slope part of the county can be considered as within the rain shadow of the west-facing slopes and generally receives less annual precipitation. Typically the majority of the county's annual precipitation comes in the winter months as snowfall. Due to the overall remoteness of the county there are relatively few precipitation gauges within the study area. Data compiled by others at the Woodfords/Markleeville station indicate the highest annual precipitation occurs in the months of December, January and February. Review of climate data for the Woodfords/ Markleeville station between 1948 and 2005 indicates the average highest precipitation that has historically occurred is approximately 93 inches. The highest average daily temperature of approximately 84ºF occurs in July and the average lowest temperature of 16.9ºF occurs in December.

2.2 Regional Hydrogeology

Alpine County is located within portions of the Carson River, American River, Mokelumne River, Stanislaus River, and Truckee River watersheds. The majority of Alpine County is on the eastern slope of the Sierra Nevada and drains into the Carson River watershed. The four remaining watersheds contribute little or no recharge to the Carson River or Carson River watershed.

The Carson River watershed encompasses an area of approximately 4,000 square miles on the eastern slope of the Sierra Nevada in both California and Nevada. Approximately 50 percent of the Carson River watershed is located within Alpine County, including the southern portion of the Carson Valley and the headwaters for the Carson River.

The hydrology of Carson Valley is dominated by flow of the Carson River. The East and West Forks of the Carson River enter from the southern parts of the valley and flow northward to join near Genoa, Nevada. After the confluence, Carson River flows northerly and out of the Carson Valley southeast of Carson City, Nevada. Surface water from the Carson River is diverted across the valley floor through a network of canals and ditches for flood irrigation of crops and native pasture grasses. Thirteen perennial streams drain the Carson Range, whereas only two perennial streams, the Buckeye and Pine Nut Creeks, drain the Pine Nut Mountains Valley.

The principal source of groundwater in the Carson Valley is the basin-fill deposits. Unconsolidated deposits beneath the basin, which range from clay to boulders, are present in thickness of up to 5,000 feet. The California Division of Mines and Geology map, Walker Lake Sheet, indicates the presence of alluvium in the northwestern and Diamond Valley portions of the basin. The southeastern portion and the southern apex of the basin are primarily Pliocene volcanics and Pleistocene non-marine. Most water supply wells drilled in the basin are completed in the basin-fill deposits (DWR unpublished data).

2.3 Project Site Geology and Hydrogeology

The project study area is located in the Sierra Nevada geomorphic province between the Basin and Range province to the east and the Central Valley geomorphic province to the west. More specifically, it lies at the southern end of the Carson Valley groundwater basin and adjacent to the Carson Range in Alpine County.

Carson Valley is at the eastern base of the Sierra Nevada and straddles the California-Nevada state line in northern Alpine County. The California portion of the basin is about 10,700 acres. The West Fork of the Carson River flows northerly through the Carson Valley basin and is the confluence of many streams draining the eastern slopes of the Sierra Nevada. Scott Creek and Indian Creek flow through Diamond Valley, which is in the southern portion of the basin.

The floor of the valley is oval-shaped, approximately 20 miles long and 8 miles wide, and slopes from about 5,000 feet above mean sea level at the southern end to about 4,600 feet at the northern end. The Carson Range on the western side of the Sierra Nevada rises abruptly from the valley floor with mountain peaks ranging from 9,000 to 11,000 feet. The Pine Nut Mountains on the eastern side rise more gradually to peaks ranging from 8,000 to 9,000 feet.

The consolidated granitic and metamorphic bedrock surrounding and underlying Carson Valley are relatively impermeable to groundwater flow, although some wells produce sufficient water from fractures for domestic use. In the semi-consolidated Tertiary sediments, lenses of sand and gravel are the primary water-bearing units, and probably transmit most groundwater through the unit. Unconsolidated sediments that form alluvial fans surrounding the valley and underlie the flood plain of the Carson River are the principal aquifers within Carson Valley.

During a previous hydrogeologic reconnaissance conducted by STPUD, soil borings were drilled to depths of up to 770 feet in Diamond Valley. Volcanic rock (andesite) was encountered as shallow as 45 feet below ground surface (bgs) and as deep as 405 feet bgs and 770 feet bgs. The andesite encountered in these borings was interpreted as defining the bottom of the potentially water-bearing sand, gravels and other basin fill deposits in the study area.

2.4 Surface Water Features

The primary surface water features within the project study area include the West Fork of Carson River and Indian Creek. The infiltration of surface water through streambeds and ditches and percolation of recycled wastewater from the flood-irrigated fields have maintained the shallow water table beneath much of the valley floor where depth to ground water is less than 5 feet. Groundwater level beneath alluvial fans on the western side of the valley quickly increases to greater than 200 feet within one mile of the valley floor, whereas depth to water on the eastern side of the valley reaches 200 feet approximately three miles from the valley floor.

3.0 GROUNDWATER LEVEL MONITORING

The results of the groundwater level monitoring events performed for this evaluation study are presented in this section, including a description of the field procedures used for water level measurement.

3.1 Existing Groundwater Monitoring Network

The Monitoring and Reporting Program (MRP) included in Order No. R6T-2004-0010 for the Alpine County Groundwater Monitoring Program (Section V) listed the following monitoring points within the wastewater application area, the locations of which are shown on Figure 2:

- Domestic Water Supply Wells: GW-03, GW-04, GW-05, GW-07, GW-08, GW-11, and GW-14.

- Groundwater Monitoring Wells: ACMW-01AW, ACMW-01BE, ACMW-02N, ACMW-02S, ACMW-03W (former ACMW-03), ACMW-04W, ACMW-06N, and ACMW-06S.

As required by the MRP, the STPUD monitors and samples these wells on a monthly basis for analysis of the required parameters. The results of the groundwater sampling and analysis are submitted in a quarterly report along with the results of the other MRP requirements.

As part of the hydrogeologic reconnaissance in 2003, three soil borings were drilled within Diamond Valley and converted into three dual completion groundwater monitoring wells. These wells (ACMW-07D, ACMW-07S, ACMW-08D, ACMW-08S, ACMW-09S, ACMW-09D) as shown on Figure 2, are currently not included in the Alpine County groundwater monitoring program of the MRP. Although STPUD monitors and samples these wells on a periodic basis, the results are not included in the monitoring reports submitted by the STPUD to the RWQCB for the groundwater monitoring program.

3.2 Site Reconnaissance and Well Inspection

On June 4, 2008, STPUD personnel accompanied Alisto to conduct a field reconnaissance of the permitted application areas and Diamond Valley, and a visual inspection of existing monitoring wells. The visual survey was performed to identify and evaluate potential locations for additional groundwater monitoring wells and assess the physical conditions of the existing monitoring wells.

Although the majority of the land application areas are relatively flat, the boggy ground conditions and surface water courses traversing the area could limit accessibility for drilling and monitoring of additional wells. Most of the potential well sites identified within the Alpine County wastewater discharge area can be accessed by buggy-mounted drilling equipment. Similarly, potential locations for additional wells were also identified based on year round accessibility using four-wheel drive vehicles. Other factors considered included:

access for drilling equipment, optimization of the existing well network; proximity to land application areas, surface water features and private water supply wells; and potential for snow burial of the wells during winter months.

All the existing monitoring wells were visually inspected as to their location relative to the monitoring network and application areas, physical condition and construction, and adequacy for collection of representative groundwater quality data. The visual inspection was performed to determine which of the existing wells will need to be abandoned and removed from the network, repaired and modified, or replaced to meet the objectives of Alpine County for monitoring the impact of wastewater application on groundwater, surface water and soil within the project area.

3.3 Well Surveying

All the monitoring wells at the wastewater application areas and at the emergency discharge area at Diamond Valley and selected domestic/private wells were surveyed on October 22 and December 11, 2007 by a California licensed surveyor in reference to the two survey control points (STPUD1 and STPUD2) established by STPUD for the Diamond Valley wells. The survey was performed to verify and establish the horizontal and vertical controls of each monitoring point to a common datum for use in interpreting the groundwater flow condition within the project area. The locations of the STPUD control points are shown in Figure 2, and a copy of the well survey data is included in Appendix A.

The wellhead survey of all existing monitoring wells was performed by Morrow Surveying of West Sacramento, California using global positioning system (GPS) equipment in reference to the two STPUD control points. The basis of the horizontal controls survey was the California State Plane Zone 2 and California Spatial Reference Center Datum, reference Epoch 2000.35. Continuously Operating Reference Stations (CORS) CH01 and CMOB were also incorporated in the GPS survey. The reference datum for the vertical control or elevation of each wellhead for the survey was the North American Vertical Datum (NAVD) 1988.

3.4 Water Level Monitoring Procedures

Groundwater level in all the existing monitoring wells within the wastewater discharge areas and the Diamond Valley emergency discharge area was measured from the permanent survey reference point at the top of the well casing during the four quarterly events. Alisto conducted the four monitoring events on September 24 and December 12, 2007; and on March 19 and June 4, 2008. STPUD personnel accompanied Alisto during all four events to provide access to the wells.

The depth to groundwater in each well was measured to an accuracy of 0.01 foot from the top of the PVC well casing using an electronic sounder. The field forms presenting the depth to water measurements during each event are included in Appendix B.

4.0 MONITORING DATA AND PROGRAM EVALUATION

An evaluation of the current groundwater monitoring program, data collected during the four monitoring events performed as part of this study, and available historical data provided by STPUD is presented in this section.

4.1 Water Level Monitoring Results

Depth to water data collected during the four monitoring events performed by Alisto in 2007 and 2008 are summarized in Table 1 including available historical data collected and provided by STPUD. The groundwater elevation at each well was calculated using the surveyed elevation of the top of well casing and the depth to water measured during each monitoring event. The surveyed location (longtitude and latitude) of each well together with the calculated groundwater elevation for each monitoring event were then used in interpreting groundwater flow direction and gradient and in preparing potentiometric groundwater elevation contour map for each monitoring event.

4.2 Interpretation of Groundwater Monitoring Data

The interpreted groundwater flow direction and potentiometric contour maps for the monitoring events performed by Alisto in September and December 2007 and in March and June 2008 are shown on Figures 3 through 10. As interpreted from the results of the four monitoring events, the groundwater flow direction within Wade Valley and Carson Valley was consistently towards the north, generally following the flow direction of the Carson River. The interpreted groundwater gradient and flow direction within Diamond Valley was also consistently towards the north-northeast for all four events.

To determine if the shallow groundwater in the project area occurs in one hydrogeologic unit or if the water-bearing zone in Diamond Valley area is a discrete hydrologic unit from the Wade Valley and south Carson Valley area, two versions of data interpretations of the groundwater monitoring data were prepared for each quarterly monitoring event performed by Alisto. The two versions of groundwater flow and gradient interpretations were as follows:

Version 1: Potentiometric groundwater elevation contour and gradient was interpreted using the groundwater level data from all the wells in Diamond Valley, Wade Valley, and Carson Valley as one hydrologic unit as shown on Figures 3, 5, 7 and 9 for September, December, March and June events, respectively.

Version 2: Potentiometric contour map and gradient was interpreted using water level data from the Diamond Valley wells separately from the Wade Valley and Carson Valley wells assuming each is a discrete hydrologic unit as shown on Figures 4, 6, 8, and 10 for the September and December 2007 and March and June 2008 events.

The groundwater contour maps and gradients based on the two versions of data interpretations indicate that the water bearing zones in Diamond Valley, Wade Valley, and south Carson Valley are hydraulically connected and do not appear to be two discrete hydrologic units. The interpreted groundwater flow direction and gradient for the four quarterly monitoring events are relatively consistent across the project area using both versions of data interpretation.

The difference in groundwater elevations between the farthest northerly monitoring point (ACMW-04) in Diamond Valley and the southernmost monitoring point (ACMW-07) is approximately 500 feet, which is consistent with the overall ground surface elevation change between the two monitoring points (approximately 650 feet). The changes in groundwater elevation over time in the monitoring wells as graphically shown on Figures 11 and 12 also reflect similar flow characteristics within the project area, indicating that the volcanic and volcaniclastic blocks between Diamond Valley and Wade Valley are not acting as hydraulic barriers to groundwater flow from south to north.

Based on the location and limited number of groundwater monitoring wells in the Carson Valley area, the groundwater flow and gradient direction cannot be adequately and reliably interpreted. However, the groundwater elevation in the northernmost well (ACMW-04W) was consistently lower than the other wells for all four quarterly events indicating the groundwater gradient is likely in a northerly direction.

Available geologic and hydrogeologic information on the project area was considered in developing a conceptual groundwater model to assist the preparation of potentiometric groundwater contour maps. It was assumed that the regional groundwater flow is through the alluvium generally from the higher elevations at the recharge areas along the basin margins towards the lower elevations within Diamond Valley and the wastewater discharge areas in Wade Valley and Carson Valley. Within the valley floor, groundwater flow is also influenced by pasture crop irrigation using recycled wastewater and surface water flow in the West Fork of Carson River and Indian Creek.

The gradient of the shallow groundwater in Diamond Valley is generally towards the north-northeast as shown on the potentiometric groundwater contour maps on Figures 3 through 10 for both versions of data interpretation. The slight difference in the interpreted gradient and flow direction between the two versions is due in part to the limited number and location of wells in the current monitoring network to reliably calculate and interpret groundwater flow conditions within the project area. Because of this limitation in the current monitoring network, it is likely that the groundwater quality data collected for this area is also not sufficient to properly evaluate the impact of the present and future discharges of recycled wastewater on groundwater quality within the project area.

4.3 Groundwater Level Trend

Historical and recent groundwater level data collected over time are graphically shown on Figures 11 and 12. Although there is a data gap from 2004 to 2006, the shallow groundwater level in the Diamond Valley area shows an increasing trend from September 2007 to June 2008.

The groundwater level in the Wade Valley and Carson Valley has remained relatively consistent over time since 2005, most likely due to the influence of recycled wastewater application. The slight difference in water level trends between ACMW-06S, ACMW-06N, and ACMW-04W may be due to different methods of application, proximity to ditches and local evapotranspiration rates. Groundwater level in the project area, which is largely influenced by recharge along the basin fringes and stream flow, fluctuates seasonally and has generally been increasing since 2007.

4.4 Evaluation of Current Groundwater Monitoring Network

From review and evaluation of geologic information and groundwater monitoring data, and visual reconnaissance of the monitoring network, it is evident that the number and location of monitoring wells are not sufficient to effectively and reliably interpret groundwater flow conditions within the present application areas of recycled wastewater and the Diamond Valley area. As can be noted in Figures 3 through 10, the number and location of wells of the current monitoring network does not adequately encompass the wastewater discharge areas to assess groundwater conditions in Carson Valley particularly at the eastern, western, and northern portions of the project area.

Evaluation of available geologic information and monitoring data collected during the recent quarterly events in 2007 and 2008 indicates that the regional flow direction of the shallow groundwater is generally towards the north-northeast in the Diamond Valley area and primarily to the north within Wade Valley and Carson Valley. These data interpretations are consistent with the results of previous monitoring events and the Diamond Valley hydrogeologic reconnaissance study conducted by STPUD.

Based on the two versions of monitoring data interpretation, it is apparent that the shallow water bearing unit beneath Diamond Valley, Wade Valley, and Carson Valley is hydraulically connected as one hydrogeologic unit. The volcanic and volcaniclastic blocks between Diamond Valley and Wade Valley are not acting as hydraulic barriers to groundwater flow from the south (Diamond Valley) towards Carson Valley and the California-Nevada border. The hydrogeologic characteristics of the project area should be considered in developing a comprehensive and effective groundwater monitoring program to reliably address and assess the impact of present and future wastewater discharges on groundwater quality within the land application areas and to properly protect water supply sources in the region.

5.0 RECOMMENDATIONS

Based on the results of the water level monitoring and evaluation of available data, following are the recommendations to the existing groundwater monitoring network and program of STPUD for the recycled wastewater discharge within Alpine County.

- Modify, repair, or destroy selected wells included in the current monitoring network to improve data reliability and wellhead protection and security.
- Install additional monitoring wells at the present and future wastewater discharge areas in two phases in accordance with applicable regulatory standards and Alpine County Groundwater Management Plan.
- Evaluate and determine the appropriate water quality parameters for use as indicators of impact of wastewater discharge on groundwater quality.
- Conduct an on-going evaluation of the effectiveness and adequacy of the monitoring program and network to determine the need for modifications to address future changes in regulations and land application areas and practices.

Detailed discussion of each of the above recommendations is presented below and the recommended modifications to the existing monitoring network are presented in Tables 2 to 4. The proposed locations of the additional monitoring wells are shown on Figure 13 and described in Tables 3 and 4.

5.1 Recommended Modifications to Existing Monitoring Wells

The construction and current condition of each well included in the current monitoring program are described in Table 2 including the well-specific recommended action or modification based on field observations, applicable requirements of RWQCB Order No. R6T-2004-0010, and regulatory guidelines. The recommended modifications or actions for the existing wells include the following:

- Replacement of selected wells listed in Table 2 with properly constructed wells to ensure collection of reliable data that are representative of site conditions
- Modification of wellhead construction as listed in Table 2 for improved protection, security, and accessibility.
- Destruction of wells that are no longer included in the monitoring network or considered to be deficient for use in monitoring.

The recommended actions for the existing wells as presented in Table 2 were developed in conjunction with the proposed modifications to the monitoring network and program described in the following sections.

5.2 Recommended Modifications to Current Monitoring Well Network

As discussed in the preceding section, the current groundwater monitoring network is limited and not adequate for collection of representative data to effectively and reliably assess groundwater conditions and the impact of recycled wastewater discharge on groundwater quality beneath the present and future application or discharge areas. In determining the number and potential location of additional wells, the following criteria were used:

- Applicability and adequacy to evaluate the geologic and hydrogeologic conditions and impact on groundwater quality.
- Accessibility for drilling and well installation and year-round monitoring and sampling.
- Right-of-way access or likelihood of obtaining access permit from property owner.
- Optimization of existing well network and proximity to land application areas, surface water features and private water supply wells.
- Location of other potential sources of contaminants to groundwater.
- Compliance with Federal, State, and local regulatory requirements and specific provisions and intent of the RWQCB Order for discharge of recycled wastewater.
- Consistency with the objectives of this evaluation study and with the Alpine County Groundwater Management Plan.

During field reconnaissance in June 2008, a total of 11 potential additional well sites were identified by Alisto and STPUD personnel. Subsequently, STPUD personnel identified eight additional potential well sites. Based on field observations, requirements of RWQCB Order No. R6T-2004-0010, and review of available historical data, it is recommended that installation of additional wells be implemented in two phases. The potential locations of proposed additional wells for Phase 1 are listed in Table 3 and in Table 4 for Phase 2. Each phase of the implementation plan for the recommended modifications to the current monitoring network is described below:

- **Phase 1:** Installation of additional monitoring wells at 10 locations within the active land application areas in Carson Valley and Wade Valley to address the limitations in collecting representative data that is adequate and effective in evaluating hydrogeologic conditions and impact on groundwater quality.
- **Phase 2**: Installation of additional wells at 7 locations within the emergency discharge area in Diamond Valley before conversion and use as a permanent discharge or application area to obtain sufficient water level and quality data in the future. These additional wells are also necessary to collect sufficient baseline data on water quality within Diamond Valley to comply with future regulatory requirements.

Of the total 17 additional monitoring points proposed for the two phases, monitoring wells at the 10 locations under Phase 1 are recommended to be installed as soon as practicable after receipt of concurrence of regulatory agencies and STPUD. The additional wells under Phase 2 are recommended to be installed before converting and using the Diamond Valley area as a permanent recycled wastewater application or discharge area in order to collect sufficient baseline groundwater level and quality data to comply with regulatory requirements.

As stated in the preceding section, the current monitoring well network and configuration within the active wastewater application areas is limited and not adequate to collect data to reliable interpret groundwater flow conditions. As such, it is also apparent that the current monitoring network is likely not adequate to collect data that is representative of site conditions to assess the impact of wastewater discharge on groundwater quality in south Carson Valley and Wade Valley at this time. The number and location of the proposed additional wells were therefore selected to address the potential data gaps in groundwater flow conditions and quality.

The purpose and rationale for each additional well proposed under Phase 1 are described in Table 3 and summarized below:

- Wells A-1, A-6, and A-8: Monitoring of groundwater elevation and water quality indicator parameters in the shallow groundwater as sentinel wells to assess potential impact of wastewater discharge and migration of constituents of concern (COC) in recycled wastewater on groundwater downgradient of the discharge areas and upgradient of the California-Nevada border.
- Wells A-4, A-5, and A-9: Monitoring of groundwater elevation and water quality parameters to assess impact within the application areas.
- Well A-7: Monitoring of groundwater elevation and shallow water quality along the western margin of the application and recharge areas.
- Well A-2: One well to monitor the shallow groundwater elevation and water quality at the eastern margin of the application area and as a recharge monitoring point for application ditches in T11N, R20 E; Section 17. One deep well next to the shallow well to serve as a sentry monitoring point to assess potential impact of the active sewage treatment ponds in NE ¼ of SW ¼ of Section 21 on water quality.
- Wells A-3 and A-10: Monitoring of shallow groundwater elevation and water quality at the southern margin of the application areas. A-10 would serve as monitoring point for Diamond ditch to the south and Well A-3 would monitor the active land application area in Wade Valley upgradient of the pivot irrigation system.

Table 4 lists the additional wells proposed under Phase 2 including the rationale and proposed construction. The unidentified well in Diamond Valley, north of Well ACMW-02 should be further investigated to determine its construction and use for possible inclusion into the monitoring program. If the construction of this well does not meet regulatory standards and is not suitable for use as a monitoring well, it is recommended that this unidentified well be properly destroyed. Proposed Wells B-5 and B-6 under Phase 2 will adequately monitor the groundwater elevations and water quality at the northerly edge of the Diamond Valley emergency discharge area.

If the pH and chloride level in existing well ACMW-07 have been consistently elevated as compared to the other wells, it is recommended that this well be properly destroyed. As described in the boring log and construction details, Well ACMW-07 was grouted up to a depth of 163 feet and then re-drilled to its current depth of the well at 345 feet. Drilling fluids and neat cement have likely penetrated the sidewalls of the boring and adversely affected groundwater quality resulting in higher chloride level.

5.3 Recommended Specifications and Procedures for Monitoring Well Construction

Due to the variability of subsurface soil and rock in the project area, it is recommended that the additional wells be installed with a drilling rig equipped with a casing advance system (such as Odex/Stratex or equivalent). Casing advance drilling method ensures the boreholes will remain open during advancement and well construction and eliminates the generation of waste stream of a mud rotary drilling method. Undisturbed and uncontaminated soil samples can be collected ahead of the working face of the boring with a split spoon sampler using this method. In addition, casing advance methods are preferred due to its ability to advance through boulders and rocks as well as fine sediments without the introduction of drilling fluids into the water bearing sediments. Since no drilling fluid is used, the drill cuttings are typically discharged to the ground surface as compared to the drill cuttings generated by mud drilling method that requires transportation to an offsite disposal facility.

At locations where a combination deep and shallow monitoring well is recommended, multiple completion or nested wells are not recommended because of the potential for vertical communication between the screened intervals within the same borehole. In installing a dual shallow and deep monitoring point, the shallow well should first be drilled, logged and constructed to the appropriate or targeted water-bearing zone. The boring for the deep well should be drilled a minimum of 10 feet away without logging or sampling the interval from ground surface to the depth of the shallow well. The boring for the deep well should be logged and sampled beginning at the bottom depth of the shallow well to the proposed total depth of the deeper well. Soil samples should be logged in the field by a qualified geologist or engineer in accordance with the Unified Soils Classification System.

The construction of a groundwater monitoring well should be in accordance with the Alpine County Groundwater Management Plan with respect to construction materials, filter pack, sanitary seal and wellhead completion. A sample construction diagram of a groundwater monitoring well is shown on Figure 14.

A groundwater monitoring well is typically constructed of blank Schedule 40 polyvinyl chloride (Sch. 40 PVC) casing from the surface to approximately 5 feet above the groundwater level encountered during drilling to allow for seasonal water level fluctuation. The screened interval of the shallow well should extend a minimum of 10 to 15 feet below the top of the encountered groundwater level using factory slotted Sch. 40 PVC casing. For deep wells extending to depths of 50 feet or deeper, well centralizers should be used at interval of 25 feet.

After the casings have been placed in the boring, an appropriate filter pack is placed around the well screen interval to a depth of approximately 5 feet above the screen. A sand pack is then placed inside the drive casing using the tremie method to reduce bridging. As the filter pack is emplaced, the drive casing is removed a section at a time to ensure the drive casing is not above the top of the sand pack. The screen interval should be swabbed to eliminate bridging of the sand filter pack, optimize well production, and minimize intrusion of fines into the well. After swabbing, the depth to the top of the filter pack is tagged and if the filter pack has settled, additional sand should be added. Once the filter pack has been installed, a 2- to 3-foot thick bentonite spacer is placed above the sand pack, and the remainder of the boring annulus is sealed with Portland Type I/II neat cement using the tremie method.

All well surface completions should consist of a lockable stovepipe monument set in a minimum 3 feet by 3-feet by 6-inch thick concrete pad. Where practicable a minimum of three bollards should be installed around each wellpad to protect the monument from damage by snow removal equipment, livestock, and/or vehicle.

After a minimum of 48 hours after installation of the sanitary seal, each well should be developed by removing at least 10 saturated borehole volumes from the well as measured from static water level to the well's total depth. Development should be performed with either a variable speed submersible pump, airlift pump or bailer. During well development, indicator parameters pH, temperature, specific conductivity and turbidity should be measured using a calibrated field instrument. Development purging should continue until the indicator parameters have stabilized and vary by no more than the following values:

- pH - 0.2 units
- Temperature - 0.5 degrees Celsius
- Specific conductivity - 10 percent
- Turbidity – 20 ntu

After stabilization of the above indicator parameters, a sample of groundwater should be collected from the well using a clean disposable Teflon bailer and placed in appropriate laboratory-supplied containers for analysis of COC. Samples collected must be transported to a certified laboratory following standard chain-of-custody procedures.

Actual site conditions such as first encountered groundwater and characteristics of sediments encountered during drilling of the boring will determine the specific well construction based on observation in the field by a qualified geologist or engineer. After development and collection of initial groundwater sample from the well, each well can be equipped with a dedicated pneumatic airlift pump or bailer to eliminate potential for cross contamination during future sampling events.

5.4 Evaluation of Water Quality Indicator Parameters

The scope of work for this monitoring program evaluation study does not include an assessment of the groundwater quality parameters or constituents of concern being analyzed in the groundwater under the current RWQCB Order. It is recommended, however, that Alpine County and STPUD re-evaluate the current groundwater sampling and analysis plan to determine if the current COC and monitoring parameters being analyzed are appropriate indicators of wastewater discharge impact on groundwater quality. The re-evaluation of monitoring parameters should also consider constituents that are specific indicators of other potential sources of contaminants to groundwater other than wastewater discharges from STPUD.

The selection of the appropriate chemical and/or biological indicator parameters should be one of the primary objectives in evaluating the current water quality sampling and analysis requirements of the RWQCB Order for the STPUD wastewater discharge program in Alpine County. At this time, the constituents of concern outlined in the MRP of the RWQCB Order appear to be adequate to assess the potential impact of recycled wastewater discharge on groundwater quality. Groundwater samples are required to be collected by the discharger on a monthly basis as outlined in Section V; Page 6 of the MRP.

After installation of the proposed additional monitoring wells and collection of sufficient data set (at least one year of data), it is recommended that Alpine County and STPUD re-evaluate the sampling and analysis plan to determine the adequacy and applicability of the monitoring parameters in assessing the impact wastewater discharge on groundwater quality. Revisions or modifications to the list of monitoring and indicator parameters that are deemed warranted should be submitted to the RWQCB for consideration and approval before implementation.

5.5 Ongoing Evaluation of the Groundwater Monitoring Program

Because of future changes in regulatory requirements, wastewater treatment technology and discharge practices, agricultural irrigation practices, and environmental conditions within the project area, Alpine County and STPUD should evaluate the effectiveness and adequacy of the groundwater monitoring program on an ongoing basis. This ongoing evaluation should also focus on the adequacy of the sampling and analysis plan in collecting representative data on the indicator parameters of impact on groundwater quality.

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TABLES

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-01AW	11/28/1989	9.00	5493.13	5484.13
ACMW-01AW	8/1/1990	7.70	5493.13	5485.43
ACMW-01AW	8/21/1991	7.10	5493.13	5486.03
ACMW-01AW	7/21/1992	7.80	5493.13	5485.33
ACMW-01AW	1/1/1993	7.20	5493.13	5485.93
ACMW-01AW	7/12/1994	7.90	5493.13	5485.23
ACMW-01AW	8/15/1995	6.50	5493.13	5486.63
ACMW-01AW	6/19/1996	6.30	5493.13	5486.83
ACMW-01AW	6/16/1997	7.40	5493.13	5485.73
ACMW-01AW	7/21/1998	6.30	5493.13	5486.83
ACMW-01AW	6/20/1999	6.30	5493.13	5486.83
ACMW-01AW	7/18/2000	6.20	5493.13	5486.93
ACMW-01AW	6/19/2001	6.80	5493.13	5486.33
ACMW-01AW	6/18/2002	6.30	5493.13	5486.83
ACMW-01AW	6/17/2003	6.90	5493.13	5486.23
ACMW-01AW	5/18/2004	6.00	5493.13	5487.13
ACMW-01AW	6/14/2005	6.10	5493.13	5487.03
ACMW-01AW	6/1/2006	4.80	5493.13	5488.33
ACMW-01AW	2/7/2006	5.20	5493.13	5487.93
ACMW-01AW	3/22/2006	5.80	5493.13	5487.33
ACMW-01AW	4/19/2006	5.50	5493.13	5487.63
ACMW-01AW	5/16/2006	4.80	5493.13	5488.33
ACMW-01AW	6/1/2006	3.80	5493.13	5489.33
ACMW-01AW	7/18/2006	4.70	5493.13	5488.43
ACMW-01AW	8/16/2006	4.90	5493.13	5488.23
ACMW-01AW	9/26/2006	5.10	5493.13	5488.03
ACMW-01AW	10/19/2006	5.70	5493.13	5487.43
ACMW-01AW	11/14/2006	4.60	5493.13	5488.53
ACMW-01AW	12/26/2006	5.30	5493.13	5487.83
ACMW-01AW	9/24/2007	7.77	5493.13	5485.36
ACMW-01AW	12/12/2007	4.81	5493.13	5488.32
ACMW-01AW	3/19/2008	4.66	5493.13	5488.47
ACMW-01AW	6/4/2008	4.02	5493.13	5489.11

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-01BE	11/28/1989	10.50	5503.55	5493.05
ACMW-01BE	8/1/1990	10.10	5503.55	5493.45
ACMW-01BE	8/21/1991	18.20	5503.55	5485.35
ACMW-01BE	7/21/1992	12.90	5503.55	5490.65
ACMW-01BE	1/1/1993	10.80	5503.55	5492.75
ACMW-01BE	7/12/1994	11.10	5503.55	5492.45
ACMW-01BE	8/15/1995	8.10	5503.55	5495.45
ACMW-01BE	6/19/1996	7.90	5503.55	5495.65
ACMW-01BE	6/16/1997	11.10	5503.55	5492.45
ACMW-01BE	7/21/1998	8.40	5503.55	5495.15
ACMW-01BE	6/20/1999	9.00	5503.55	5494.55
ACMW-01BE	7/18/2000	9.70	5503.55	5493.85
ACMW-01BE	6/19/2001	11.60	5503.55	5491.95
ACMW-01BE	6/18/2002	9.90	5503.55	5493.65
ACMW-01BE	6/17/2003	11.50	5503.55	5492.05
ACMW-01BE	5/18/2004	10.00	5503.55	5493.55
ACMW-01BE	6/14/2005	9.50	5503.55	5494.05
ACMW-01BE	6/1/2006	4.00	5503.55	5499.55
ACMW-01BE	2/7/2006	4.80	5503.55	5498.75
ACMW-01BE	3/22/2006	3.60	5503.55	5499.95
ACMW-01BE	4/19/2006	4.70	5503.55	5498.85
ACMW-01BE	5/16/2006	5.80	5503.55	5497.75
ACMW-01BE	6/1/2006	3.00	5503.55	5500.55
ACMW-01BE	7/18/2006	5.50	5503.55	5498.05
ACMW-01BE	8/16/2006	7.00	5503.55	5496.55
ACMW-01BE	9/26/2006	7.60	5503.55	5495.95
ACMW-01BE	10/19/2006	9.30	5503.55	5494.25
ACMW-01BE	11/14/2006	6.90	5503.55	5496.65
ACMW-01BE	12/26/2006	7.70	5503.55	5495.85
ACMW-01BE	9/24/2007	12.27	5503.55	5491.28
ACMW-01BE	12/12/2007	12.27	5503.55	5491.28
ACMW-01BE	3/19/2008	10.56	5503.55	5492.99
ACMW-01BE	6/4/2008	7.06	5503.55	5496.49

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-02N	11/28/1989	7.10	5469.7	5462.60
ACMW-02N	8/1/1990	6.80	5469.7	5462.90
ACMW-02N	8/21/1991	7.00	5469.7	5462.70
ACMW-02N	7/21/1992	7.00	5469.7	5462.70
ACMW-02N	1/1/1993	6.30	5469.7	5463.40
ACMW-02N	7/12/1994	7.10	5469.7	5462.60
ACMW-02N	8/15/1995	6.20	5469.7	5463.50
ACMW-02N	6/19/1996	5.80	5469.7	5463.90
ACMW-02N	6/16/1997	6.80	5469.7	5462.90
ACMW-02N	7/21/1998	6.00	5469.7	5463.70
ACMW-02N	6/20/1999	6.20	5469.7	5463.50
ACMW-02N	7/18/2000	6.20	5469.7	5463.50
ACMW-02N	6/19/2001	7.00	5469.7	5462.70
ACMW-02N	6/18/2002	6.50	5469.7	5463.20
ACMW-02N	6/17/2003	6.80	5469.7	5462.90
ACMW-02N	5/18/2004	6.60	5469.7	5463.10
ACMW-02N	6/14/2005	7.00	5469.7	5462.70
ACMW-02N	6/1/2006	6.00	5469.7	5463.70
ACMW-02N	2/7/2006	6.90	5469.7	5462.80
ACMW-02N	3/22/2006	6.80	5469.7	5462.90
ACMW-02N	4/19/2006	6.40	5469.7	5463.30
ACMW-02N	5/16/2006	6.00	5469.7	5463.70
ACMW-02N	6/1/2006	5.50	5469.7	5464.20
ACMW-02N	7/18/2006	5.70	5469.7	5464.00
ACMW-02N	8/16/2006	6.20	5469.7	5463.50
ACMW-02N	9/26/2006	6.40	5469.7	5463.30
ACMW-02N	10/19/2006	7.50	5469.7	5462.20
ACMW-02N	11/14/2006	7.30	5469.7	5462.40
ACMW-02N	12/26/2006	7.70	5469.7	5462.00
ACMW-02N	9/24/2007	7.32	5469.7	5462.38
ACMW-02N	12/12/2007	8.36	5469.7	5461.34
ACMW-02N	3/19/2008	7.50	5469.7	5462.20
ACMW-02N	6/4/2008	5.74	5469.7	5463.96

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-02S	11/28/1989	7.10	5471.6	5464.50
ACMW-02S	8/1/1990	7.00	5471.6	5464.60
ACMW-02S	8/21/1991	7.00	5471.6	5464.60
ACMW-02S	7/21/1992	6.90	5471.6	5464.70
ACMW-02S	1/1/1993	6.60	5471.6	5465.00
ACMW-02S	7/12/1994	7.40	5471.6	5464.20
ACMW-02S	8/15/1995	6.80	5471.6	5464.80
ACMW-02S	6/19/1996	6.00	5471.6	5465.60
ACMW-02S	6/16/1997	7.40	5471.6	5464.20
ACMW-02S	7/21/1998	6.30	5471.6	5465.30
ACMW-02S	6/20/1999	6.60	5471.6	5465.00
ACMW-02S	7/18/2000	6.50	5471.6	5465.10
ACMW-02S	6/19/2001	7.70	5471.6	5463.90
ACMW-02S	6/18/2002	6.60	5471.6	5465.00
ACMW-02S	6/17/2003	6.90	5471.6	5464.70
ACMW-02S	5/18/2004	6.60	5471.6	5465.00
ACMW-02S	6/14/2005	7.30	5471.6	5464.30
ACMW-02S	6/1/2006	5.30	5471.6	5466.30
ACMW-02S	2/7/2006	7.50	5471.6	5464.10
ACMW-02S	3/22/2006	7.30	5471.6	5464.30
ACMW-02S	4/19/2006	7.10	5471.6	5464.50
ACMW-02S	5/16/2006	6.60	5471.6	5465.00
ACMW-02S	6/1/2006	4.40	5471.6	5467.20
ACMW-02S	7/18/2006	5.00	5471.6	5466.60
ACMW-02S	8/16/2006	5.90	5471.6	5465.70
ACMW-02S	9/26/2006	7.00	5471.6	5464.60
ACMW-02S	10/19/2006	8.50	5471.6	5463.10
ACMW-02S	11/14/2006	8.90	5471.6	5462.70
ACMW-02S	12/26/2006	9.00	5471.6	5462.60
ACMW-02S	9/24/2007	8.24	5471.6	5463.36
ACMW-02S	12/12/2007	9.71	5471.6	5461.89
ACMW-02S	3/19/2008	8.07	5471.6	5463.53
ACMW-02S	6/4/2008	4.80	5471.6	5466.80

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-03	11/28/1989	5.00	5048.93	5043.93
ACMW-03	8/1/1990	5.10	5048.93	5043.83
ACMW-03	8/21/1991	6.00	5048.93	5042.93
ACMW-03	7/21/1992	7.00	5048.93	5041.93
ACMW-03	1/1/1993	4.90	5048.93	5044.03
ACMW-03	7/12/1994	5.10	5048.93	5043.83
ACMW-03	8/15/1995	3.90	5048.93	5045.03
ACMW-03	6/19/1996	4.10	5048.93	5044.83
ACMW-03	6/16/1997	5.30	5048.93	5043.63
ACMW-03	7/21/1998	3.80	5048.93	5045.13
ACMW-03	6/20/1999	4.60	5048.93	5044.33
ACMW-03	7/18/2000	3.30	5048.93	5045.63
ACMW-03	6/19/2001	5.90	5048.93	5043.03
ACMW-03	6/18/2002	4.40	5048.93	5044.53
ACMW-03	6/17/2003	6.70	5048.93	5042.23
ACMW-03	5/18/2004	8.70	5048.93	5040.23
ACMW-03	6/14/2005	3.50	5048.93	5045.43
ACMW-03	1/10/2006	6.20	5048.93	5042.73
ACMW-03	6/1/2006	NA	5048.93	---
ACMW-03	2/7/2006	NA	5048.93	---
ACMW-03	3/22/2006	NA	5048.93	---
ACMW-03	4/19/2006	NA	5048.93	---
ACMW-03	5/16/2006	8.50	5048.93	5040.43
ACMW-03	6/1/2006	3.30	5048.93	5045.63
ACMW-03	7/18/2006	5.20	5048.93	5043.73
ACMW-03	8/16/2006	7.80	5048.93	5041.13
ACMW-03	9/26/2006	NA	5048.93	---
ACMW-03	10/19/2006	NA	5048.93	---
ACMW-03	11/14/2006	NA	5048.93	---
ACMW-03	12/26/2006	NA	5048.93	---
ACMW-03W	9/24/2007	9.75	5048.93	5039.18
ACMW-03W	12/12/2007	9.78	5048.93	5039.15
ACMW-03W	3/19/2008	9.82	5048.93	5039.11
ACMW-03W	6/4/2008	3.00	5048.93	5045.93

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-04	9/24/2007	13.19	4919.89	4906.70
ACMW-04	12/12/2007	NM	4919.89	---
ACMW-04	3/19/2008	DRY	4919.89	---
ACMW-04	6/4/2008	9.51	4919.89	4910.38
ACMW-04W	11/28/1989	14.20	4919.89	4905.69
ACMW-04W	8/1/1990	14.00	4919.89	4905.89
ACMW-04W	8/21/1991	15.10	4919.89	4904.79
ACMW-04W	7/21/1992	15.40	4919.89	4904.49
ACMW-04W	1/1/1993	12.20	4919.89	4907.69
ACMW-04W	7/12/1994	15.20	4919.89	4904.69
ACMW-04W	8/15/1995	12.90	4919.89	4906.99
ACMW-04W	6/19/1996	13.20	4919.89	4906.69
ACMW-04W	6/16/1997	11.90	4919.89	4907.99
ACMW-04W	7/21/1998	13.20	4919.89	4906.69
ACMW-04W	6/20/1999	13.40	4919.89	4906.49
ACMW-04W	7/18/2000	14.00	4919.89	4905.89
ACMW-04W	6/19/2001	14.20	4919.89	4905.69
ACMW-04W	6/18/2002	13.90	4919.89	4905.99
ACMW-04W	6/17/2003	13.80	4919.89	4906.09
ACMW-04W	5/18/2004	15.00	4919.89	4904.89
ACMW-04W	6/14/2005	14.70	4919.89	4905.19
ACMW-04W	1/10/2006	13.40	4919.89	4906.49
ACMW-04W	6/1/2006	14.20	4919.89	4905.69
ACMW-04W	2/7/2006	15.70	4919.89	4904.19
ACMW-04W	3/22/2006	17.00	4919.89	4902.89
ACMW-04W	4/19/2006	17.50	4919.89	4902.39
ACMW-04W	5/16/2006	11.30	4919.89	4908.59
ACMW-04W	6/1/2006	11.80	4919.89	4908.09
ACMW-04W	7/18/2006	6.70	4919.89	4913.19
ACMW-04W	8/16/2006	7.40	4919.89	4912.49
ACMW-04W	9/26/2006	9.40	4919.89	4910.49
ACMW-04W	10/19/2006	13.90	4919.89	4905.99
ACMW-04W	11/14/2006	16.80	4919.89	4903.09
ACMW-04W	12/26/2006	19.00	4919.89	4900.89
ACMW-04W	9/24/2007	13.07	4919.89	4906.82
ACMW-04W	12/12/2007	21.29	4919.89	4898.60
ACMW-04W	3/19/2008	22.14	4919.89	4897.75
ACMW-04W	6/4/2008	9.51	4919.89	4910.38

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-06N	11/28/1989	3.60	5222.48	5218.88
ACMW-06N	8/1/1990	3.60	5222.48	5218.88
ACMW-06N	8/21/1991	3.40	5222.48	5219.08
ACMW-06N	7/21/1992	3.90	5222.48	5218.58
ACMW-06N	1/1/1993	3.40	5222.48	5219.08
ACMW-06N	7/12/1994	3.30	5222.48	5219.18
ACMW-06N	8/15/1995	3.50	5222.48	5218.98
ACMW-06N	6/19/1996	3.00	5222.48	5219.48
ACMW-06N	6/16/1997	3.10	5222.48	5219.38
ACMW-06N	7/21/1998	3.80	5222.48	5218.68
ACMW-06N	6/20/1999	4.10	5222.48	5218.38
ACMW-06N	7/18/2000	4.10	5222.48	5218.38
ACMW-06N	6/19/2001	4.40	5222.48	5218.08
ACMW-06N	6/18/2002	4.40	5222.48	5218.08
ACMW-06N	6/17/2003	4.40	5222.48	5218.08
ACMW-06N	5/18/2004	4.10	5222.48	5218.38
ACMW-06N	6/14/2005	4.10	5222.48	5218.38
ACMW-06N	6/1/2006	2.90	5222.48	5219.58
ACMW-06N	2/7/2006	3.60	5222.48	5218.88
ACMW-06N	3/22/2006	3.50	5222.48	5218.98
ACMW-06N	4/19/2006	3.60	5222.48	5218.88
ACMW-06N	5/16/2006	3.70	5222.48	5218.78
ACMW-06N	6/1/2006	4.60	5222.48	5217.88
ACMW-06N	7/18/2006	5.20	5222.48	5217.28
ACMW-06N	8/16/2006	5.60	5222.48	5216.88
ACMW-06N	9/26/2006	5.90	5222.48	5216.58
ACMW-06N	10/19/2006	5.00	5222.48	5217.48
ACMW-06N	11/14/2006	4.30	5222.48	5218.18
ACMW-06N	12/26/2006	4.00	5222.48	5218.48
ACMW-06N	9/24/2007	6.63	5222.48	5215.85
ACMW-06N	12/12/2007	3.85	5222.48	5218.63
ACMW-06N	3/19/2008	4.07	5222.48	5218.41
ACMW-06N	6/4/2008	4.86	5222.48	5217.62

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-06S	11/28/1989	14.80	5223.5	5208.70
ACMW-06S	8/1/1990	14.90	5223.5	5208.60
ACMW-06S	8/21/1991	14.50	5223.5	5209.00
ACMW-06S	7/21/1992	14.90	5223.5	5208.60
ACMW-06S	1/1/1993	14.60	5223.5	5208.90
ACMW-06S	7/12/1994	14.90	5223.5	5208.60
ACMW-06S	8/15/1995	15.90	5223.5	5207.60
ACMW-06S	6/19/1996	14.90	5223.5	5208.60
ACMW-06S	6/16/1997	14.70	5223.5	5208.80
ACMW-06S	7/21/1998	15.60	5223.5	5207.90
ACMW-06S	6/20/1999	15.90	5223.5	5207.60
ACMW-06S	7/18/2000	16.10	5223.5	5207.40
ACMW-06S	6/19/2001	16.40	5223.5	5207.10
ACMW-06S	6/18/2002	15.90	5223.5	5207.60
ACMW-06S	6/17/2003	15.50	5223.5	5208.00
ACMW-06S	5/18/2004	15.90	5223.5	5207.60
ACMW-06S	6/14/2005	15.50	5223.5	5208.00
ACMW-06S	6/1/2006	14.80	5223.5	5208.70
ACMW-06S	2/7/2006	15.20	5223.5	5208.30
ACMW-06S	3/22/2006	15.10	5223.5	5208.40
ACMW-06S	4/19/2006	15.10	5223.5	5208.40
ACMW-06S	5/16/2006	15.10	5223.5	5208.40
ACMW-06S	6/1/2006	15.50	5223.5	5208.00
ACMW-06S	7/18/2006	16.40	5223.5	5207.10
ACMW-06S	8/16/2006	16.50	5223.5	5207.00
ACMW-06S	9/26/2006	15.70	5223.5	5207.80
ACMW-06S	10/19/2006	16.30	5223.5	5207.20
ACMW-06S	11/14/2006	15.80	5223.5	5207.70
ACMW-06S	12/26/2006	15.40	5223.5	5208.10
ACMW-06S	9/24/2007	17.24	5223.5	5206.26
ACMW-06S	12/12/2007	15.64	5223.5	5207.86
ACMW-06S	3/19/2008	15.59	5223.5	5207.91
ACMW-06S	6/4/2008	16.23	5223.5	5207.27

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-07D	8/20/2003	71.79	5574.58	5502.79
ACMW-07D	12/17/2003	71.51	5574.58	5503.07
ACMW-07D	1/17/2004	71.04	5574.58	5503.54
ACMW-07D	2/13/2004	70.68	5574.58	5503.90
ACMW-07D	3/24/2004	70.28	5574.58	5504.30
ACMW-07D	4/20/2004	70.41	5574.58	5504.17
ACMW-07D	5/25/2004	69.37	5574.58	5505.21
ACMW-07D	9/24/2007	NM	5574.58	---
ACMW-07D	12/12/2007	73.60	5574.58	5500.98
ACMW-07D	3/19/2008	72.95	5574.58	5501.63
ACMW-07D	6/4/2008	71.99	5574.58	5502.59
ACMW-07S	8/20/2003	57.22	5574.39	5517.17
ACMW-07S	12/17/2003	59.19	5574.39	5515.20
ACMW-07S	1/17/2004	58.50	5574.39	5515.89
ACMW-07S	2/13/2004	58.74	5574.39	5515.65
ACMW-07S	3/24/2004	58.16	5574.39	5516.23
ACMW-07S	4/20/2004	58.37	5574.39	5516.02
ACMW-07S	5/25/2004	58.20	5574.39	5516.19
ACMW-07S	9/24/2007	NM	5574.39	---
ACMW-07S	12/12/2007	61.34	5574.39	5513.05
ACMW-07S	3/19/2008	60.70	5574.39	5513.69
ACMW-07S	6/4/2008	59.33	5574.39	5515.06

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-08D	10/22/2003	2.19	5464.45	5462.26
ACMW-08D	12/17/2003	2.87	5464.45	5461.58
ACMW-08D	1/17/2004	1.64	5464.45	5462.81
ACMW-08D	2/13/2004	1.94	5464.45	5462.51
ACMW-08D	3/24/2004	1.84	5464.45	5462.61
ACMW-08D	4/20/2004	0.86	5464.45	5463.59
ACMW-08D	5/25/2004	0.84	5464.45	5463.61
ACMW-08D	9/24/2007	NM	5464.45	---
ACMW-08D	12/12/2007	4.74	5464.45	5459.71
ACMW-08D	3/19/2008	4.12	5464.45	5460.33
ACMW-08D	6/4/2008	2.92	5464.45	5461.53
ACMW-08S	10/22/2003	2.19	5464.75	5462.56
ACMW-08S	12/17/2003	2.87	5464.75	5461.88
ACMW-08S	1/17/2004	1.64	5464.75	5463.11
ACMW-08S	2/13/2004	1.94	5464.75	5462.81
ACMW-08S	3/24/2004	1.84	5464.75	5462.91
ACMW-08S	4/20/2004	0.86	5464.75	5463.89
ACMW-08S	5/25/2004	0.84	5464.75	5463.91
ACMW-08S	9/24/2007	NM	5464.75	---
ACMW-08S	12/12/2007	4.36	5464.75	5460.39
ACMW-08S	3/19/2008	3.76	5464.75	5460.99
ACMW-08S	6/4/2008	2.41	5464.75	5462.34

TABLE 1 - GROUNDWATER ELEVATION DATA
SOUTH TAHOE PUBLIC UTILITY DISTRICT
ALPINE COUNTY RECYCLED WATER APPLICATION PROJECT
Alpine County, California

Alisto Engineering Group Project No. 10-657-01

Well ID	Date	DTW	TOC	GW Elevation
ACMW-09D	12/17/2003	29.35	5510.56	5481.21
ACMW-09D	1/17/2004	28.97	5510.56	5481.59
ACMW-09D	2/13/2004	27.59	5510.56	5482.97
ACMW-09D	3/24/2004	27.14	5510.56	5483.42
ACMW-09D	4/20/2004	23.07	5510.56	5487.49
ACMW-09D	5/25/2004	4.94	5510.56	5505.62
ACMW-09D	9/24/2007	NM	5510.56	---
ACMW-09D	12/12/2007	29.85	5510.56	5480.71
ACMW-09D	3/19/2008	29.33	5510.56	5481.23
ACMW-09D	6/4/2008	12.35	5510.56	5498.21
ACMW-09S	12/17/2003	NA	5510.32	---
ACMW-09S	1/17/2004	NA	5510.32	---
ACMW-09S	2/13/2004	NA	5510.32	---
ACMW-09S	3/24/2004	12.01	5510.32	5498.31
ACMW-09S	4/20/2004	12.24	5510.32	5498.08
ACMW-09S	5/25/2004	4.30	5510.32	5506.02
ACMW-09S	9/24/2007	NM	5510.32	---
ACMW-09S	12/12/2007	20.61	5510.32	5489.71
ACMW-09S	3/19/2008	20.01	5510.32	5490.31
ACMW-09S	6/4/2008	8.91	5510.32	5501.41

Notes: Well top-of-casing elevations re-surveyed to STPUD datum in October and December 2007; Morrow Surveying Inc.

Exact date of monitoring not recorded in STPUD 2006 Annual report.

TABLE 2 - DESCRIPTION OF EXISTING MONITORING WELL NETWORK AND RECOMMENDED ACTION
SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WASTEWATER APPLICATION PROGRAM
Alpine County, California

Well ID #	Description	Total Depth (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Current Status or Condition	Recommended Action
GW-02	STPUD Farmhouse Well	221.37	130.00	210.00	Sounding port frozen; surrounded by barbed wire fence	Continue monitoring for water quality; improve accessibility for sampling
GW-03	Smith Springmeyer	unk	unk	unk	Sounding port frozen and well surrounded by barbed wire fence	Continue monitoring for water quality; repair sounding port and improve well
GW-04	Celio Ranch Property	246.00	186.00	246.00	Nitrate level shows increasing trend; needs wellhead repair	Continue monitoring; install concrete pad around wellhead to augment surface seal
GW-05	Neddenriep Property	unk	unk	unk	Nitrate level shows increasing trend	Continue monitoring; discontinue for domestic use if nitrate level continue to
GW-07	Gansberg Property	unk	unk	unk	Well near septic tank, elevated levels of nitrates and fecal coliform in groundwater	Continue monitoring; discontinue for domestic use if nitrates and coliform levels continue to increase
GW-08	Arant Property	unk	unk	unk	Historical "spikes" in nitrate and fecal coliform concentrations; increasing trend in nitrates.	Continue monitoring; install concrete pad to augment surface seal and fence around wellhead.
GW-11	Diamond Valley School Well	490.00	260.00	490.00	Good background well (historically low Nitrates, TDS, and Cl).	Continue monitoring for water quality
GW-14	Sierra Pines Store (control)	unk	unk	unk	Currently used for water supply	Continue monitoring for background water quality
ACMW-01AW	Below main dam at Harvey Place Reservoir	22.60	5.50	20.50	Included in the current MRP, good condition	Continue monitoring; no change in wellhead configuration
ACMW-01BE	Below auxillary dam at Harvey Place Reservoir	23.80	6.60	21.60	Included in the current MRP, good condition	Continue monitoring; no change in wellhead configuration
ACMW-02N	On dam access road at Diamond Valley	34.10	13.00	33.00	Good condition but need additional wellhead protection	Continue monitoring; install bollards around the stovepipe for added protection from damage
ACMW-02S	On dam access road at Diamond Valley	22.00	9.50	19.50	Good condition but need increased wellhead protection	Continue monitoring; install bollards around the stovepipe for added protection from damage
ACMW-03W	Bruns Ranch, east side of Highway 88	10.00	5.00	10.00	Good condition but need wellhead modification	Continue monitoring, install a raised stovepipe monument
ACMW-04E	Gansberg Ranch, west side of Highway	30.00	10.00	30.00	Good condition but need wellhead modification	Continue monitoring, install a raised stovepipe monument
ACMW-04W	Gansberg Ranch, west side of Highway	18.23	UNK	UNK	Well not included in the program; too shallow for monitoring	Destroy well per State and County regulations
ACMW-06N	Celio Ranch, on Diamond Valley Road	22.50	10.00	20.00	Well too shallow formonitoring and sampling	Destroy. Well ACMW-06S is adequate for monitoring
ACMW-06S	Celio Ranch, on Diamond Valley Road	30.00	12.00	27.00	Good condition	Continue monitoring; no change in wellhead configuration required
ACMW-07S [A]	Diamond Valley Ranch, southwest of Farmhouse Well	180.50	140.00	180.00	Good condition but need wellhead modification	Continue monitoring; install additional concrete pad around wellhead and "safe hit" markers for increased visibility.
ACMW-07D [A]	Diamond Valley Ranch, southwest of Farmhouse Well	340.50	300.00	340.00	Good condition but need wellhead modification	Modify wellhead similar to ACMW-07S; use this well for background water quality monitoring only.
ACMW-08S	Diamond Valley Ranch, north of Snowshoe Thompson Historical	70.10	60.00	70.00	Good condition	Continue monitoring; no wellhead configuration change
ACMW-08D	Diamond Valley Ranch, north of Snowshoe Thompson Historical	120.10	90.00	120.00	Good condition	Continue monitoring; no wellhead configuration change
ACMW-09S	Diamond Valley Ranch, east of Snowshoe Thompson Ditch	20.1	10.00	20.00	Wellhead cover plate not attached to well; need wellhead modification	Continue monitoring; attach cover plate to well and add concrete pad around wellhead and "safe hit" markers for easy access
ACMW-09D	Diamond Valley Ranch, east of Snowshoe Thompson Ditch	45.1	35.00	45.00	Wellhead cover plate not attached to well; need wellhead modification as ACMW-09S	Repair wellhead as ACMW-09S; discontinue monitoring as it is redundant to ACMW-09S.
Unidentified Well	Central Diamond Valley; approx 500 feet north of Wells ACMW-08S/08D (SE 1/4, NW 1/4, Sec 31, T11N,	unk	unk	unk	Existing well within the land application area of unknown construction and use	Obtain information on well construction and determine if useable as monitoring well

NOTES:

(shaded)	Not currently included in the groundwater monitoring network as set forth in the Monitoring and Reporting Requirements of Order No. R6T-2004-0010
[A]	Verify if chloride or TDS levelis elevated compared to other Diamond Valley wells; well was installed in a re-drilled boring that was previously grouted up.
UNK	Unknown, data or information on well not available

TABLE 3. PROPOSED ADDITIONAL MONITORING WELLS - PHASE I
SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WASTEWATER APPLICATION PROGRAM
ALPINE COUNTY, CALIFORNIA

Alisto Project No. 10-657-01

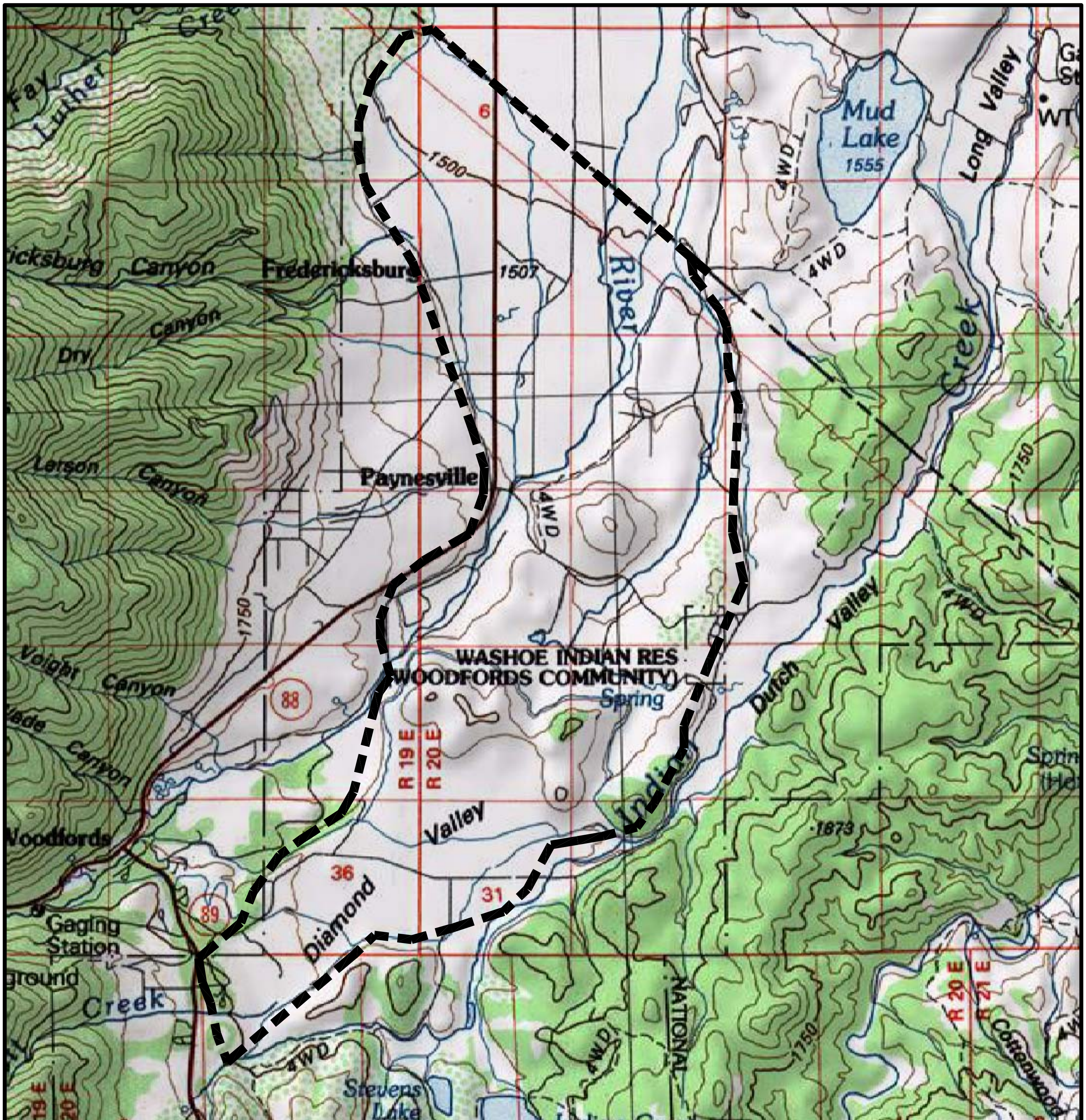
Well ID #	Description of Location	Approximate Location	Purpose of New Well	Recommended Construction
A1	South end of Carson Valley, near east margin of Brooke irrigation area at CA-NV Stateline, down-slope of Brooke Ditch.	SW 1/4, NE 1/4, Sec 8, T11N, R20E	Monitoring of application and recharge areas	Two wells: one for shallow and one for deep water bearing zone
A2	South end of Carson Valley, near east margin and upslope of Brooke irrigation area.	Cntr Sec 17, T11N, R20E	Background monitoring well and sentry point for upgradient sewage ponds	Two wells: one for shallow and one for deep water bearing zone
A3	North side of Wade Valley, between on-farm lateral ditch and north edge of application area.	NW 1/4, SW 1/4, Sec 20, T11N, R20E	Monitoring of application area	One shallow well
A4	South end of Carson Valley on School House Road, between Fredricksburg Road and Highway 88, west of upper Fredricksburg Ditch and application areas.	Cntr, NE 1/4, Sec 18, T11N, R20E	Monitoring of application area	One shallow well
A5	South end of Carson Valley, on Chambers Road, east of Neddenriep Ranch, east margin of application area.	NE 1/4, SE 1/4, Sec 7, T11N, R20E	Monitoring of application area	One shallow well
A6	South end of Carson Valley, on Chambers Road, at Cal-Neva Stateline, east margin of application area.	SW 1/4, SW 1/4, Sec 5, T11N, R20E	Monitoring of application area	One shallow well
A7	So. Carson Valley on School House Road, West of upper Fredricksburg Ditch, west of application area.	NW 1/4, SW 1/4, Sec 7, T11N, R20E	Monitoring of application area	One shallow well
A8	South end of Carson Valley near west shoulder of Hwy 88, approx. 1500' south of CA-NV Stateline at center of application area.	NE 1/4, NW 1/4, Sec 6, T11N, R20E	Monitoring of application area	One shallow well
A9	South end of Carson Valley, north of Brooke Diversion Box, near east margin and upslope of Brooke irrigation area.	SE 1/4, SW 1/4, Sec 8, T11N, R20E	Monitoring of application area	One shallow well
A10	West end of Wade Valley, upslope of Diamond Ditch and northwest of Wade Valley application area.	SE 1/4, SW 1/4, Sec 19, T11N, R20E	Monitoring of application area	One shallow well

TABLE 4. PROPOSED ADDITIONAL MONITORING WELLS - PHASE 2
SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WASTEWATER APPLICATION PROGRAM
ALPINE COUNTY, CALIFORNIA

Alisto Project No. 10-657-01

Well ID #	Description	Approximate Location	Purpose of New Well	Recommended Construction
B1	South end of "Road to Nowhere" in Diamond Valley, west margin of Field No. 2	SW 1/4, SE 1/4, Sec 36, T11N, R19E	Monitoring of emergency discharge or application and recharge areas	Two wells: one for shallow and one for deep water bearing zone
B2	Northwest quarter of Diamond Valley, west margin of Field No. 6	SE 1/4, NW 1/4, Sec 36, T11N, R19E	Monitoring of emergency discharge or application area	One shallow well
B3	South of Snowshoe Thompson Ditch No. 2 Diversion Box in Diamond Valley, west margin of Field No. 6	NW 1/4, NE 1/4, Sec 36, T11N, R19E	Monitoring of emergency discharge or application area	One shallow well
B4	North side of Diamond Valley, ~1,200 feet east of Snowshoe Thompson Ditch No. 4	SW 1/4, SW 1/4, Sec 30, T11N, R20E	Monitoring of emergency discharge or application area	One shallow well
B5	North side of Diamond Valley, ~2,200 feet east of Snowshoe Thompson Ditch No. 4	NW 1/4, SE 1/4, Sec 30, T11N, R20E	Monitoring of emergency discharge or application area	One shallow well
B6	NE corner of Diamond Valley, on terrace above un-named tributary of Indian Creek, downslope of Diamond Ditch.	NW 1/4, NW 1/4, Sec 32, T11N, R20E	Monitoring of emergency discharge or application area	One shallow well
B7	South of Snowshoe Thompson Ditch No. 2 in Diamond Valley, east margin of Field No. 6	SW 1/4, NW 1/4, Sec 31, T11N, R20E	Monitoring of emergency discharge or application area	One shallow well

FIGURES



SOURCE: TOPO!

STUDY AREA

QUADRANGLE LOCATION

0 5000 10000

SCALE IN FEET

FIGURE 1

SITE VICINITY MAP

ALPINE COUNTY
VICINITY OF HIGHWAYS 88 & 89

10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_B.dwg 8/29/2008

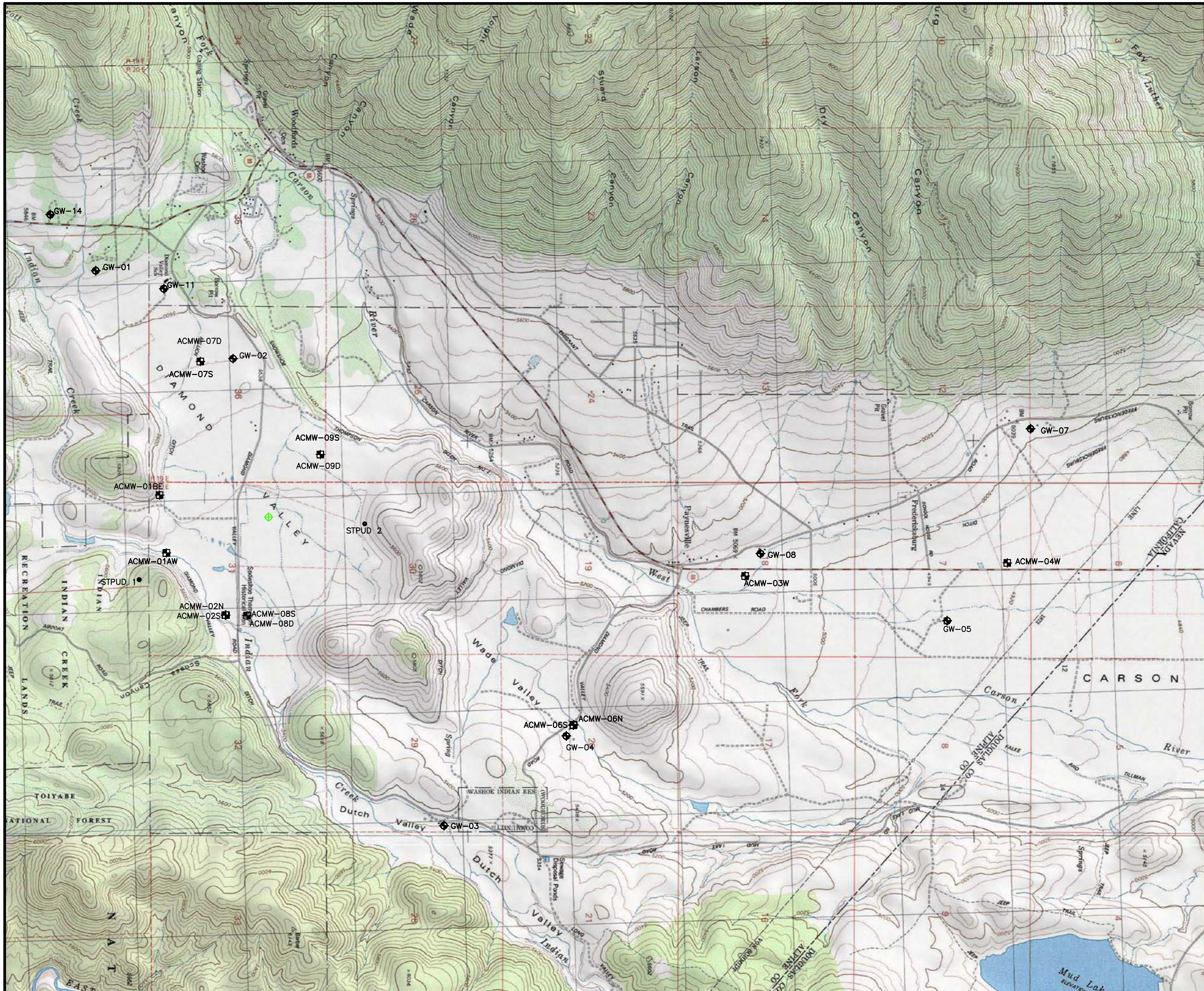


FIGURE 2

SITE PLAN

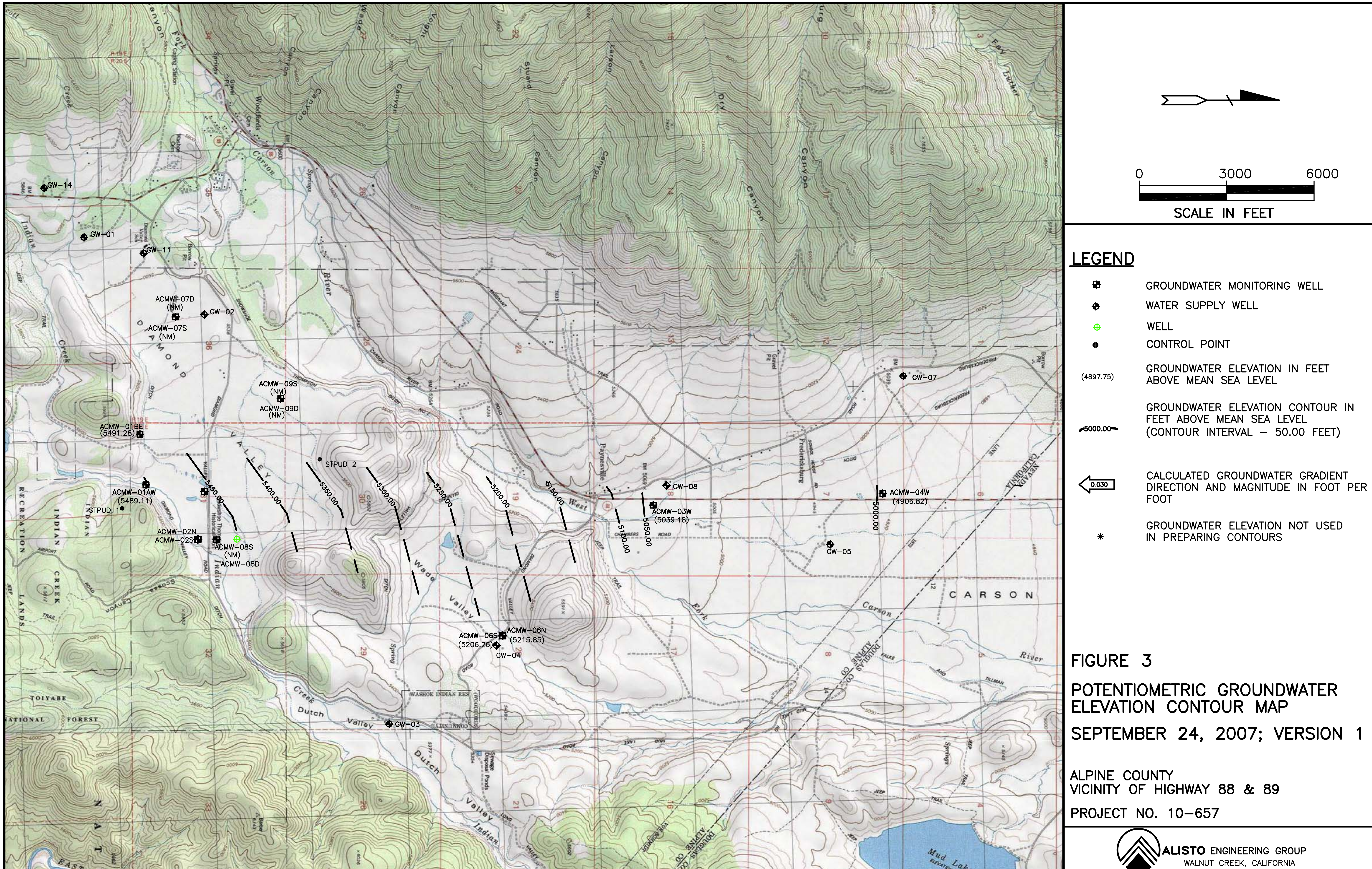
ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

11/26/2008

10657_C.dwg



LEGEND

- GROUNDWATER MONITORING WELL
- WATER SUPPLY WELL
- WELL
- CONTROL POINT
- (4897.75) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- 5000.00 GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
- 0.030 CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
- * GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 3

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

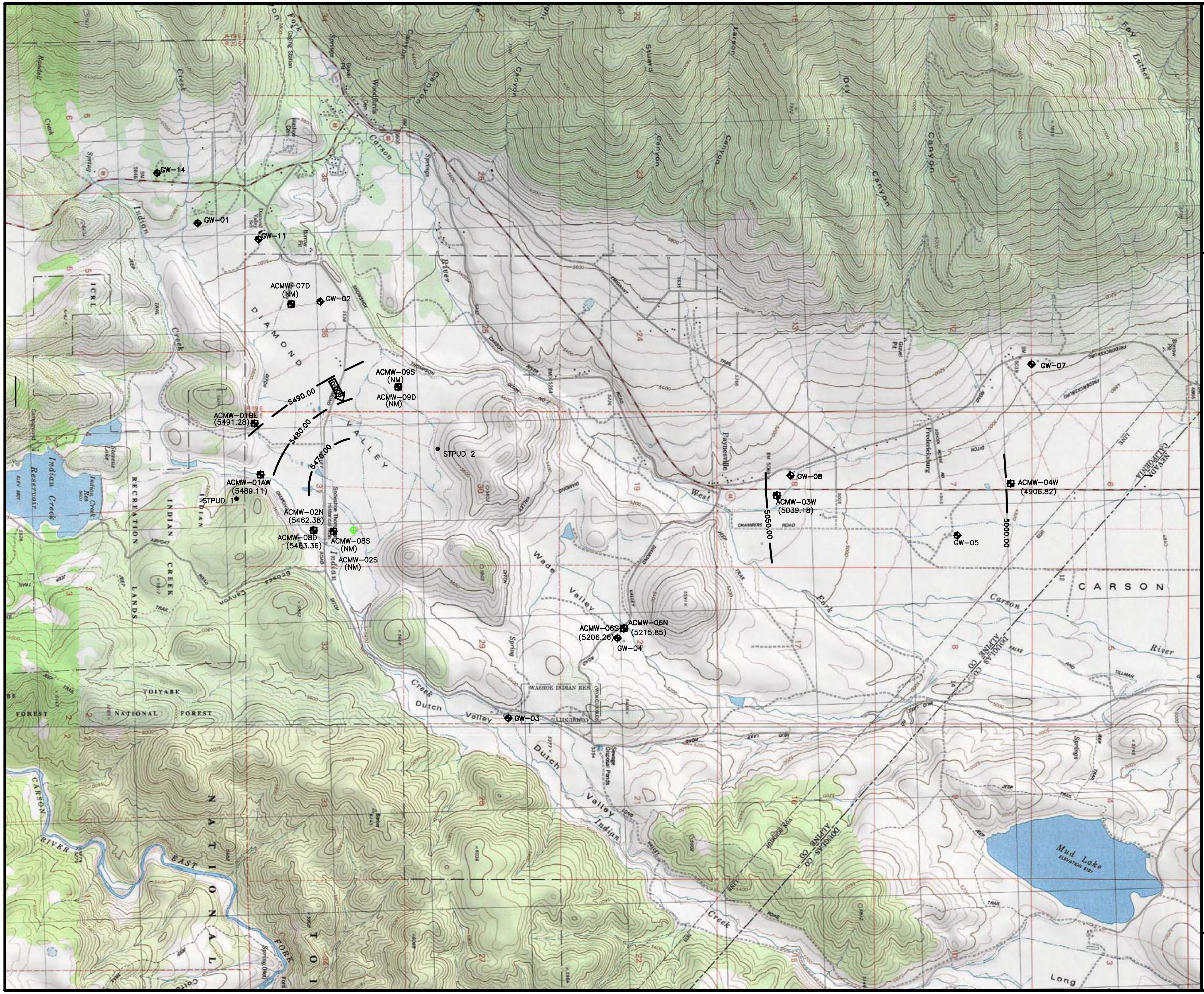
SEPTEMBER 24, 2007; VERSION 1

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(9-24-07).dwg 9/9/2008



0 3000 6000

SCALE IN FEET

LEGEND

GROUNDWATER MONITORING WELL

WATER SUPPLY WELL

WELL

CONTROL POINT

(4897.75) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL

5000.00 GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)

0.030 CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT

* GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 4

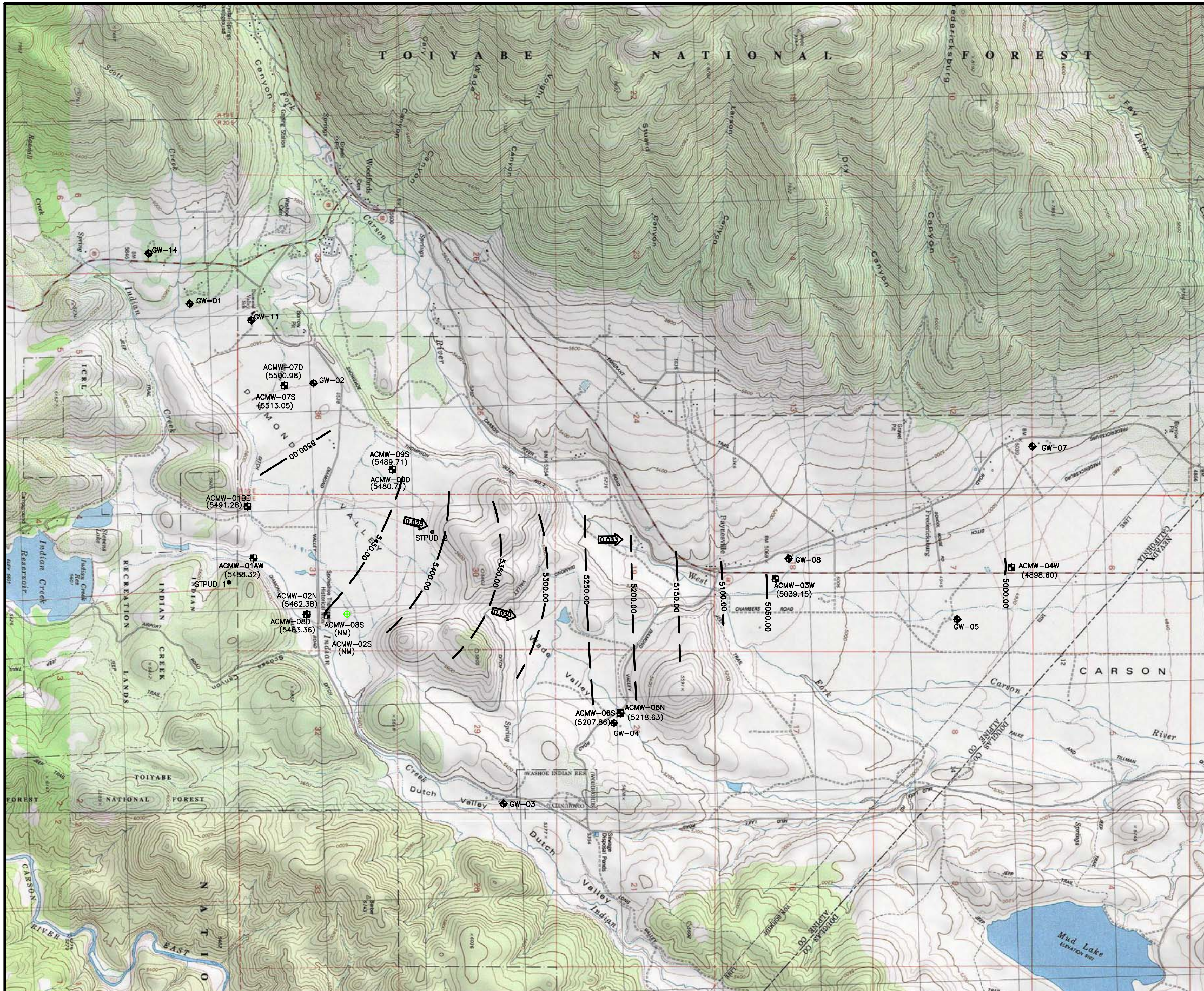
POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

SEPTEMBER 24, 2007; VERSION 2

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89
PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(9-24-07) V2.dwg 9/9/2008



0 3000 6000

SCALE IN FEET

LEGEND

	GROUNDWATER MONITORING WELL
	WATER SUPPLY WELL
	CONTROL POINT
	WELL
(4897.75)	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
5000.00	GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
0.030	CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
*	GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 5

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

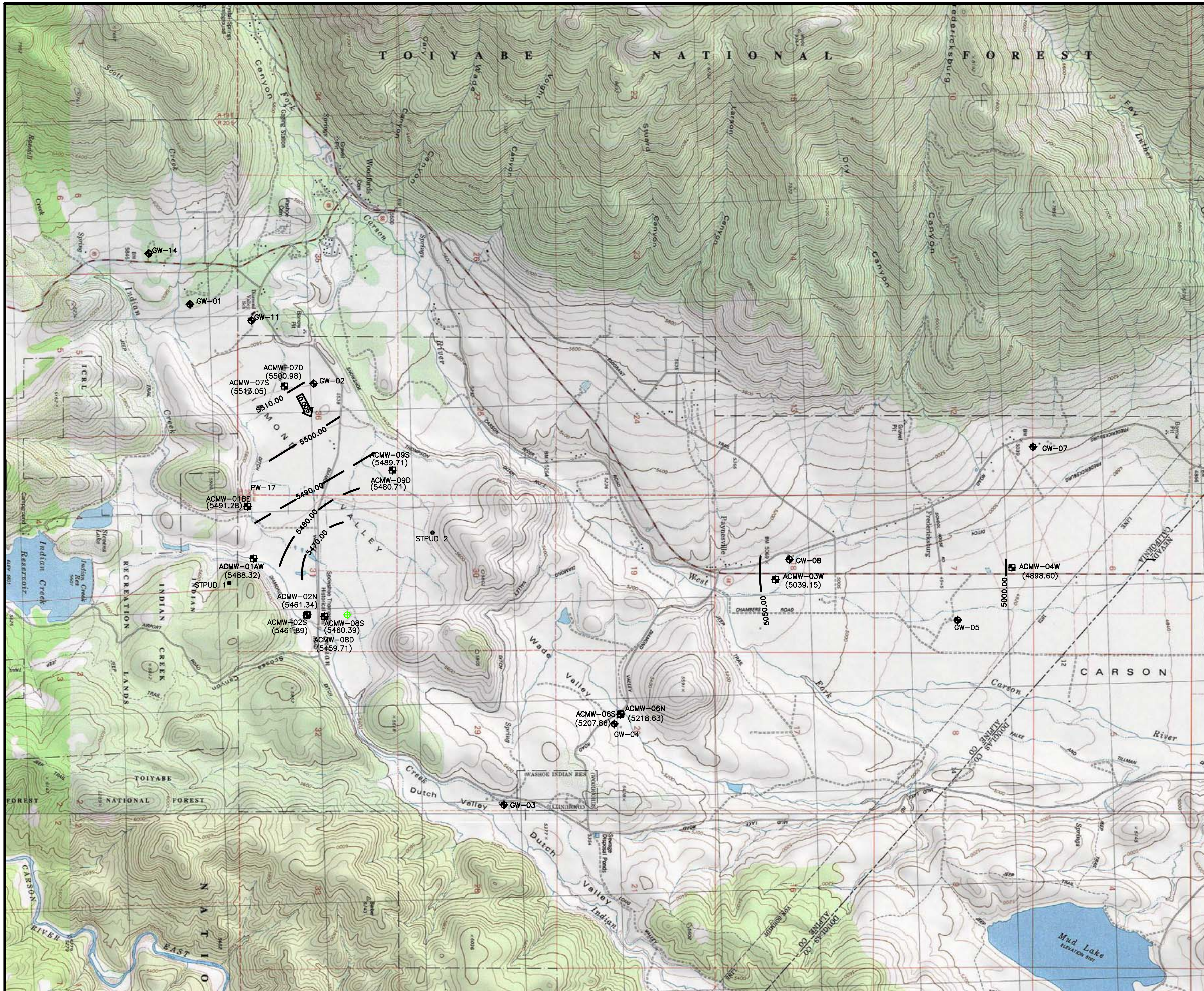
DECEMBER 12, 2007; VERSION 1

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 99

PROJECT NO. 10–657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(12-12-07).dwg 11/26/2008



0 3000 6000

SCALE IN FEET

LEGEND

	GROUNDWATER MONITORING WELL
	WATER SUPPLY WELL
	CONTROL POINT
	WELL
(4897.75)	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
5000.00	GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
0.030	CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
*	GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 6

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

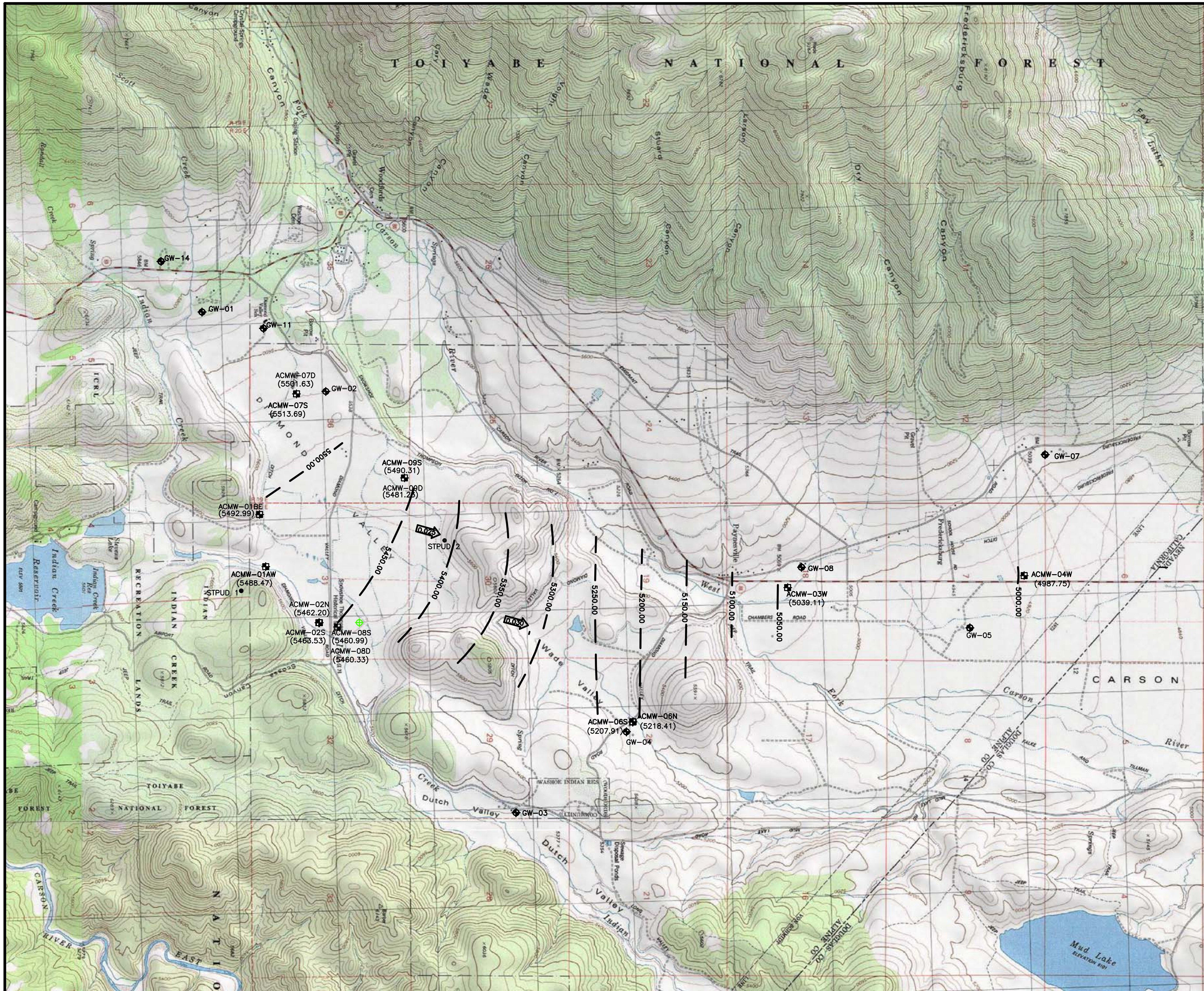
DECEMBER 12, 2007; VERSION 2

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(12-12-07) V2.dwg 9/9/2008



0 3000 6000

SCALE IN FEET

LEGEND

	GROUNDWATER MONITORING WELL
	WATER SUPPLY WELL
	CONTROL POINT
	WELL
(4897.75)	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
5000.00	GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
0.030	CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
*	GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 7

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

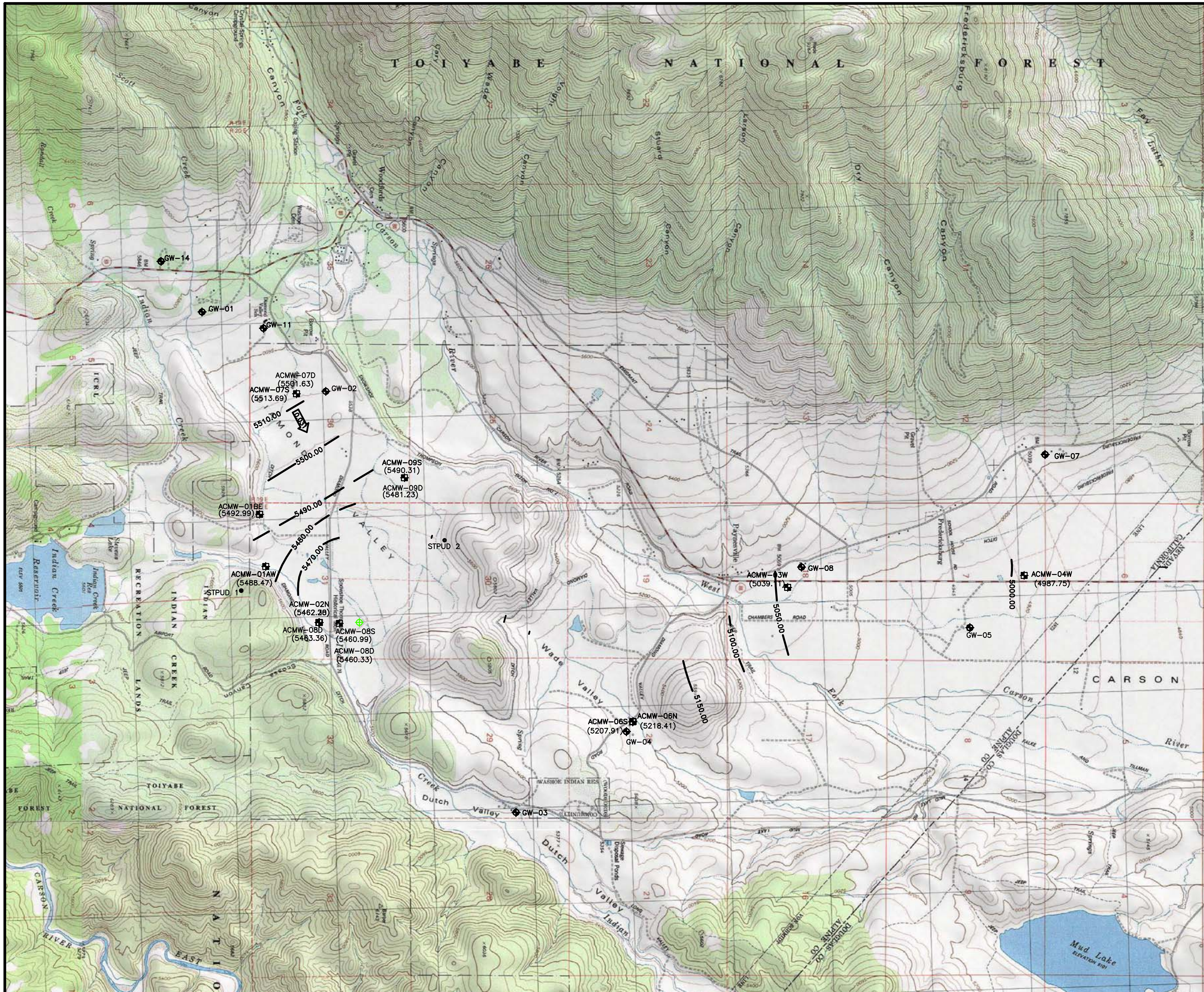
MARCH 19, 2008; VERSION 1

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10–657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(3–19–08).dwg 9/9/2008



0	3000	6000

SCALE IN FEET

LEGEND

- GROUNDWATER MONITORING WELL
- WATER SUPPLY WELL
- CONTROL POINT
- WELL
- (4897.75) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- 5000.00 GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
- 0.030 CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
- * GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 8

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

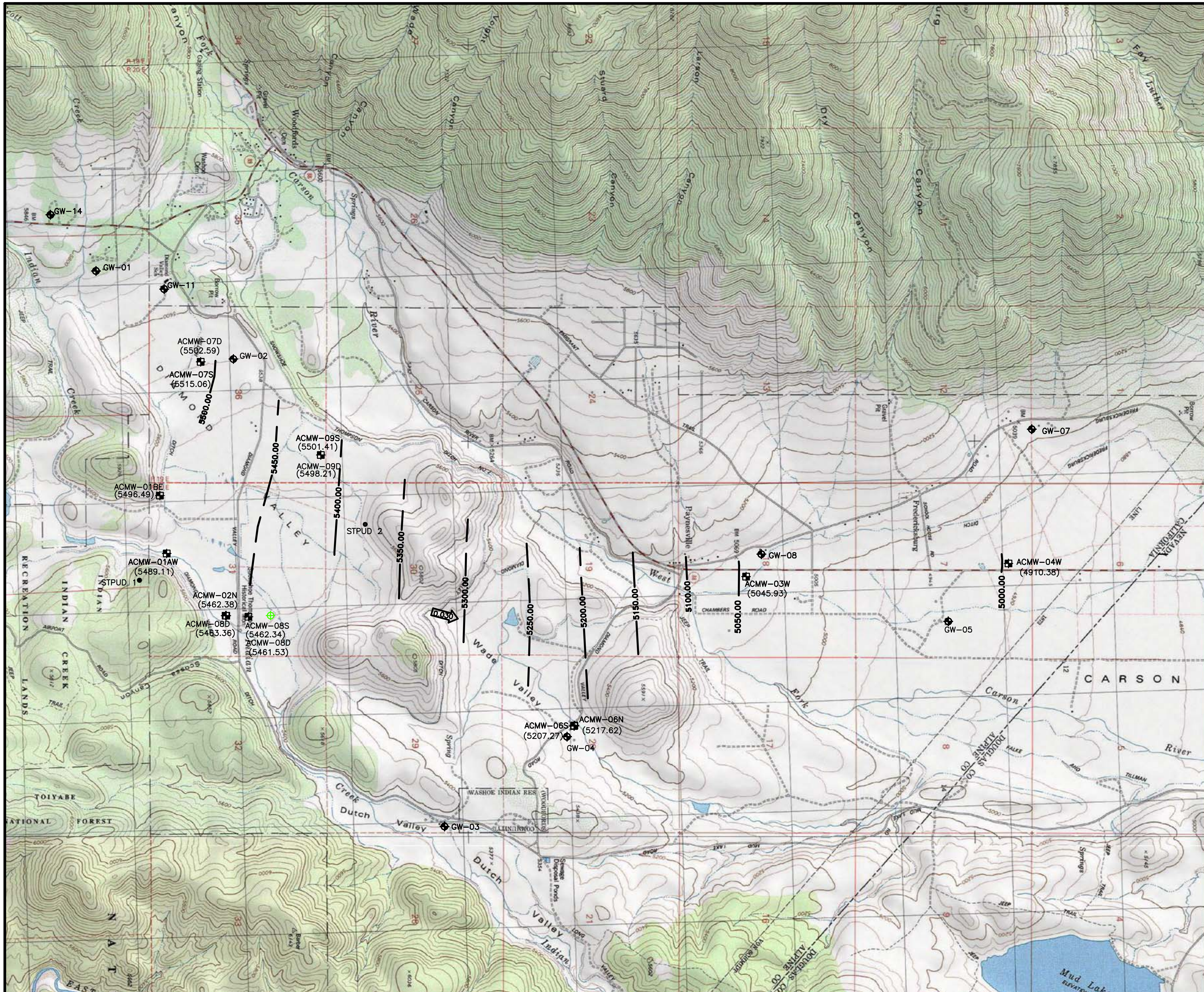
MARCH 19, 2008; VERSION 2

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(3-19-08) V2.dwg 9/9/2008



SCALE IN FEET

0 3000 6000

LEGEND

	GROUNDWATER MONITORING WELL
	WATER SUPPLY WELL
	CONTROL POINT
	WELL
(4897.75)	GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
5000.00	GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
0.030	CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
*	GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 9

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

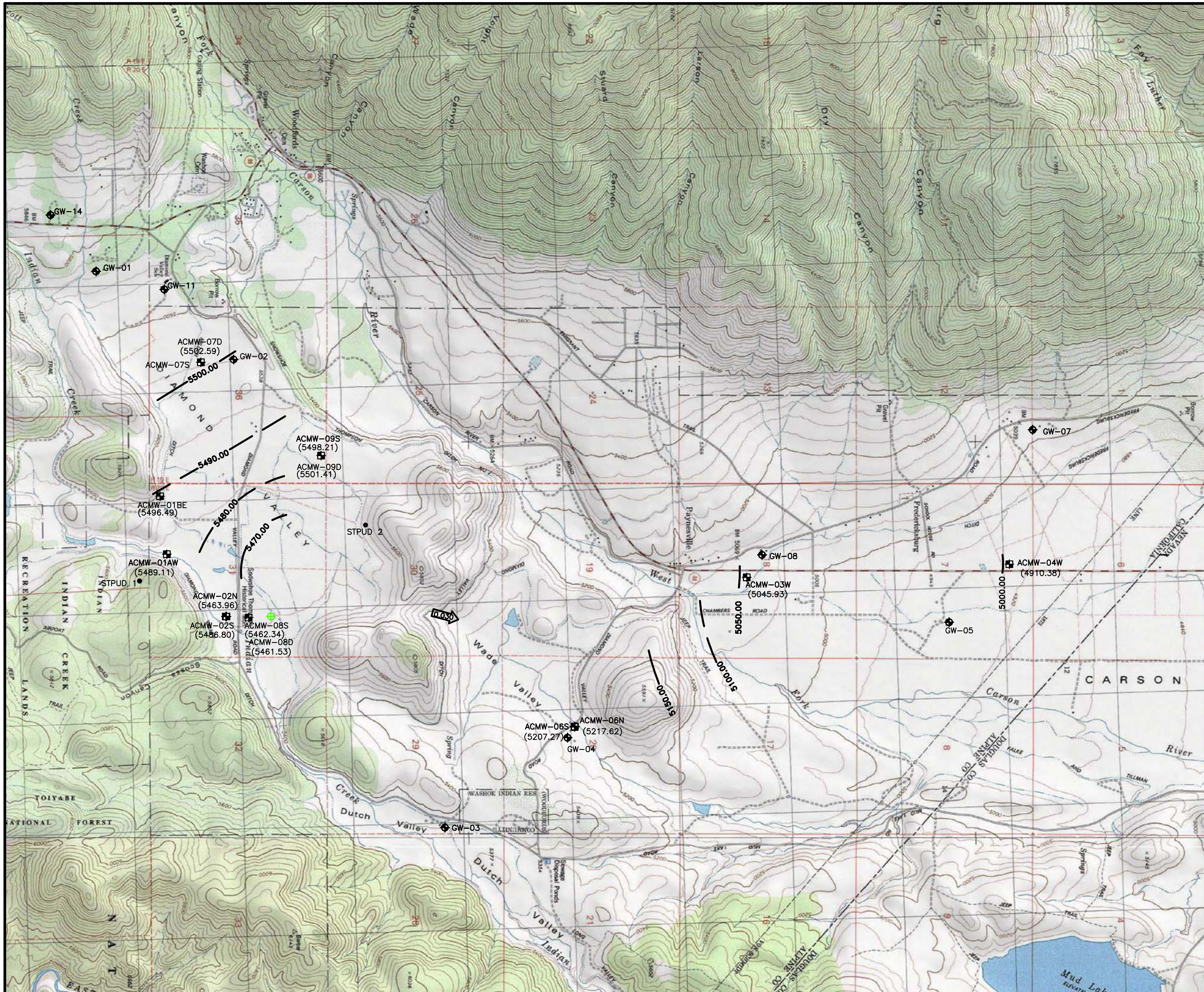
JUNE 4, 2008; VERSION 1

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(6-4-08).dwg 9/29/2008



0 3000 6000

SCALE IN FEET

LEGEND

- GROUNDWATER MONITORING WELL
- WATER SUPPLY WELL
- CONTROL POINT
- WELL
- (4897.75) GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- 5000.00 GROUNDWATER ELEVATION CONTOUR IN FEET ABOVE MEAN SEA LEVEL (CONTOUR INTERVAL – 50.00 FEET)
- 0.030 CALCULATED GROUNDWATER GRADIENT DIRECTION AND MAGNITUDE IN FOOT PER FOOT
- * GROUNDWATER ELEVATION NOT USED IN PREPARING CONTOURS

FIGURE 10

POTENTIOMETRIC GROUNDWATER ELEVATION CONTOUR MAP

JUNE 4, 2008; VERSION 2

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10–657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_D(6–4–08) version 2.dwg 11/26/2008

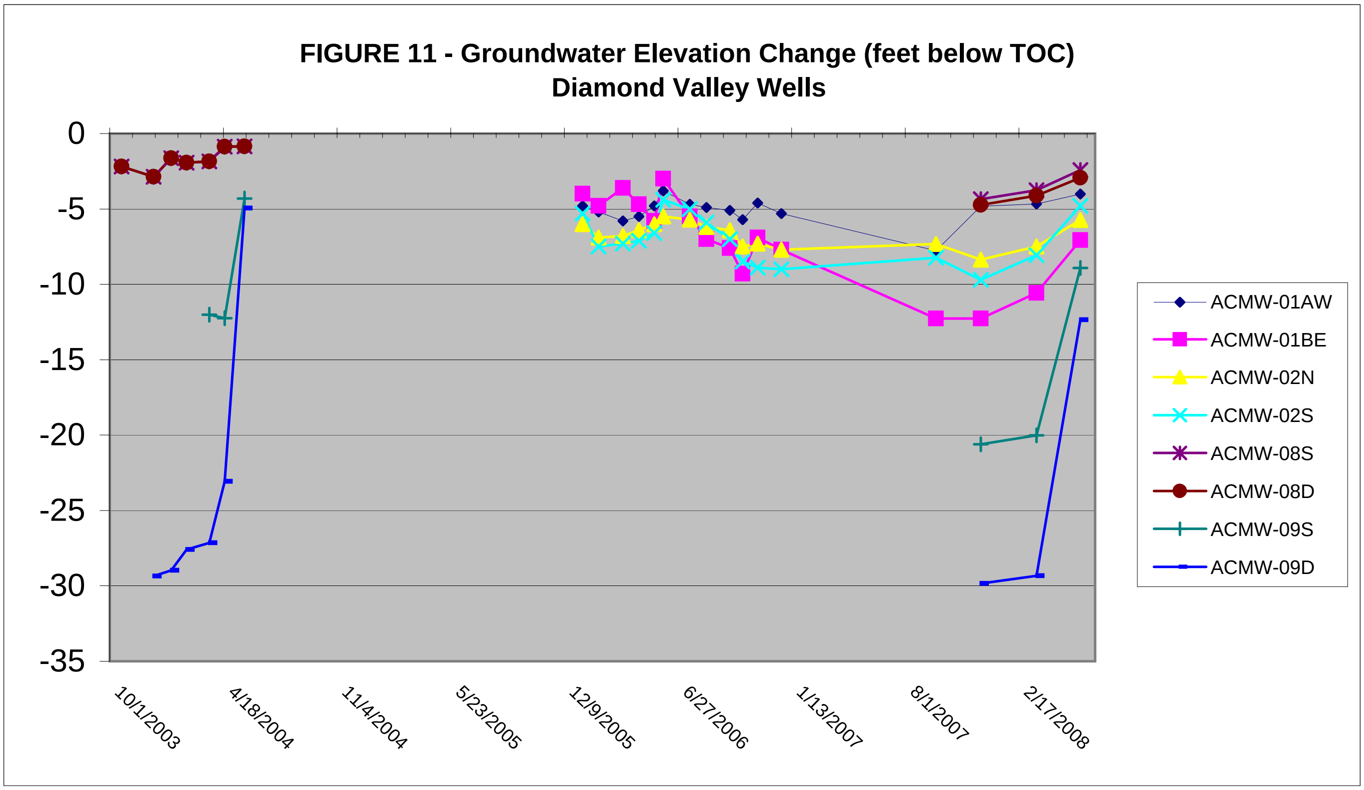


FIGURE 11 - Groundwater Elevation Change (feet below TOC)
Diamond Valley Wells
0
-5
-10
-15
-20
-25
-30
-35
10/1/2003
4/18/2004
11/4/2004
5/23/2005
12/9/2005
6/27/2006
1/13/2007
8/1/2007
2/17/2008
ACMW-01AW
ACMW-01BE
ACMW-02N
ACMW-02S
ACMW-08S
ACMW-08D
ACMW-09S
ACMW-09D

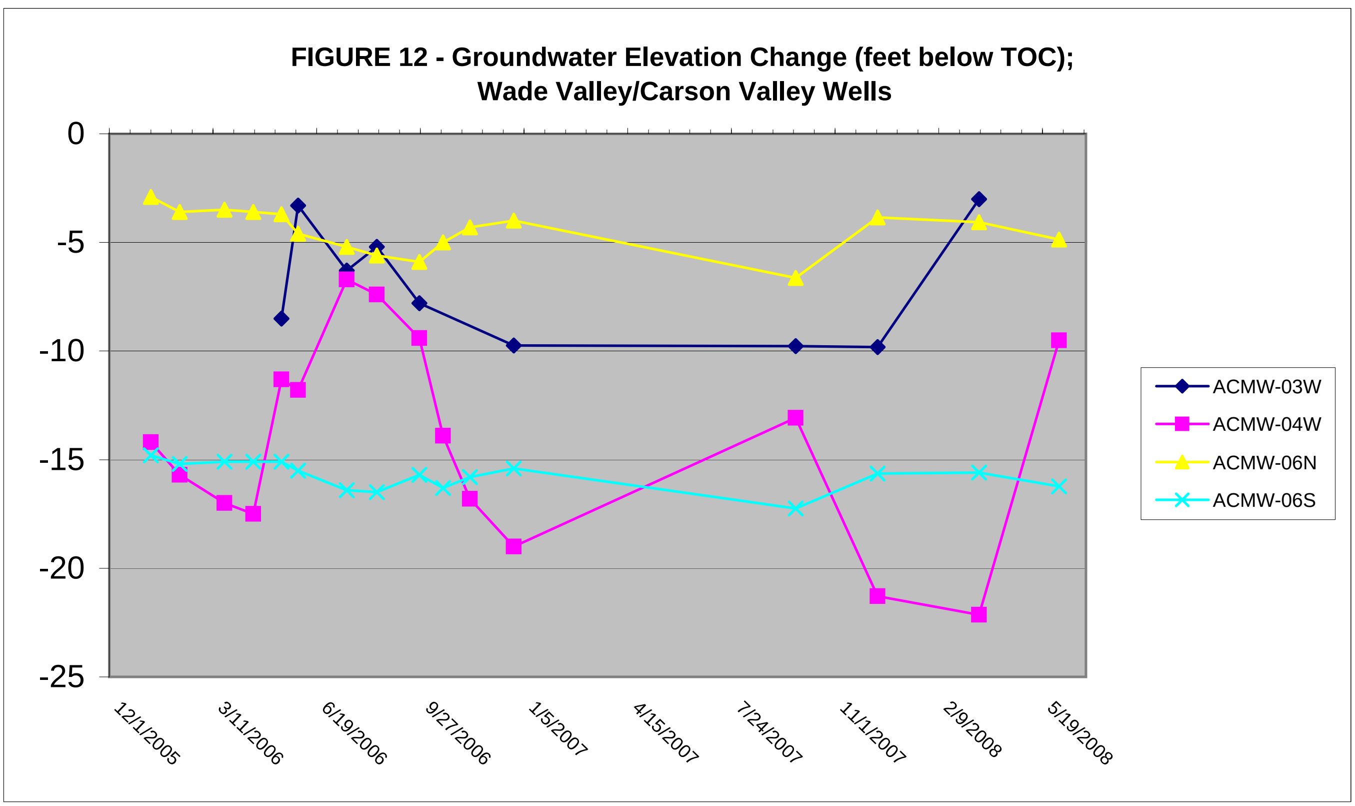


FIGURE 12 - Groundwater Elevation Change (feet below TOC);
Wade Valley/Carson Valley Wells
0
-5
-10
-15
-20
-25
12/1/2005
3/11/2006
6/19/2006
9/27/2006
1/5/2007
4/15/2007
7/24/2007
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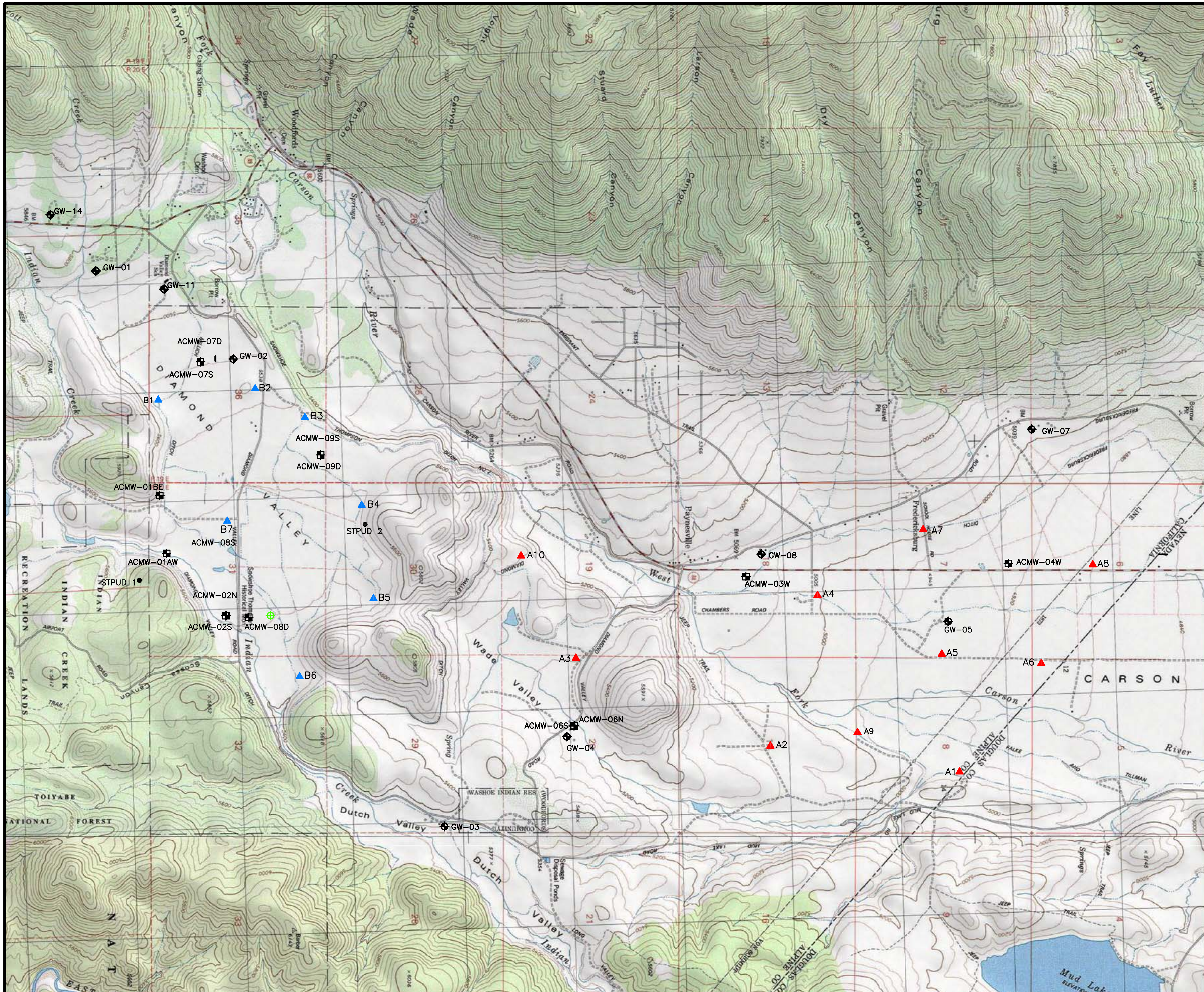
ACMW-06N
ACMW-06S



LEGEND

- GROUNDWATER MONITORING WELL
- WATER SUPPLY WELL
- WELL
- CONTROL POINT
- A1 PROPOSED WELL LOCATION: PHASE I
- B1 PROPOSED WELL LOCATION: PHASE II

0 3000 6000
SCALE IN FEET

FIGURE 13

PROPOSED WELL NETWORK

ALPINE COUNTY
VICINITY OF HIGHWAY 88 & 89

PROJECT NO. 10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

10657_FIGURE 13.dwg 11/26/2008

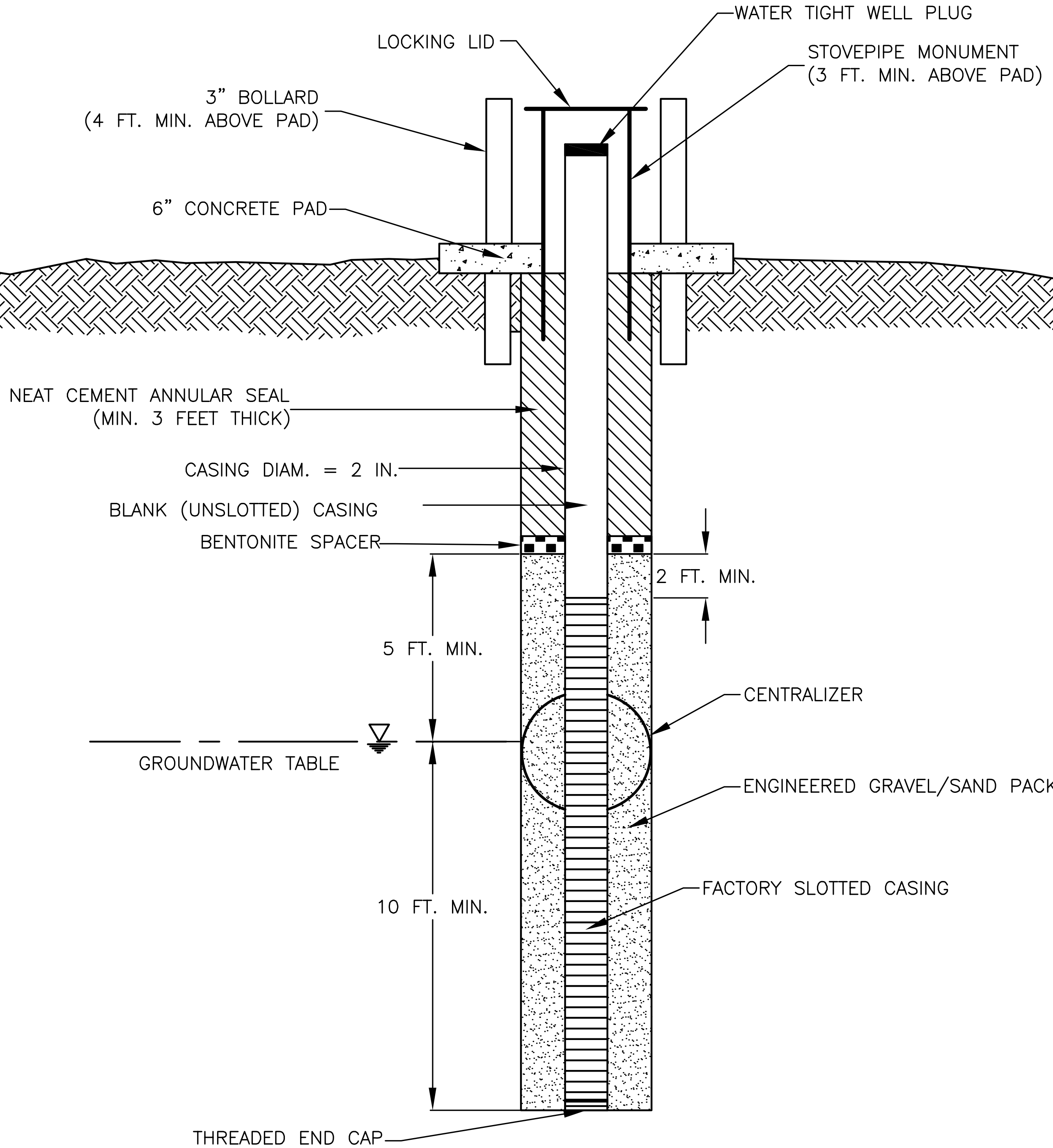


FIGURE 14

WELL CONSTRUCTION SCHEMATIC

ALPINE COUNTY
VICINITY OF HIGHWAYS 88 & 89

10-657

ALISTO ENGINEERING GROUP
WALNUT CREEK, CALIFORNIA

WELL CONSTRUCTION SCHEMATIC.dwg 11/12/2008

APPENDIX A

WELL SURVEY DATA

Well ID	Description of Location	Latitude	Longtitude	TOC Elev.
	Survey Data by Morrow Surveying			
GW-01	Sagues Well (D. Mitzner Well)	38.7611460	-119.8109263	---
GW-02	STPUD Farmhouse Well	38.7721946	-119.8012591	
GW-03	Smith/Springmeyer Well	38.7891317	-119.7524462	
GW-04	Celio Ranch Well	38.8003426	-119.7625788	
GW-05	Neddenriep Well	38.8308974	-119.7738073	
GW-07	Gansberg Jr. Well	38.8388954	-119.7941544	
GW-08	Arant Well	38.8155275	-119.7810952	
GW-11	Diamond Valley School Well	38.7665223	-119.8085400	
GW-14	Sierra Pines Store Well (Control)	38.7571395	-119.8184623	
ACMW-01AW	Below main dam at Harvey Pl. Rsvr.	38.7669521	-119.7815605	5493.13
ACMW-01BE	Below auxillary dam at Harvey Pl. Rsvr.	38.7663333	-119.7853206	5503.55
ACMW-02N	On dam access road at Diamond Valley Road	38.7723921	-119.7768186	5469.70
ACMW-02S	On dam access road at Diamond Valley Road	38.7723412	-119.7768161	5471.60
ACMW-03W	Bruns Ranch, east side of Highway 88	38.8151379	-119.7788483	5048.93
ACMW-04W	Gansberg Ranch, west side of Highway 88	38.8367191	-119.7794391	4919.89
ACMW-06N	Celio Ranch, on Diamond Valley Road	38.8005221	-119.7632253	5222.48
ACMW-06S	Celio Ranch, on Diamond Valley Road	38.8004810	-119.7631948	5223.50
	Survey Data by Tri-State			
ACMW-07s	Diamond Valley Ranch, southwest of Farmhouse Well	38.77188	-119.80166	5575.13
ACMW-07d	Diamond Valley Ranch, southwest of Farmhouse Well	38.77188	-119.80166	5575.32
ACMW-08s	Diamond Valley Ranch, north of Snowshoe Thompson Historical Marker	38.77362	-119.77684	5468.21
ACMW-08d	Diamond Valley Ranch, north of Snowshoe Thompson Historical Marker	38.77362	-119.77684	5468.47
ACMW-09s	Diamond Valley Ranch, east of Snowshoe Thompson Ditch	38.78050	-119.79033	5511.40
ACMW-09d	Diamond Valley Ranch, east of Snowshoe Thompson Ditch	38.78050	-119.79033	5511.59

GLOBAL_ID	FIELD_PT_NAME	FIELD_PT_CLASS	XY_SURVEY_DATE	LATITUDE	LONGTITUDE	XY_METHOD	XY_DATUM	XY_ACC_VAL	XY_SURVEY_ORG	GPS_EQUIP_TYPE	XY_SURVEY_DESC
	ACMW-01AW		10/22/2007	38.7669521	-119.7815605	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-01BE		10/22/2007	38.7663333	-119.7853206	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-02S		10/22/2007	38.7723412	-119.7768161	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-02N		10/22/2007	38.7723921	-119.7768186	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-03W		10/22/2007	38.8151379	-119.7788483	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-04W		10/22/2007	38.8367191	-119.7794391	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-06S		10/22/2007	38.8004810	-119.7631948	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-06N		10/22/2007	38.8005221	-119.7632253	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-07S		12/12/2007	38.7718824	-119.8016584	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-07D		12/12/2007	38.7718824	-119.8016584	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-08N		12/12/2007	38.7736180	-119.7768470	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-08S		12/12/2007	38.7736180	-119.7768470	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-09N		12/12/2007	38.7804886	-119.7903142	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	ACMW-09S		12/12/2007	38.7804886	-119.7903142	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-01		10/22/2007	38.7611460	-119.8109263	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-02		10/22/2007	38.7721946	-119.8012591	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-03		10/22/2007	38.7891317	-119.7524462	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-04		10/22/2007	38.8003426	-119.7625788	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-05		10/22/2007	38.8308974	-119.7738073	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-07		10/22/2007	38.8388954	-119.7941544	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-08		10/22/2007	38.8155275	-119.7810952	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-11		10/22/2007	38.7665223	-119.8085400	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX
	GW-14		10/22/2007	38.7571395	-119.8184623	CGPS	NAD83	30	MORROW SURVEYING LS 4650	LEG	TOP OF BOX

GLOBAL_ID	FIELD_PT_NAME	ELEV_SURVEY_DATE	ELEVATION	ELEV_METHOD	ELEV_DATUM	ELEV_ACC_VAL	ELEV_SURVEY_ORG	RISER_HT	ELEV_DESC	EFF_DATE
	ACMW-01AW	10/22/2007	5493.13	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-01BE	10/22/2007	5503.55	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-02S	10/22/2007	5471.60	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-02N	10/22/2007	5469.70	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-03W	10/22/2007	5048.93	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-04W	10/22/2007	4919.89	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-06S	10/22/2007	5223.50	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-06N	10/22/2007	5222.48	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-07S	12/12/2007	5574.39	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-07D	12/12/2007	5574.58	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-08N	12/12/2007	5464.45	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-08S	12/12/2007	5464.75	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-09N	12/12/2007	5510.56	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	ACMW-09S	12/12/2007	5510.32	DIG	88	0.3	MORROW SURVEYING LS 4650		TOP OF CASING	
	GW-01	10/22/2007								
	GW-02	10/22/2007								
	GW-03	10/22/2007								
	GW-04	10/22/2007								
	GW-05	10/22/2007								
	GW-07	10/22/2007								
	GW-08	10/22/2007								
	GW-11	10/22/2007								
	GW-14	10/22/2007								

APPENDIX B

FIELD MONITORING FORMS

ALISTO

ENGINEERING GROUP
2737 N. Main Street, Suite 100
Walnut Creek, CA 94597
(925) 279-5000 PHONE FAX (925) 279-5001

Project NO. 10-657-04/001 Date: 9/24/07
Address Woodfords, CA Day: M T W TH F
Contract NO. . City: Woodfords
Site: STUPD

WELL	WELL DIAM.	DEPTH TO WATER	TOTAL DEPTH	DEPTH TO PRODUCT	PRODUCT THICKNESS	TIME MONITORED	COMMENTS
ACMW-03W	2'	9.75	10.00	N/P	N/P	0920	Dedicated bladder pump
GW-05		N/M	N/M	N/P	N/P	0930	No depth to water access (sealed piping, no access port)
ACMW-04W	2'	13.07	28.65	N/P	N/P	0940	Dedicated bladder pump
ACMW-04	2'	13.19	18.23	N/P	N/P	0950	No pump present
GW-07		N/M	N/M	N/P	N/P	1015	Rt. side of porch, cannot locate actual well head
GW-08		N/M	N/M	N/P	N/P	1030	8' stovepipe, open casing
GW-04		13.97	N/M	N/P	N/P	1042	Under garbage can
ACMW-06S	2'	17.24	N/M	N/P	N/P	1045	Dedicated bladder pump
ACMW-06N	2'	6.63	N/M	N/P	N/P	1047	Dedicated bladder pump
GW-03		N/M	N/M	N/P	N/P	1052	No depth to water access, sample collected from red
							non-freeze spigot near small white shed
GW-02		61.30	N/M	N/P	N/P	1105	3/4' piping at north side of well is access for D.T.W.
GW-11		78.09	N/M	N/P	N/P	1140	At school, sample spigot at right side of school property
							entrance, open casing
GW-14		N/M	N/M	N/P	N/P	1150	cannot access well (bldg. it is housed in is locked), it
							is located inside 2 door small bldg. near vertical tank
GW-01		100.11	N/M	N/P	N/P	1205	Open casing
ACMW-02N	2'	7.32	N/M	N/P	N/P	1215	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-02S	2'	8.24	N/M	N/P	N/P	1220	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01AW	2'	7.77	N/M	N/P	N/P	1238	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01BE	2'	12.27	N/M	N/P	N/P	1300	Off of 2595 Diamond Valley Blvd., dedicated bladder pump

Comments: **N/P = NOT PRESENT** **N/M = NOT MEASURED**

pH METER ________ 4.00 ________ 7.00 ________ 10.00 ___ TEMPERATURE COMPENSATED Y N

D.O. METER ____________________ BAROMETRIC PRESSURE ________ TEMP ________ WEATHER ______________

CONDUCTIVITY METER ______________ 10,000 ______ TURBIDITY METER ______________ 5.0 NTU __________ Eh METER ______________

ALISTO

ENGINEERING GROUP
2737 N. Main Street, Suite 100
Walnut Creek, CA 94597
(925) 279-5000 PHONE FAX (925) 279-5001

Project NO. 10-657-04/001 Date: 12/12/07
Address Woodfords, CA Day: M T W TH F
Contract NO. City: Woodfords
Site: STUPD

WELL	WELL DIAM.	DEPTH TO WATER	TOTAL DEPTH	DEPTH TO PRODUCT	PRODUCT THICKNESS	TIME MONITORED	COMMENTS
ACMW-03W	2'	9.78	10.00	Ø	Ø	0943	Dedicated bladder pump
ACMW-04W	2'	21.29	28.65			0950	Dedicated bladder pump
ACMW-04	2'	Dry	18.23			0948	No pump present
ACMW-06S	2'	15.64	N/M			0934	Dedicated bladder pump
ACMW-06N	2'	3.85	N/M			0931	Dedicated bladder pump
ACMW-02N	2'	8.36	N/M			0901	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-02S	2'	9.71	N/M			0903	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01AW	2'	4.81	N/M			0850	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01BE	2'	12.27	N/M			0847	Off of 2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-07S	2'	61.34	N/M			1055	
ACMW-07D	2'	73.60	N/M			1100	
ACMW-09S	2'	20.61	N/M			1043	
ACMW-09D	2'	29.85	N/M			1040	
ACMW-08S	2'	4.36	N/M			1035	
ACMW-08D	2'	4.74	N/M			1030	

Comments: N/P = NOT PRESENT N/M = NOT MEASURED

ALISTO

ENGINEERING GROUP
2737 N. Main Street, Suite 100
Walnut Creek, CA 94597
(925) 279-5000 PHONE FAX (925) 279-5001

Project NO. 10-657-01/003 Date: 3/19/08
Address Woodfords, CA Day: M T (W) TH F
Contract NO. City: Woodfords
Site: STUPD Tech: LCB

WELL	WELL DIAM.	DEPTH TO WATER	TOTAL DEPTH	DEPTH TO PRODUCT	PRODUCT THICKNESS	TIME MONITORED	COMMENTS
ACMW-03W	2'	9.82	10.00	Ø	Ø	0900	Dedicated bladder pump
ACMW-04W	2'	22.14	28.65			0958	Dedicated bladder pump
ACMW-04	2'	Dry	18.23			0955	No pump present
ACMW-06S	2'	15.59	N/M			0908	Dedicated bladder pump
ACMW-06N	2'	4.07	N/M			0910	Dedicated bladder pump
ACMW-02N	2'	7.50	N/M			0941	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-02S	2'	8.07	N/M			0939	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01AW	2'	4.66	N/M			0932	2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-01BE	2'	10.56	N/M			0924	Off of 2595 Diamond Valley Blvd., dedicated bladder pump
ACMW-07S	2'	60.70	N/M			1135	
ACMW-07D	2'	72.95	N/M			1138	
ACMW-09S	2'	20.01	N/M			1120	
ACMW-09D	2'	29.33	N/M			1122	
ACMW-08S	2'	3.76	N/M			1034	
ACMW-08D	2'	4.12	N/M			1035	

Comments: N/P = NOT PRESENT N/M = NOT MEASURED

ALISTO

ENGINEERING GROUP
2737 N. Main Street, Suite 100
Walnut Creek, CA 94597
(925) 279-5000 PHONE FAX (925) 279-5001

CREINHEIMER

Project NO. 10-657-01 Date: 6/4/2008
Address Woodfords, CA Day: M T W TH F
Contract NO. City: Woodfords
Site: Carson / Wade / Diamond Valley: Alpine Co.

WELL	WELL DIAM.	DEPTH TO WATER	TOTAL DEPTH				COMMENTS
ACMW-03W	2"	3.00	N/M				
ACMW-04W	2"	9.51	N/M				
ACMW-04	2"	9.51	N/M				
ACMW-06S	2"	16.23	N/M				
ACMW-06N	2"	4.86	N/M				
ACMW-02N	2"	5.74	N/M				
ACMW-02S	2"	4.80	N/M				
ACMW-01AW	2"	7.02	N/M				
ACMW-01BE	2"	7.06	N/M				
ACMW-07S	2"	59.33	N/M				
ACMW-07D	2"	71.99	N/M				
ACMW-09S	2"	8.91	N/M				Well head needs repair
ACMW-09D	2"	12.35	N/M				Well head needs repair
ACMW-08S	2"	2.41	N/M				
ACMW-08D	2"	2.92	N/M				

N/M = NOT MEASURED

APPENDIX C

PHOTOGRAPHS OF SELECTED WELLS

Photo of ACMW-01BE with no bollards and concrete pad for protection

Photo of ACMW-04 with no concrete seal around wellbox

Photo of another monitoring well with no bollards and concrete pad for protection

Photo of ACMW-02N and ACMW-02S near the road with no bollards for protection

Appendix I-b - Farr West Report - Phase 1 Irrigation Fields Monitoring Well Installations, Diamond Valley, Alpine County, CA

FARR WEST
ENGINEERING

April 3, 2009

Mr. Ivo Bergsohn, P.G., C.Hg.
Hydro-Geologist
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, California 96150

IBergsohn@stpud.dst.ca.us

Subject: Phase 1 Irrigation Fields Monitoring Well Installations, Diamond Valley, Alpine County, California (FWE Project: STPUD 08-01)

Dear Mr. Bergsohn,

This letter report documents soil sampling, well construction and water quality sampling conducted for the South Tahoe Public Utility District (District). The purpose of the project was to determine the depth and thickness of water-bearing zones, construct monitoring wells and collect baseline water quality data. A brief chronological executive summary is provided below with an in depth discussion provided in the body of this letter report with figures, tables, permits, analysis, etc. provided as attachments.

EXECUTIVE SUMMARY

1. Soil sampling, well construction and water quality sampling were conducted in northern Diamond Valley, Alpine County, California. The work was completed in accordance with the objectives of the September 29, 2008 Workplan which was prepared by Ivo Bergsohn, the District's Hydro-Geologist, and approved by the Regional Water Quality Control Board-Lahonton Region (RWQCB-LR). Farr West Engineering, Reno, Nevada, provided hydrogeologic supervision and subcontracting for field and laboratory work performed. Permits for boring and well construction were obtained from the Alpine County Health Department. The boring sites were marked and a utility clearance request was received by USA North one week prior to the borings.

2. Boring activities were conducted on November 3rd and 4th, 2008 by Boart Longyear, Yuba City, California utilizing a truck mounted sonic drilling system with split spoon sampling capability. Soil samples were collected continuously from unconsolidated alluvial units from three sites with borehole depths between 32.5 to 72.5 feet below ground surface (bgs).

3. The borings contained minor organic material between 1 and 2 feet bgs with interbedded silty sands to well graded sand with silt and impermeable units comprised of silty, clayey sands with minor gravel and rare cobbles up to approximately 8-inches in diameter. Direct push split spoon samples and samples oriented vertically and horizontally (collected directly from the sonic core) were submitted for laboratory geotechnical analysis. Soil classifications from the geotech analysis ranged from silty sand (sm) and silty, clayey sand with gravel (sc-sm) in borings ACMW-10 and ACMW-12 and well graded sand with silt (sw-sm) in boring ACMW-11. Hydraulic conductivities from laboratory analysis ranged from the lowest of 0.06 ft/day in well ACMW-10 to the highest of 1.58 ft/day in well ACMW-11.

4. The Boart Longyear crew conducted well construction activities on November 3, 4 and 5, 2008. Two wells (ACMW 10 and ACMW 11) were screened in the shallow alluvial water bearing zone. Well (ACMW 12) was screened below perched water encountered in the shallow alluvial zone in the underlying lower alluvial zone.

5. Well development was conducted for the three wells on November 7, 13 and 14, 2008. Development was continued until water generated from the purge pump did not contain observable turbidity. Because of poor production during sampling, ACMW 10 was redeveloped on December 8, 2008.

6. Surveying of wellheads was conducted on November 11, 2008 and repeated on December 3, 2008 utilizing GPS methods by Morrow Surveying of West Sacramento, California. A stamped survey plot with the well coordinates was revised and finalized (December 16, 2008). Depth to water in the boreholes ranged from approximately 21.38 to 36.87 feet bgs and suggests that the shallow alluvial water bearing zone has a hydraulic gradient to the east.

7. Baseline groundwater sampling was completed for the three wells on November 19, 2008. Groundwater sampling was conducted after water quality parameters had stabilized. Samples were transported to Western Environmental Testing (WET), Sierra Environmental Monitoring (SEM) and the District lab for analytical analysis under chain of custody.

8. Protective measures were in place to prevent release of contaminants during project activities. No contaminant releases occurred associated with this project. Water generated and released during project activities infiltrated the ground surface and did not enter any irrigation ditches or drainages.

BACKGROUND

On September 29, 2008 the South Tahoe Public Utility District (District) provided a Workplan for the installation of three monitoring wells to the Lahonton Regional Water Quality Control Board. The following background information is from the Workplan:

> The District is designing irrigation fields that will serve a dual purpose. Their primary use will be as an irrigation site for land application of reclaimed wastewater. During emergencies, especially in response to a flood event, the fields will also provide an area for emergency discharge and temporary containment. After the emergency event is over, the contained water will be pumped back to Harvey Place Reservoir.
>
> The design concept for the proposed irrigation fields allows flood and sprinkler irrigation, useable in all seasons. Initially the facility may be irrigated with existing freshwater rights diverted from the West Fork of the Carson River. As the potential need for recycled application area grows in response to potential development of existing application areas, reclaimed wastewater may be used to irrigate the Irrigation Fields.
>
> The existing emergency reclaimed wastewater facility (a.k.a. "On-Farm") was evaluated and found to be insufficient for emergency discharge needs. Sites for new emergency facilities (the irrigation fields), have been identified in Fields 1, 2, 3, 6 and part of Field 7. Based on the topography and layout of Diamond Valley Ranch, the District has determined that Fields 6 and 7 are the most feasible candidates for emergency discharge and temporary containment in the first phase.
>
> Two irrigation fields have been planned along the western perimeter of Field 6. The fields are designed to follow the natural contour of the surrounding area, sloping toward the northeast. The maximum cut of the irrigation fields is estimated at about 9 feet. Each field will be bounded by a 6-ft tall berm on its down-slope side. Because the berms are 6-ft tall, they are not governed by the California Division of Safety of Dams regulations.
>
> The area of the planned irrigation fields will be initially used for a demonstration project to ascertain the potential effects of applying reclaimed wastewater to land in Diamond Valley. Information gained from the demonstration project will be incorporated into a Nutrient Management Plan for the area. To evaluate hydrogeologic conditions near the planned irrigation fields, prior to the application of reclaimed water, and to establish a groundwater monitoring system after the irrigation fields are put in service, the District plans to drill and install groundwater monitoring wells.

HYDROGEOLOGIC INVESTIGATION

The northern area of Diamond Valley has been mapped as Quaternary moraine, younger outwash and valley-fill deposits (Armin and John, 1983) Borings drilled by the District prior to this Workplan encountered poorly-graded mixtures of medium to coarse granitic sands, gravels and boulders with rare thin layers of clayey sand and silt within the Quaternary deposits. Units underlying the Quaternary deposits include andesitic tuffs, lavas and alluvial materials encountered at depths varying from 40 feet to as much as 480 ft below ground surface. These underlying deposits have been mapped as Tertiary Volcanics (Armin and John, 1983).

The work was completed in accordance with the objectives of the September 29, 2008 Workplan, which was prepared by Ivo Bergsohn (STPUD District Hydro-Geologist) and approved by the Regional Water Quality Control Board-Lahonton Region (RWQCB-LR). Farr West Engineering, Reno, Nevada, provided hydrogeologic field supervision and subcontracted with the drilling, survey and laboratory contractors. Permits for boring and well construction were obtained from the Alpine County Health Department. The boring sites were marked and a utility clearance request was filed with USA North. The STPUD advised of buried electrical utilities in the vicinity of ACMW-10

Three sonic borings and associated monitoring wells were constructed at locations shown on the map presented in Figure 1 and photographs presented in Figure 2. An alternate well location to the west of the initial three proposed locations was selected and permitted prior to the start of the field project. This location was drilled and completed as a monitoring well (replacing the proposed IFMW-03p site) to help constrain the gradient of the shallow alluvial water bearing zone. Permits and utility clearance requests are included in the report as attachments. Locations and elevations were surveyed on November 11, 2008 and repeated on December 3, 2008 utilizing GPS methods. Morrow Surveying of West Sacramento, California provided final stamped survey drawing (dated December 16, 2008) and data tables for the survey (attached). A compilation of selected monitor well data from the projected is provided Table 1.

Borings

Sonic drilling was conducted November 3 and 4, 2008 by Boart Longyear of Yuba City, California (C57#694686) utilizing a truck mounted rig. The sonic drilling method was selected as the most cost effective drilling method that could drill through boulders, if necessary. Sonic drilling also provided the benefit of economically collecting continuous samples from the unconsolidated alluvial units. Borings were drilled utilizing sonic methods or pushed with the split spoon sampler to maximum depths from 32.5 to 72.5 feet below ground surface (bgs). Daily drill reports, California Driller's reports and borehole logs are provided as attachments.

In general the borings contained minor organic material in the upper most interval grading into interbedded units with low hydraulic conductivity comprised of silty sands, silt with minor gravel and rare cobbles up to approximately 8-inches in diameter. Some of the more consolidated units provided significant resistance for the truck mounted rig to sonically drill and push the split spoon sampler. Boulders were not encountered as had been anticipated in the glacial moraine deposits. Tertiary volcanic bedrock encountered in previous borings at relatively shallow depths (ACMW-09) were not encountered in any of the borings.

Borings ACMW-10 and ACMW-11 encountered materials of low to moderate hydraulic conductivity, respectively, and the materials remained saturated to total depth after encountering the water table. Because of a known perched water horizon in the northern portion of the proposed irrigation fields and the proximity of ACMW-12 to ACMW-09 the District Hydrogelogist requested drilling of ACMW-12 below the perched water. Perched water was encountered at a depth of between 32 and and 37 feet bgs. A confining layer comprised of silt with variable gravel was encountered from 37 feet bgs to 57 feet bgs. A water bearing zone was then encountered at depths from 57 feet bgs to the boreholes total depth of 73.5 feet bgs.

Brass sleeves pounded directly into the sonic core by hand and brass sleeves in a split spoon sampler hydraulically pushed by the drill rig were submitted for geotechnical analysis. In general, the samples extracted from the split spoon sampler had higher bulk density than the in-situ material because pushing the split spoon sampler required significant force and may have caused some compaction of the samples during the sampling event. Sampling with a conventional split spoon hammer would probably have resulted in refusal of the sampler for several of the samples because of the density and nature of the in-situ material. Samples extracted from the sonic core may have had lower bulk density than the in-situ material because granular material had an opportunity to expand as the core is released from the sonic core barrel. Bulk density is inversely related to the porosity of the soil. It is possible that changes in bulk density may have affected the hydraulic properties of the soil samples.

AMEC was selected for testing of soil samples because of reliable results during previous laboratory efforts for the District and to provide consistency from previous work performed for the District. Laboratory analysis of the soil samples confirmed the generally low hydraulic conductivities of the soil samples identified in the field and observed during development pumping of the wells. Unified Soils Classification System description from the laboratory analysis ranged from silty sand (sm) and silty, clayey sand with gravel (sc-sm) in borings ACMW-10 and ACMW-12 and well graded sand with silt (sw-sm) in boring ACMW-11. A summary of the geotechnical laboratory analysis is presented in Tables 2 and 3. Data sheets from the laboratory analysis are provided as attachments.

Hydraulic conductivities from laboratory analysis ranged from 0.06 ft/day in ACMW-10 to 1.58 ft/day in ACMW-11. The comparison of hydraulic conductivity results from samples extracted horizontal to the core and samples extracted vertical to the core were similar. The vertical samples had hydraulic conductivities approximately 15% greater than the horizontal samples. The lower horizontal hydraulic conductivity could be because the samples were compromised because the 6-inch width of the core did not provide a sufficient length from which to extract the samples. Three separate cylinders from a sample depth of 61 feet in ACMW-12 were not tested for hydraulic conductivity because voids indicated that the sample had been disturbed.

Slight changes in grain size distributions between ACMW-11 23.0-23.5 and 25.5 H and 25.5-26.0 V demonstrates the effect that small changes (as low as two percent in the percentage of fines) can have on hydraulic conductivity which resulted in more than an order of magnitude difference. Hydraulic conductivities of the samples range from higher values, typical of fine to coarse sand, to lower values, typical of glacial till. These values are indicative of poor aquifer conditions and are orders of magnitude below what would be required for significant infiltration or municipal groundwater production. This hydraulic analysis supports earlier studies for the area indicating that the material in the northern Diamond Valley area is not suitable for aquifer storage and recovery (ASR).

Well Construction

The Boart Longyear crew conducted well construction activities on November 3, 4 and 5, 2008. Two wells (ACMW 10 and ACMW 11) were completed with 20 foot screened intervals that intercept the water table. The third well (ACMW 12) was completed below the perched water into the underlying confined lower alluvial zone with a 20 ft screen interval. After completing ACMW-12 the water level rose above the elevation of screened interval which was positioned adjacent to the permeable material below the confining layer.

The specific depths of well screen, casing, filter pack and seals for the most part follow the Workplan (Figure 3) and are shown on Table 1. Dennis Lampson of Alpine County Health provided verbal permission to complete well ACMW-11 with a cement seal of 10 ft so that the screened interval could be positioned across the water table. Well construction activities followed the Workplan except for the use of schedule 40 PVC instead of schedule 80 PVC casing in well ACMW-12 because of screen availability.

A protective steel locking well cover was installed to protect the wells prior to the contractor moving off the site. Alpine County Health did not require bollards to protect the wells because the wells are not adjacent to improved roads. Installation of bollards around the wells would provide additional protection to the wells during ranching or excavation for the temporary containment structures.

Protection of Environment

Environmental protection in place during drilling and construction activities included plastic sheeting placed beneath drilling equipment and straw wattles were placed between equipment and irrigation ditches to intercept any accidental releases. The drilling method and dry weather conditions during the field program eliminated the potential for runoff from the work sites. Soil samples were collected in plastic bags and brass core tubes. All of the cores from sonic drilling have been located near site ACMW-10 adjacent to the weather station. Fluids generated during well development and water quality sampling infiltrated on site away from irrigation ditches. During boring, well construction, well development and water quality sampling no materials or fluids entered any surface watercourses.

Well Development

Because of the sonic drilling method, surge block development was not deemed necessary and not implemented by the drilling contractor. Well development was conducted by over pumping the monitoring wells on November 7, 13 and 14, 2008. Development was continued until water generated from the purge pump did not contain significant turbidity. Because of poor production during the water quality sampling event, ACMW 10 was redeveloped on December 8, 2008. Development with the purge pump utilized as a pump and surge block was adequate at agitating the well and breaking fine materials away from the well bore. Because of the use of schedule 80 casing, a standard 2-inch MonoFlex surge block will not fit in ACMW-10 and ACMW-11.

Water Quality Sampling

Farr West Engineering contracted with Western Environmental Testing (WET), and Sierra Environmental Monitoring (SEM) for analytical analysis. Western Environmental Testing (WET) was selected because of their ability and experience achieving the detection limits and methods requested by the District. Terry Powers, the District's Laboratory Manager, allowed WET to use alternate analytical methods from that of the Workplan. The alternate methods will meet regulatory compliance requirements according to the District. A limited selection of laboratories perform the prescribed method for coliform analysis and SEM was selected for the analysis because of their familiarity with the methods and previous work with the District.

Baseline groundwater sampling was completed for the three wells on November 19, 2008. Groundwater sampling was conducted after water quality parameters had stabilized during purging of the wells. Samples were transported to WET, SEM and the STPUD laboratory for analytical analysis under chain of custody. Table 4 provides a summary of the analytical results. Analytical data sheets are provided as attachments.

Fecal and total coliform were analyzed below detection limits. The absence of coliform is understandable because of the semi pervious character of layers between the surface and water table. Even though all equipment was washed and rinsed as prescribed in the Workplan during the processes of drilling, well construction, well development and sampling coliform can be introduced to the well during well construction, which can increase with time. Neither well construction materials or the well has been chlorinated and positive coliform counts could develop and increase with time if conditions are favorable to coliform growth.

The laboratory results present bicarbonate alkalinity in mg/L and total alkalinity in mg/L CaCo3. These different units are based on historically accepted regulations/requirements. If the values for bicarbonate are converted to mg/L CaCO3 the values for bicarbonate and total alkalinity are nearly identical as should be the case since the carbonate and hydroxide components are below detection limits.

The total dissolved solids (TDS) value from sample ACMW-10 appears high compared to the EC. The lab reanalyzed the EC and obtained the same value, which is in agreement with the value obtained with the field meter at the time of sampling. The laboratory did not have an explanation for the anomalous results and was unable to rerun the sample because the sample had exceeded the hold time. Therefore the anomalous, higher than expected (based on EC) TDS value is probably incorrect. Laboratory error or suspended solids from inadequate development of the well are probably the cause of the anomalous TDS value.

The concentration of water quality parameters in the three wells correlates inversely with the groundwater yield of the three wells. This can be related to either inadequate development of the well and possible incorporation of suspended solids during sampling or that the more productive wells have higher transmissivity and thus the water encountered in the well could have shorter resonance time in the aquifer to acquire increased concentration of constituents.

Water Bearing Zones

Water level data from existing monitoring wells, hydrogeologic data collected during drilling and water level data from the new monitoring wells constructed and surveyed during this project indicates that low to virtually impermeable material separates multiple permeable units. The informal discontinuous alluvial units are separated into two groups in this report and referred to as the shallow alluvial zone and lower alluvial zone. The shallow alluvial zone can be under the direct influence of surface water, locally includes perched water zones, and is generally less than 40 ft bgs. Alluvial units between the upper alluvial zone and the bedrock interface are referred to in this report as the lower alluvial zone. Water levels in the shallow alluvial zone fluctuate seasonally to a much greater extent than the lower alluvial zone. The water levels in the shallow alluvial zone can be greater than ten feet higher in elevation than water levels in lower alluvial zone. In general, the water level elevation difference between shallow alluvial zone and lower alluvial zone is less than several feet. The extent of the downward gradient is poorly understood because of the lack of sites with multiple wells.

Shallow Alluvial Zone

Several factors make the creation of a potentiometric map of the shallow alluvial zone difficult. These factors include topographic relief of greater than 100 feet within less than ¼ mile of the proposed irrigation fields, discharging springs and several ditches that provide sources of recharge. Even within the shallow alluvial zone, semi-confined conditions within individual alluvial units result in depth to water measurements not representing unconfined water table conditions. Because of these factors, several more wells would be required in the shallow alluvial zone to constrain the unconfined water table surface. Based on the limited wells, ACMW-10 and ACMW-11, completed in unconfined units within the shallow alluvial zone and observations during drilling at ACMW-12 the hydraulic gradient of the shallow alluvial zone in the area of the proposed irrigation fields is generally to the east. Seasonally groundwater from the shallow alluvial zone could discharge in the vicinity of Indian Creek. During the January 2009 sampling event the eastward gradient decreased significantly because the water levels in the north dropped which is attributed to decreases in the flow rate in Snowshoe Ditch #2 and increases in discharge rate in the ditch near ACMW-11.

Several water levels obtained in ACMW-09S are coincident with the bottom of the screen interval and may indicate that the well is not in good hydraulic communication with saturated materials. Thus developing a potentiometric surface without conformation that the well is in hydraulic communication may provide an inaccurate water table surface. Although ACMW-07S and ACMW-08S are screened below the water table, these wells provide minimum water surface elevations, which are coincident with the potentiometric surface that the other shallow wells are completed within.

Lower Alluvial Zone

Wells ACMW-08D, ACMW-09N and ACMW-12 are screened in the lower alluvial zone and could all be down gradient of the proposed irrigation fields due to hydraulic mounding caused by infiltration and radial flow from the irrigation fields. There is a greater probability that the hydraulic gradient represented by these wells will continue to the east during most conditions. This theory is supported by the potential for recharge from the Snowshoe Ditch #2 to the northeast, the probability that the lateral moraine deposits to the northwest are less permeable and that the water levels in the lower alluvial zone are more similar to the Indian Creek (~5550 ft) than the Carson River (~5350 ft) discharge level indicating that the glacial moraine forms a significant hydraulic barrier. Local seeps and springs may discharge above the level of the Carson River. The direction of the hydraulic gradient of the lower alluvial zone below the water table is probably not as significant to the project because the water that infiltrates below the containment structure will flow predominantly in the down gradient direction of the shallow alluvial zone.

SUMMARY

The proposed irrigation and temporary containment area at Diamond Valley could receive reclaimed wastewater with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained poorly sorted material. Movement of water from the shallow alluvial zone to the lower semi-confined and confined alluvial zones will be minimal because of the interbedded alluvial and morainal deposits that form confining layers that will retard infiltration.

Water level data collected from existing monitoring wells, water level data collected during drilling and data from the new monitoring wells (constructed and surveyed during the project) indicates that locally confining layers with virtually impermeable material (comprised of morainal deposits) to low hydraulic conductivities separate multiple aquifers. These confining layers have resulted in seasonal water levels in the unconfined zones being greater than ten feet higher in elevation than underlying semi-confined and confined water zones. Quantifying the vertical and horizontal groundwater gradients will require careful evaluation of well construction and seasonal water level data.

The horizontal and vertical hydraulic gradients are dynamic seasonally because of the combination of seasonal recharge from irrigation, low hydraulic conductivities, significant source of recharge (from groundwater and surface water) and topographic setting between two drainages that discharge groundwater seasonally. The change in hydraulic gradients can seasonally exceed an order of magnitude and could significantly change the direction of groundwater flow.

This field project was successful in collecting data to characterize the hydrogeologic characteristics of the northern Diamond Valley area for temporary containment and irrigation. The sonic drill rig was the appropriate equipment for collecting the required data resulting in a cost efficient drilling program. Data collected during this project indicates that the northern Diamond Valley area generally contains materials of low hydraulic conductivities.

RECOMMENDATIONS

The District should continue with the collection of water quality and water level data from each of the new monitoring wells and from the previously installed wells at regularly scheduled intervals. After evaluation of the time series data from the wells the District will be able to determine the type of additional data that is required for designing the proposed irrigation fields and containment structures.

Evaluation and maintenance of the monitoring wells in Diamond Valley should occur regularly. This should include sounding the lowest screened intervals and semi-quantitative pumping tests, if necessary, to assure that the wells are in direct communication with the water bearing zone associated with the screened intervals. Since the water level in well ACMW-09S has been dry and is commonly recorded within two feet of the lowest screen the well should be evaluated to determine what water levels are representative of the adjacent saturated material. A sump caused by the end plug on the casing or inadequate development of the lowest screen interval could provide a water level that is not representative of the water table. Ongoing maintenance of the wells in the well field can include removal of fill that might have accumulated in the well casing, repair of protective casing and installation of bollards around wells (if heavy equipment activity is anticipated).

Collection of baseline data down gradient of the proposed irrigation fields at ACMW-11 and ACMW-09N, should provide adequate data to identify water quality changes in the shallow alluvial zone. The influence of water placed in the containment field on these monitoring wells will be dependent on where in the containment field the water is placed, local permeability within the containment fields, seasonal and annual groundwater conditions and the distribution of surface water through the ditches in the area. Since the northwest portion of the infiltration fields occur within 1/8 mile of a topographic divide hydraulic mounding from infiltration at the irrigation fields could cause groundwater to flow radially away from the irrigation fields from the southwest to the northwest. This could reverse the direction of groundwater flow resulting in groundwater flow from the irrigation field flowing toward ACMW-12. Water quality from the screened interval of ACMW-12 may not change even if the gradient direction reverses because of the thick impermeable zone above the screen interval may not allow infiltration to the lower alluvial zone.

Understanding the impacts from irrigation water to the local hydrogeology will require careful evaluation of the seasonal water level data. Data sets could include periods where water from the ditch network is temporarily rerouted to develop relationships between surface water and the alluvial water bearing zones. A better understanding of the existing relationships between surface water and the shallow alluvial zone will assist in understanding the effects of irrigation and or storage of reclaimed water.

Sincerely;

PROFESSIONAL GEOLOGIST
KIRK SWANSON
No. 340
CERTIFIED HYDROGEOLOGIST
Exp 3/31/11
STATE OF CALIFORNIA

Kirk Swanson, PhD
Senior Hydrogeologist, Ph.D.
California P.G.# 6272, C.Hg.# 340

Attachments:

<u>Figures</u>
Figure 1.) Location Map
Figure 2.) Photographs of the Project Well Site and Drilling Equipment
Figure 3.) Schematic of monitor well construction utilized for all wells

<u>Tables</u>
Table 1 2009 Diamond Valley Boring/Monitor Well Information
Table 2 Geotechnical Parameters
Table 3 Hydraulic Parameters
Table 4 Water Quality Parameters

<u>Work Plan and Permits</u>
RWQCB-LR Work Plan September 29, 2008
Alpine County Well Permit # 02-2008 07
02-2008 07
02-2008 07
02-2008 07
USA North Ticket # 2008/10/27 #00000 0562720-000
2008/10/27 #00000 0562742-000
2008/10/27 #00000 0562766-000
2008/10/27 #00000 0562780-000

<u>Daily Drill Reports</u>
11/03/2008
11/04/2008
11/05/2008

Appendix I-c - Farr West Memorandum - Diamond Valley Containment Fields Nitrate Evaluation, Alpine County, CA

FARR WEST

ENGINEERING

October 15, 2009

Ivo Bergsohn,
Hydro-Geologist,
South Tahoe Public Utility District
1275 Meadow
Crest Drive
South Lake Tahoe, CA 96150

Re: Diamond Valley Temporary Containment Fields Nitrate Evaluation, Alpine County, CA

Dear Mr. Bergsohn:

This letter provides a preliminary analysis regarding the probable annual changes in nitrate concentrations in the shallow water bearing zone underlying the proposed temporary storage site of up to 95 million gallons of treated water for a maximum of 100 days at South Tahoe Public Utilities District's temporary containment fields located in Diamond Valley, Alpine County, California.

Data collected during the November 2008 well installation and subsequent sample collection program is in accord with data that was collected during previous data collection efforts. The data indicate that water stored in the irrigation fields will have low infiltration rates into the vadose zone underlying these irrigation fields during periods of temporary containment of recycled water. The evidence collected that supports this conclusion includes low laboratory hydraulic conductivities from the most permeable soil horizons, low effective transmissivities observed during pumping for sampling and observations of significant silt and clay in the cores obtained during well installation. Layers of silts and clays that form aquitards and confining layers are situated between the most permeable zones that the samples were collected from for determination of hydraulic conductivity. The combination of these subsurface hydrogeologic conditions will contribute to low infiltration rates resulting in minimal mixing of recycled water that infiltrates from the temporary containment fields with water in underlying water bearing zones.

During nine months of the year the nitrate (measured as nitrogen) concentrations of the water that could be stored in the temporary containment fields for a period of up to 100 days ranges between 0.16 and 2.14 mg/L (previous 20 months). The nitrate concentration of the underlying water bearing zones ranges between 0.092 and 1.27 mg/L (2009). Thus, for nine months of the year infiltration of water from the temporary containment field would result less than significant increase in nitrate concentrations in the underlying water bearing zones. The mixing of water that infiltrates from storage during the months of late May to late July could result in minimal increases in the nitrate concentration. Using the highest, annual nitrate concentrations that have been discharged from the South Tahoe Public Utility District's treatment facilities during the past fifteen years for calculations, the concentration of the mixed waters would remain below the proposed action level of 7.0 mg/L.

In this portion of the project area there are highly variable site conditions and a level of uncertainty concerning environmental metrics such as hydraulic conductivity, hydraulic gradient and effective porosity. Additionally, the vadose zone is determined to be dynamic. For these reasons, a standard one dimensional mass flux equation was used for determining the "worse case" scenario for evaluating potential groundwater impacts from temporary containment of recycled water.

The "worse case" scenario for the temporary containment of water for 100 days was evaluated with a recycled water nitrate concentration of 1.53 mg/L. This is the median nitrate value for the previous 20 months of water delivery by South Tahoe Public Utilities to Alpine County, Ca. This scenario predicts a nitrate concentration of 2.16 mg/L (Table 1, including assumptions and uncertainties) from the nitrate mass of the infiltrate from temporary storage and groundwater from the upper water bearing zone. This value is sufficiently less than the proposed action level of 7.0 mg/L and the drinking water maximum contaminant level of 10.0 mg/L.

Based on the significance levels presented in the South Tahoe Public District Recycled Water Facilities EIR, I would recommend proceeding with implementation of the temporary containment fields with concurrent collection of data to allow for future significant modeling efforts with limited assumptions. The data collected during a temporary containment of recycled water could provide sufficient data for the calibration of numerical modeling for determination of effects of concentrations and duration of temporary containment.

Should you have any questions or require any additional information regarding this report please contact Kirk Swanson by phone at (775) 853-7257.

Best Regards,

Kirk Swanson, Ph.D., P.G.# 6272, C.Hg. #340

PROFESSIONAL GEOLOGIST
KIRK SWANSON
No. 340
CERTIFIED HYDROGEOLOGIST
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STATE OF CALIFORNIA

Attachement:

Table 1

Table 1 Nitrate Concentration of Water Bearing Zone Resulting From Temporary Storage of Water in Containment Fields
Diamond Valley Irrigation Fields, South Tahoe Public Utility District, Alpine County, California

15-Oct-09

Assumptions:

Parameter	Value	Units	Comment/Source
Influent NO3-N	1.53	mg/L	20 month influent average provided by the Distric laboratory
Hydraulic Conductivity	0.118	ft/day	Estimate from laboratory tests from units of higher permeability (median value from 9 samples, 2008 characterization report)
Hydraulic Gradient	1.00	ft/ft	Gravity conditions in vadose zone
Area of Infiltration	49.0	acres	Proposed area of irigation fields as provided from STPUD
Effective Porosity	0.151		Estimate from laboratory tests from units of higher permeability Value obtained from water saturation analysis
Groundwater Thickness	10.0	Ft	inferred thickness of water bearing zone that mixes with influent annually
Receiving NO3-N	0.35	mg/L	Annual median concentration of uppermost water bearing zone

Mass Flux to Water Bearing Zone for 100 Day Storage Period

Influent NO3-N Concentration	Hydraulic Conductivity	Area	Area	Velocity	Effective	Vadose Zone Flux, g/(d-m^2)	Mass Flux	Mass Flux From Influent
gram/meter^3	ft/day	acres	meter ^{2}	meter/day	Porosity	grams/(day-meter^2)	gm/day	mg/100 days
1.53	0.118	49.0	198,368	0.036	0.151	0.0083	1,647	164,734,530

Estimated Potential Nitrate-Nitrogen in Uppermost Water Bearing Zone from Annual Introduction of Influent

Area	Thickness	Water Bearing Zone Total Volume	Water Bearing Zone Effective Porosity	Receiving Groundwater Volume	Mass Flux from Influent	NO3-N infiltration from 100-day storage in uppermost Water Bearing Zone	NO3-N from pre-existing sources in upper most Water Bearing Zone	Total Annual Maximum NO3-N from 100 day storage in uppermost Water Bearing Zone
acres	feet	feet^3		liters	milligrams/100 days	mg/L	mg/L	mg/L
49.0	10.0	21,344,400	0.151	91,249,056	164,734,530	1.81	0.35	2.16
							Nitrate Nitrogen Action Level	7.0
							Nitrate Nitrogen MCL	10.0

Assumptions, input parameters and methods used only provide rough estimates for the nitrate nitrogen concentrations at a screening level. Actual concentrations may differ significantly based on actual input parameters and the appropriateness of the methods and/or errors that might provide incorrect values that cannot be support by sufficient empirical data at the time of this preliminary evaluation.

Data Sources:

South Tahoe Public Utility provided scenario for water delivery to irigation fields, October 2009
South Tahoe Public Utility provided laboratory water quality data for influent and monitor wells in Diamond Valley, October 2009
Farr West Engineering Report, 2008 Phase 1 Irrigation Fields Monitor Installation Report contained subsurface hydrogeologic data, April 3,2009

Appendix J - Memorandum - Proposed Changes to the Alpine County Groundwater Monitoring Program No. R6T-2001-0010

General Manager
Richard H. Solbrig

South Tahoe
Public Utility District

"Basic Services For A Complex World"

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March 5, 2009

Robert Tucker, P.E.
Lahontan Regional Water Quality Control Board
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150

Re: Proposed Changes to the Alpine County Ground Water Monitoring Program (LRWQCB Monitoring and Reporting Program No. R6T-2004-0010; WDID No. 6A095900700)

Dear Mr. Tucker:

The following information is provided to the Lahontan Regional Water Quality Control Board (LRWQCB) in follow-up to the December 22, 2008 meeting between yourself and South Tahoe Public Utility District staff regarding District recommendations to improve the Groundwater Monitoring Program in Alpine County, CA (ACGMP). These recommendations concern changes to the existing groundwater monitoring network, including:

1. The inclusion of six (6) existing groundwater wells into the ACGMP;
2. The removal of six (6) private wells and two (2) District monitoring wells presently included in the ACGMP; and
3. The addition of eight (8) future sites for groundwater well construction proposed for later inclusion to the ACGMP.

When completed, these changes would increase the total number of groundwater wells in the ACGMP from sixteen (16) to twenty-two (22). The District believes that the recommended changes will improve the capability of the monitoring network to collect groundwater data that can be used to better evaluate potential changes in water quality from present and future uses of recycled wastewater in Alpine County, CA.

1 BACKGROUND

1.1 Existing Groundwater Well Network

The District has been performing groundwater monitoring in Alpine County since 1981. The purpose of the monitoring is to provide adequate water quality data to determine whether the use of recycled wastewater is having a detrimental effect on the groundwater resources in Alpine County. The wells currently used for groundwater monitoring include seven (7) private wells and nine (9) shallow groundwater monitoring wells. The private wells selected for monitoring were based on recommendations provided by the USDA Natural Resource Conservation Service (NRCS) as part of their 1980 study to determine whether recycled wastewater could be safely reused in Alpine County. The shallow groundwater monitoring wells were installed by the District in 1988 as part of additions to the recycled wastewater conveyance system. The locations of these wells are shown in Figure 1. Available construction details for these wells are listed in Table 1.

Table 1. Available construction details for wells used for District groundwater monitoring in Alpine County, CA.

WELL I.D.	OWNER	TOTAL DEPTH (ft)	SCREEN INTERVAL (ft bgs)		NOTES
GW-03	Smith/Springmeyer	unk.	unk.	unk.	
GW-04	Celio	246.00	186.00	246.00	May lack surface seal (DRI, 2006)
GW-05	Neddenriep	65 (?)	unk.	unk.	No surface seal (DRI, 2006)
GW-07	Gansberg, Jr.	60(?)	unk.	unk.	No surface seal (DRI, 2006)
GW-08	Arant	unk.	unk.	unk.	
GW-11	DV School	490.00	260.00	490.00	Depth of seal = 200 feet.
GW-14	Sierra Pines Store	unk.	unk.	unk.	Control Well
ACMW-01AW	STPUD	23.20	10.00	20.00	HPR main dam
ACMM-01BE	STPUD	24.30	10.00	20.00	HPR auxilary
ACMW-02N	STPUD	37.00	14.00	34.00	DV Road
ACMW-02S	STPUD	22.00	8.50	18.50	DV Road
ACMW-03	STPUD	11.00	6.00	11.00	Bruns Ranch
ACMW-04	STPUD	30.00	10.00	30.00	Gansberg Ranch
ACMW-05	STPUD	13.00	4.00	9.00	Dressler Ranch
ACMW-06N	STPUD	23.00	10.50	20.50	Celio Ranch
ACMW-06S	STPUD	30.10	12.50	27.50	Celio Ranch

Notes: ft: Feet
Ft bgs: Feet below ground surface
STPUD: South Tahoe Public Utility District
unk.: Unknown and/or not available

1.2 DRI Investigation

Over the past 15 years, five of the private wells (GW-04, GW-05, GW-07, GW-08, and GW-11) and one shallow groundwater monitoring well (ACMW-04) have shown increasing trends in nitrate (NO_3) concentration. In 2006, the Desert Research Institute (DRI) performed a reconnaissance level investigation using site visits and a review of historical data to determine if there were simple or likely reasons for the observed NO_3 concentration trends in these wells (DRI, 2006). Findings from this investigation showed that the source of NO_3 contamination in the private wells is likely attributed to a combination of factors including: poor well construction (GW-04, GW-05, GW-07); recycled wastewater irrigation practices on private lands (GW-04, GW-05); livestock grazing practices (GW-04); and contamination by local septic systems (GW-07, GW-08). Observed NO_3 concentration trends in ACMW-04 and GW-11 were found generally to be less than 5 mg/L and were not a cause for concern.

1.3 Alisto Evaluation

In 2008, Alisto Engineering (Alisto) conducted an evaluation to determine the adequacy of the existing monitoring program in collecting data to assess the impact of using recycled wastewater for pasture crop irrigation on surface water, groundwater and soil resources in Alpine County (Alisto, 2008). Based on the results of water level monitoring and evaluation of available data, Alisto provided recommendations that included:

- Modification of wellhead construction for improved protection, security and accessibility (GW-03, GW-04, GW-08, ACMW-02N, ACMW-02S, ACMW-03W);
- Destruction of two monitoring wells (ACMW-04W and ACMW-06N) that are no longer included in the monitoring network or considered to be redundant for use in monitoring; and
- Addition of seventeen (17) new shallow groundwater monitoring wells installed in two phases to ensure collection of reliable data.

2 GROUNDWATER FLOW CHARACTERIZATION

A major portion of the Alisto effort was devoted to the collection of surveyed groundwater well location and measuring point elevation data and groundwater level data for use in evaluating groundwater flow patterns. The interpreted patterns could then be used to assess the adequacy of existing and possible future groundwater well sites for monitoring potential changes in water quality resulting from the use of recycled wastewater. Data used for groundwater flow interpretation consisted of water level measurements collected from eight of the District's shallow groundwater monitoring wells included in the existing groundwater monitoring network (ACMW-01AW, ACMW-01BE, ACMW-02N, ACMW-02S, ACMW-03, ACMW-04, ACMW-06N and ACMW-06S ACMW-05) and six additional District groundwater monitoring wells installed in 2003 (ACMW-07S, ACMW-07D, ACMW-08S, ACMW-08D, ACMW-09S and ACMW-09D). These additional wells were installed as part of a hydrogeologic reconnaissance investigation of Diamond Valley (Brown and Caldwell, 2006) and are not currently part of the ACGMP.

2.1 Hydrogeologic Setting

The irrigated properties and groundwater wells included in the Alpine County Groundwater Monitoring Program are spread across an area of about 10.5 square miles that includes portions of Diamond Valley, Dutch Valley, Wade Valley and the south end of the Carson Valley, south of the California-Nevada stateline. The surface geology through this area has been mapped by Armin and John (1983) and geologic interpretations of major rock types used through this section are taken from this source (USGS Misc. Inv. Series Map I-1424). Figure 2 shows the consolidated bedrock areas consisting of plutonic and volcanic rocks that bound unconsolidated alluvial and glacial deposits through the valley areas.

Plutonic rocks outcrop along the west side of the subject area along the steep eastern slopes of the Carson Range [above an elevation of about 5800 feet mean sea level (fmsl)] and bound the western margin of the Carson Valley. These generally consist of Jurassic and Triassis andesites and dacites and Createceous granites and granodiorites. These consolidated rocks are believed to be relatively impermeable to groundwater flow.

Volcanic rocks outcrop in the southeast corner of the subject area and form the low-lying hills occurring between Indian Creek and the East Fork of the Carson River bounding the east margin of Diamond Valley and Dutch Valley and the southeast margin of Carson Valley. Volcanic rocks also form the low lying hills between Diamond and Wade Valleys. These generally consist of Tertiary andesitic volcanics composed of interbedded andesitic lahars, stratified tuffaceous sandstone, and conglomerate with minor andesite. Some groundwater flow is believed to flow through Tertiary semi-consolidated sediments. These are typically found in the foothills west of the Pine Nut Mountains, northeast of the subject area. Generally, the consolidated Tertiary volcanic rocks described above are believed to be relatively impermeable to groundwater flow. However, the geologic log for the Celio Ranch Well in Wade Valley (GW-04) suggests that where sufficiently fractured, Tertiary volcanics may produce sufficient quantities of groundwater for domestic use.

Quaternary alluvial and glacial deposits lie upon the downthrown side (or hanging wall) of the Genoa fault, an active Sierra Nevada frontal fault, occurring along the mountain front of the Carson Range. These include outwash, moraine and alluvial deposits that form: the eastward sloping alluvial fans between the Carson Range and the West Fork of the Carson River (WFCR); the valley floor on the west side of Diamond Valley; and the valley floor underlying Wade Valley and Dutch Valley. The east side of Diamond Valley is floored by younger Quaternary valley fill deposits. Quaternary alluvial fan, basin-fill, outwash and floodplain deposits underlie the valley floor at the south end of Carson Valley. The primary water-bearing units in the Carson Valley occur in the Quaternary alluvial deposits. Confined water-bearing zones through these deposits form the principal drinking water aquifers through the area.

Geologic logs from District monitoring wells drilled in Diamond Valley show that the upper portion of the subsurface is composed predominantly of alluvial deposits consisting of poorly-graded mixtures of medium to coarse granitic sands, gravels and boulders. Thin layers of clayey sand and silt are rare. Depending on location across the valley fine silt; tuffaceous sandstone and gravel; and volcanic lithic tuffs, welded tuffs and andesite are encountered below the upper sand and gravel deposits at depths varying from about 40 feet below ground surface (ft bgs) to as much as 480 ft bgs (Figure 3). These underlying deposits have been mapped as Tertiary Volcanics (Armin and John, 1983). Geologic mapping suggests that District groundwater wells installed in Wade Valley and Carson Valley were completed in unconsolidated alluvial fan or basin-fill deposits. Boring logs describing these deposits were not found for these wells.

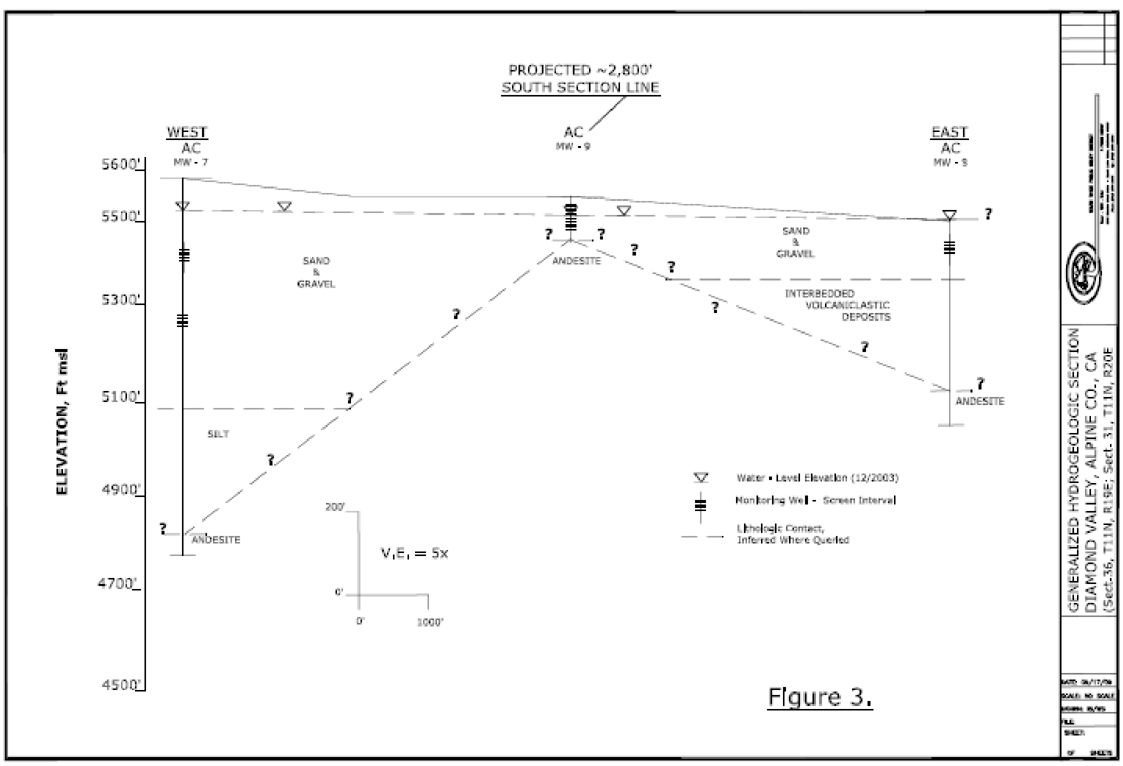

Figure 3. Generalized Hydrogeologic Section, Diamond Valley, Alpine Co., CA; Sect. 36, T 11N, R19E; Sect. 31, T 11N, R20E

The West Fork of the Carson River (WFCR) is the dominant hydrologic feature through the project area. The WFCR enters from the southwest and flows northward toward the Carson Valley. The USGS reported the average annual stream flow of the WFCR near Woodfords, CA at 75,600 acre-feet per year (acre-ft/yr) for water years 1940-2005. The WFCR is believed to be a gaining stream along its reaches through the subject area. Therefore, the bed elevation can be used to approximate shallow groundwater elevation along the stream bed.

Indian Creek is tributary to the WFCR and also enters from the southwest flowing east toward the east end of Diamond Valley and then north through Dutch Valley along the toe of the Tertiary volcanics in the southeast portion of project area. Average annual stream flow for Indian Creek has been estimated at 5,100 acre-ft/yr for water years 1940-2005 (Maurer and Berger, 2007). Indian Creek is also believed to be a gaining stream along its reaches through the subject area.

Streamflow from the WFCR is diverted for irrigation use to Snowshoe Thompson Ditch No.1 and the Millich Ditch Diversion, downstream of the USGS gaging station near Woodfords, CA. Total diversions are reported to average 5,900 acre-ft/yr for water years 1993 – 2003 (Maurer and Berger, 2007). Ditch losses from this ditch system drains to Indian Creek as return flows and is a source of groundwater recharge through the area.

Water resource investigations completed by the USGS show that groundwater characteristically flows from the mountain fronts bordering the east and west margins of the basin toward the center of the Carson Valley and then northward along the longitudinal axis of the valley concordant with the WFCR. Groundwater depths near the mountain fronts are believed to be on the order of 100 to 200 ft bgs. Groundwater depths progressively decline toward the valley floor where it is found at depths on the order of 5 ft bgs or less (Maurer, 1986; Maurer and Berger, 2007).

Available hydrogeologic information collected by the District suggests that the uppermost zone of water saturation occurs within the alluvial deposits under varying aquifer conditions. Results from geologic logging, aquifer testing and water level monitoring, suggest that the uppermost portion of the zone of saturation is confined on the west side of Diamond Valley (ACMW-07). The uppermost portion of the zone of saturation is unconfined at monitoring well locations near the center of Diamond Valley (ACMW-10 and ACMW-11) and near Indian Creek (ACMW-01AW, ACMW-01BE, ACMW-02N and ACMW-02S). Perched water has been identified overlying the zone of saturation in the north half of Diamond Valley (ACMW-09S). The uppermost portion of the zone of saturation below the perched water horizon is believed to be either semi-confined (ACMW-09D) or confined (ACMW-12). Groundwater level data collected from District groundwater wells (ACMW-06N and ACMW-06S) suggest that the uppermost portion of the zone of saturation may be semi-confined in Wade

Valley. Groundwater level data collected from District groundwater wells in Carson Valley (ACMW-04) suggests that the uppermost portion of the zone of saturation is unconfined. The water table is typically found within 20 feet of land surface. Hydrographs showing water level elevations measured in District wells in Diamond Valley; and in Wade and Carson Valleys are provided as Figures 4 and 5, respectively.

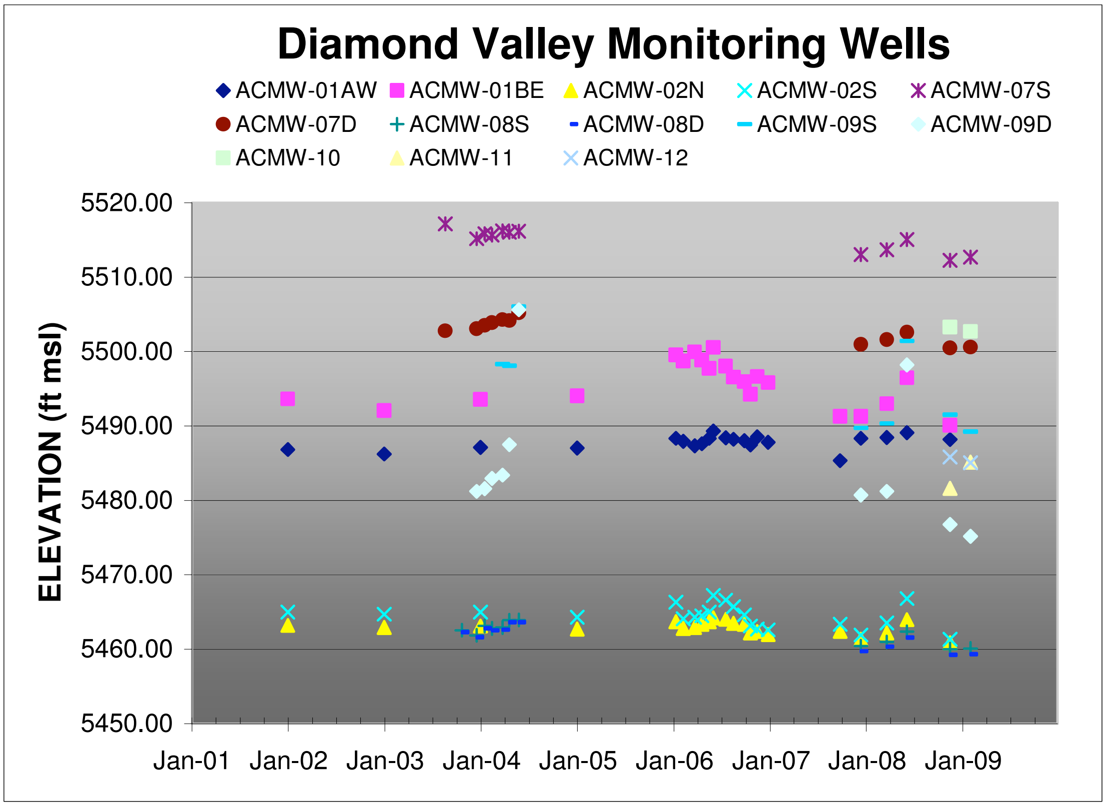

Figure 4. Water level elevations measured in District Monitoring Wells in Diamond Valley, CA.

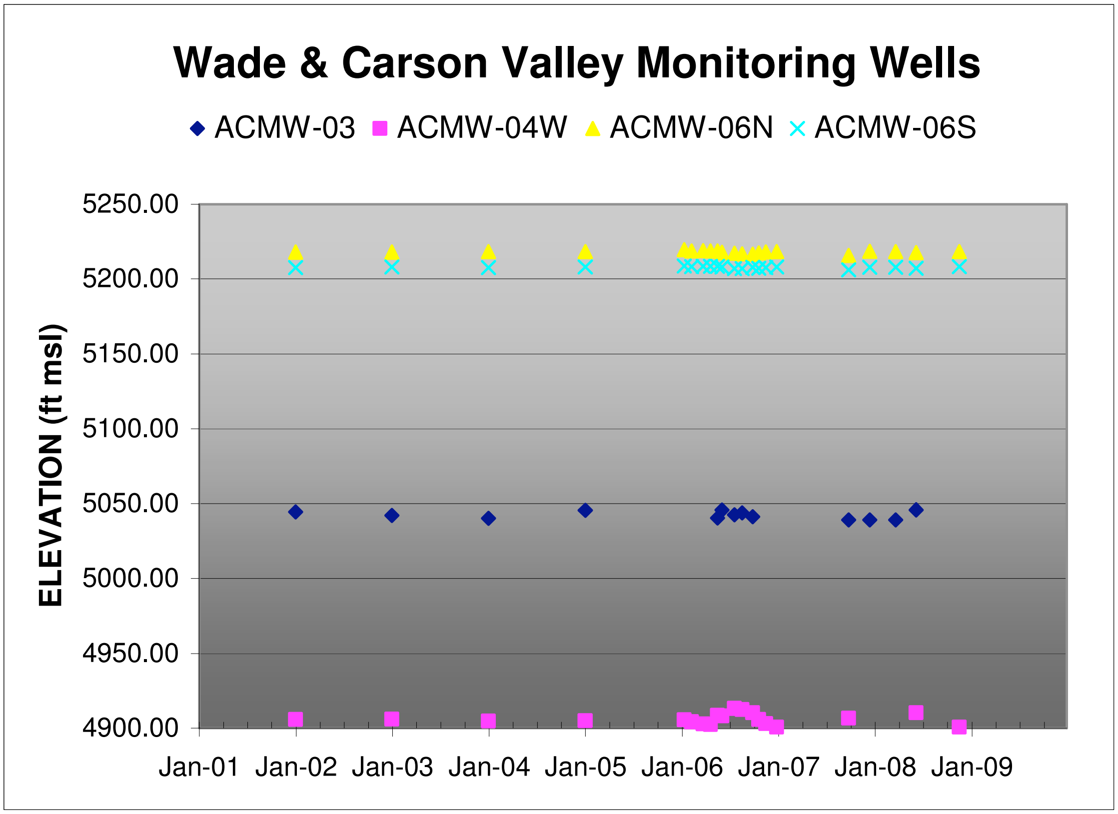

Figure 5. Water level elevations measured in District Monitoring Wells in Wade Valley and Carson Valley, CA.

2.2 Groundwater Flow

Mapping of groundwater elevations inferred from surface water features (springs, streams and lake elevations); alluvial-bedrock contact elevations along the margins of the basin; and groundwater level elevations measured at twelve of the District's groundwater wells in November 2008 (ACMW-01AW, ACMW-01BE, ACMW-02N, ACMW-02S, ACMW-04W, ACMW-06N, ACMW-07S, ACMW-08S, ACMW-09S, ACMW-10, ACMW-11 and ACMW-12) were used to develop a conceptual model showing regional groundwater flow patterns across the subject area (Figure 6). In general, groundwater moves from mountain front areas at higher elevations along the basin margins toward discharge areas at lower elevations occurring along surface water reaches along the valley floor. Groundwater depths at the mountain fronts were inferred as follows:

- 120 feet below the contact elevation between plutonic rocks and unconsolidated alluvial and glacial deposits along the mountain front of the Carson Range on the west side of the subject area.
- 60 feet below the contact elevation between consolidated volcanic rocks and unconsolidated alluvial and glacial deposits, along the southeast portion of the subject area; and

- 30 feet below the contact elevation between consolidated volcanic rocks and unconsolidated alluvial deposits bordering the Tertiary volcanics between Diamond Valley and Wade Valley.

Groundwater inflow toward Diamond Valley is inferred to be from the mountain front along the east slopes of the Carson Range, south and west of Diamond Valley. Mountain front recharge from the southwest flows northeast toward Diamond Valley. Through Diamond Valley, groundwater flow directions are believed to diverge and are generally directed to the northwest toward the West WFCR near the west side of the valley and are generally directed to the east-northeast toward Indian Creek near the east side of the valley. The Tertiary volcanic rocks forming the low-lying hills forming the north margin of the valley are believed to form a low permeability boundary that accentuates this flow divergence through Diamond Valley.

Groundwater inflow toward Carson Valley is inferred to be from the mountain front located along the east slopes of the Carson Range, west and north of Paynesville, CA and from the mountain front located along the west slopes of the Tertiary volcanics, south of Mud Lake. Mountain front recharge from the west margin of the basin is generally directed to the east toward the valley floor and then northeast along the WFCR. Mountain front recharge from the east margin of the basin is generally directed west and northwest toward the valley floor and then north along the WFCR.

Groundwater inflow toward Dutch Valley is inferred to be from the east end of Diamond Valley and from mountain front along the west slopes of the volcanic rocks, east of the Woodfords Indian Community. Groundwater inflow from Diamond Valley to Dutch Valley is directed north and northeast through unconsolidated sediments occurring within the Indian Creek stream valley. Mountain front recharge is also believed to contribute to groundwater inflow and is inferred to be directed northwest across Dutch Valley toward the WFCR.

Wade Valley appears to be an area of limited groundwater inflow. Recharge to this valley is believed to be from a relatively limited catchment area defined by the crest of the consolidated volcanic rocks bounding the east, south and west sides of the valley.

3 PROPOSED GROUNDWATER WELL NETWORK

Given the findings of the DRI Investigation and the evaluation of groundwater flow through the subject area, the District recommends that the LRWQCB change the designated groundwater wells presently used in the ACGMP (Figure 1). The purpose of these changes is to improve the capability of the monitoring network to collect groundwater data that can be used to better evaluate potential changes in water quality from present and future uses of recycled wastewater in Alpine County.

Figure 7 shows the locations of groundwater wells recommended for use in an improved groundwater well network. The needed changes to transform the existing well network involve: the inclusion of six (6) existing groundwater wells installed by the District in 2003 and 2008; the removal of eight (8) groundwater wells presently part of the ACGMP; and the addition of eight (8) sites for groundwater well construction proposed for future inclusion into the ACGMP. Discussion of these recommended changes is provided in the following section.

3.1 Groundwater Well Additions

The District has installed nine groundwater wells in Diamond Valley for the collection of hydrogeologic information that are currently not part of the ACGWMP (Figure 6). General well construction details for these wells are summarized in Table 2.

Table 2. General well construction details for existing groundwater wells proposed for addition to the ACGWMP.

WELL I.D.	OWNER	TOTAL DEPTH (ft)	SCREEN INTERVAL (ft bgs)		NOTES
ACMW-07S	STPUD	180.50	140.00	180.00	Diamond Valley up-gradient – upper confined water zone
ACMW-08N	STPUD	70.10	60.00	70.00	Diamond Valley down-gradient – upper semi-confined water zone
ACMW-09S	STPUD	20.10	10.00	20.00	DV Irrigation Field - perched water zone
ACMW-09D	STPUD	45.10	35.00	44.50	DV Irrigation Field – upper semi-confined water zone
ACMW-10	STPUD	38.50	17.00	37.00	DV Irrigation Field – upper unconfined water zone
ACMW-11	STPUD	33.50	12.00	32.00	DV Irrigation Field – upper unconfined water zone
ACMW-12	STPUD	73.50	52.00	72.00	DV Irrigation Field – upper confined water zone

ACMW-07S is located in an inferred up-gradient location on the west side of Diamond Valley within the NE ¼, SW ¼ of Section 36, T 11N, R19E. Logging, aquifer testing and water level elevation data suggest that the uppermost portion of the zone of water saturation is confined through this area. ACMW-07S is proposed as a control well for the collection of background water quality samples for Diamond Valley. Collection of water quality samples from ACMW-07S would also supplement water quality data provided by the Diamond Valley School Well (GW-11) which is screened through a similar portion of the saturated water zone.

ACMW-08N is located in an inferred down-gradient location on the east side of Diamond Valley within the SW ¼, NE ¼ of Section 35, T 11N, R20E. Logging and water level elevation data suggest that this well is screened within the uppermost semi-confined interval of the saturated water zone. The saturated water zone along the east side of Diamond Valley is believed to be multi-layered. Groundwater samples collected from this well will be used to supplement water quality data presently collected at ACMW-02N, -02S from the overlying unconfined portion of the saturated water zone.

ACMW-09S and -09D form a shallow and deep well pair located near the north margin of Diamond Valley near the SE corner of Section 25, T 11N, R19E. The District is proposing to use the area south of this well pair for the land application and emergency discharge and containment of reclaimed wastewater (Phase I Irrigation Field). Borehole logging, well development and water level elevation data suggests that the shallow well (ACMW-09S) is screened through a perched water zone above the zone of water saturation. The deeper well (ACMW-09D) is screened through the underlying zone of water saturation, occurring in unconsolidated sediments above volcanic bedrock. The zone of water saturation is believed to be semi-confined through this area. Groundwater samples are proposed to be collected solely from ACMW-09D to monitor water quality changes through the semi-confined water zone.

ACMW-10 is located in the SW ¼, NE ¼ of Section 36, T 11N, R19E in an inferred up-gradient location with respect to the District's proposed Phase I Irrigation Fields. Logging and water level elevation data show that the zone of water saturation is unconfined through this area with the well screened across the water table. Groundwater samples collected from this well will be used to provide background water quality data for the unconfined portion of the saturated water zone.

ACMW-11 is located in the SW ¼, NW ¼ of Section 31, T 11N, R20E in an inferred down-gradient location with respect to the District's proposed Phase I Irrigation Fields. Logging and water level elevation data show that the zone of water saturation is unconfined through this area with the well screened across the water table. Groundwater samples collected from this well will be used to monitor potential water quality changes from use of the Phase I Irrigation Fields through the unconfined portion of the saturated water zone.

ACMW-12 is located in the NW ¼, NE ¼ of Section 36, T 11N, R19E in an inferred down-gradient location with respect to the District's proposed Phase I Irrigation Fields. Logging data shows that perched water is present above the zone of water saturation. The uppermost portion of the saturated water zone is believed to be confined through this area. ACMW-12 will be used to monitor potential water quality changes in the uppermost confined portion of the saturated water zone.

3.2 Groundwater Well Removals

The District is proposing to remove eight (8) existing groundwater wells from the ACGMP. Six of these are private wells that for several reasons no longer provide useful water quality information for the ACGMP. The remaining two are District monitoring wells that are inadequate for collecting groundwater samples from the uppermost portion of the zone of water saturation. Reasons for the removal of these wells from the monitoring network are summarized in Table 3.

Table 3. Groundwater wells recommended for removal from the ACGMP.

WELL I.D.	Reason(s) for Removal
GW-03	Private well located outside recycled wastewater use area; well construction information is unknown; sounding port requires repair.
GW-04	Ambiguous water quality data due to poor well construction; recycled wastewater irrigation practices; and grazing practices.
GW-05	Ambiguous water quality data due to poor well construction; and recycled wastewater irrigation practices.
GW-07	Ambiguous water quality data due to poor well construction and contamination by household septic system.
GW-08	Ambiguous water quality data due to poor well construction and contamination by household septic system.
GW-14	Private well located outside recycled wastewater use area; well construction information is unknown; sounding port requires repair.
ACMW-03	Inadequate well depth for shallow groundwater monitoring.
ACMW-05	Inadequate well depth for shallow groundwater monitoring.

GW-03 is a private well located along the west margin of Dutch Valley approximately 1-mile north northeast of the Diamond Valley Ditch Inverted Siphon, at the east end of Diamond Valley. The well is far-away from areas where recycled wastewater is conveyed or used. Because of its distal location, this well is not useful for ground water monitoring and is recommended for removal from the ACGMP.

GW-04 is a private well located in Wade Valley, near Diamond Valley Road. Findings from the DRI Investigation suggest that the lack of a sanitary seal, occurrence of a treated effluent ditch within 20 feet of the wellhead and past grazing of cattle near the wellhead likely contributed to the increase in NO_3 concentrations observed in GW-04 during the mid 1990s. Poor well construction obfuscates the utility of this well for groundwater monitoring and is recommended for removal from the ACGMP.

GW-05 is a private well located in the front yard of the Neddenriep Ranch House in Carson Valley. Findings from the DRI Investigation suggest that the lack of a sanitary seal, occurrence of a treated effluent ditch within 2 feet of the wellhead and flood irrigation at the ranch house likely contributed to the increase in NO_3

concentrations observed in GW-05. Poor well construction obfuscates the utility of this well for groundwater monitoring and is recommended for removal from the ACGMP.

GW-07 is a private well located at the Gansberg Ranch House more than two miles west of the Upper Fredricksburg Ditch. The site is situated more than two miles upgradient with respect to any areas where recycled wastewater is conveyed or used. Findings from the DRI Investigation suggest that the lack of a sanitary seal and proximity within 200 feet of a septic leach field at the ranch house likely contributed to the increase in NO_3 concentrations observed in GW-07. Poor well construction and location far-away from areas using or conveying recycled wastewater obfuscates the utility of this well for groundwater monitoring and is recommended for removal from the ACGMP.

GW-08 is a private well located at the Arant Ranch House, approximately 200 feet west of the Upper Fredricksburg Ditch. The site is situated within an area irrigated with recycled wastewater. Findings from the DRI Investigation suggest shallow groundwater and proximity of a septic tank located within 100 feet of the wellhead likely contributed to the increase in NO_3 concentrations observed in GW-08. Groundwater contamination from a local septic system obfuscates the utility of this well for groundwater monitoring and is recommended for removal from the ACGMP.

GW-14 is a private well located in the Sierra Pines Trailer Park along the mountain front of the Carson Range, approximately one-half mile west of the southwest margin of Diamond Valley. The well is situated approximately 1.5 miles west from areas where recycled wastewater is conveyed or used. Construction information for this well was not found. GW-14 is the designated control well for the ACGMP. Although the location is appropriate for use as a control well for Diamond Valley, the District recommends that this well be removed from the ACGMP and replaced with GW-11.

ACMW-03 is a shallow monitoring well located on the Bruns Ranch near the south bank of the Upper Fredricksburg Ditch near Highway 88. This well is the shallowest of the groundwater wells and has been dry for about twenty five percent of the ACGMP sampling events. Water quality data from GW-03 is believed to be representative of seepage from the adjoining ditch and may not be representative of water quality in the uppermost zone of water saturation. The District therefore recommends that this well be removed from the ACGMP.

ACMW-05 is a shallow monitoring well located on the Dressler Ranch within the On-Farm Emergency Disposal site. This well is very shallow and has been dry during all of the ACGMP sampling events. Water quality samples from ACMW-05 are not likely to be representative of water quality in the uppermost zone of water saturation. Therefore it is recommended that this well be removed from the ACGMP.

3.3 Future Groundwater Well Sites

The District is recommending the installation of eight (8) new shallow groundwater wells for addition to the ACGMP. The recommended well sites were selected using relative positions with respect to the reclaimed wastewater application areas and regional patterns of groundwater flow; and accessibility for future drilling, well construction and groundwater monitoring tasks. The majority of these sites are located within public right-of-way that will require permitting with Alpine County or other relevant agencies. Several of these sites (PW-05, PW-06, PW-11 and PW-12) are located on private lands that will require access agreements with applicable property owners. Figure 7 shows the locations of the recommended well sites. General descriptions of these sites are summarized in Table 4.

Table 4. Recommended sites for future groundwater well installations.

SITE	LOCATION	DESCRIPTION	APPLICATION	NOTES
PW-04	Cntr. NE ¼, Sec. 18, T11N, R20E	South end of Carson Valley, on River Ranch Road, between Chambers Road and Highway 88, east of Lower Fredericksburg Ditch and application area	Blended Recycled Wastewater	Up-gradient/down-gradient location along south margin of application area.
PW-05	NE ¼, SE ¼, Sec 7, T11N, R20E	South end of Carson Valley, on Chambers Road, east of Neddenriep Ranch.	Blended Recycled Wastewater	Down-gradient location along east margin of Neddenriep application area, replacing GW-05.
PW-06	SW ¼, SW ¼, Sec 5, T11N, R20E	South end of Carson Valley, on Chambers Road, at Cal-Neva Stateline.	Blended Recycled Wastewater	Down-gradient location along east margin of Neddenriep application area.
PW-07	NW ¼, SW ¼, Sec 7, T11N, R20E	South end of Carson Valley on School House Road, between Fredericksburg Road and Highway 88	Blended Recycled Wastewater	Up-gradient location (control) west of application area, replacing GW-07.
PW-11	SE ¼, SW ¼, Sec 8, T11N, R20E	South end of Carson Valley, north of Brooke Diversion Box.	Recycled Wastewater	Up-gradient location (control) east of Brooke irrigation area, replacing ACMW-05.
PW-12	SW ¼, NE ¼, Sec 8, T11N, R20E	South end of Carson Valley, down-slope of Brooke Ditch at Cal-	Recycled Wastewater	Up-gradient location east of Brooke irrigation

		Neva Stateline.		area.
PW-19	SE ¼, NW ¼, Sec 32, T11N, R20E	East end of Diamond Valley, downstream of Diamond Valley Ditch inverted siphon.	Recycled Wastewater	Down-gradient location near Indian Creek, replacing GW-03.
PW-20	SW ¼, SE ¼, Sec 18, T11N, R20E	West shoulder of Chambers Road, near its intersection with Diamond Valley Road at West Fork Carson River bridge.	Blended Recycled Wastewater	Up-gradient (Control) location, up-gradient of Diamond Ditch Pipeline, replacing GW-08.

PW-04 is located within the right-of-way along the south shoulder of River Ranch Road, between Highway 88 and Chambers Road. Access to the site is excellent along a paved roadway. The site is situated near the south end of the Double Bar W Ranch and is down-gradient with respect to properties using blended recycled wastewater between Paynesville and River Ranch Road. It is situated up-gradient with respect to properties using blended recycled wastewater north of River Ranch Road.

PW-05 is located on private property along the west shoulder of Chambers Road, east of the Neddenriep Ranch. Access to the site is satisfactory along an unpaved unimproved road. The site is situated along the east margin of the ranch, down-gradient with respect to properties using blended recycled wastewater. The future groundwater well proposed for this site is recommended to replace GW-05.

PW-06 is located on private property along the west shoulder of Chambers Road, at the California-Nevada stateline. Access to the site is satisfactory along an unpaved unimproved road. The site is situated furthest down-gradient with respect to properties using blended recycled wastewater in Carson Valley.

PW-07 is located within the right-of-way along the south shoulder of School House Road, west of the Upper Fredricksburg Ditch. Access to the site is excellent along a paved roadway. The site is situated up-gradient with respect to the irrigation ditch and properties using blended recycled wastewater in Carson Valley and will be used as a control well for irrigated lands west of the WFCR. The future groundwater well proposed for this site is recommended to replace GW-07.

PW-11 is located along an unimproved road, near the east margin of the Brooke property. Access to the site is satisfactory along an unpaved unimproved road. The site is situated down-gradient with respect to the On-farm Emergency Disposal site and up-gradient with respect to the portion of the Brooke property using reclaimed wastewater and will be used as a control well for irrigated lands east of the WFCR.

PW-12 is located along an unimproved road, near the east margin of the Brooke property at the California-Nevada stateline. Access to the site is acceptable, but could use brush removal for accessibility for well drilling equipment. The site is situated down-gradient with respect to the Brooke Ditch and up-gradient with respect to the portion of the Brooke property using reclaimed wastewater.

PW-19 is located along a private unimproved road, near the north bank of Indian Creek, east of the Diamond Ditch Inverted Siphon. Access to the site is satisfactory, but may be subject to flooding from Indian Creek. The site is situated down-gradient with respect to the Diamond Ditch Inverted Siphon and irrigated lands in Diamond Valley.

PW-20 is located near the Paynesville Bridge, within the right-of-way along the west shoulder of Chambers Road, south of the Diamond Valley Ditch Pipeline. Access to the site is excellent along a paved roadway. The site is situated up-gradient with respect to the west end of the pipeline and will be used as a control well for irrigated lands using blended recycled wastewater between Paynesville and River Ranch Road. The future groundwater well proposed for this site is recommended to replace GW-08.

Construction details for future well installations will be provided in a future work plan developed to satisfy permitting requirements. This workplan will be developed after the recommended changes have been accepted by the LRWQCB for inclusion in the ACGMP.

Please contact me at your earliest convenience, should you require any further information regarding the changes proposed to the District's groundwater monitoring network.

Sincerely,

Ivo Bergsohn, P.G., C.Hg.
Hydro-Geologist

Cc; J. Molnar, Alpine County
T. Powers
Hal Bird
P. Sciuto
R. Solbrig
File

TABLES (embedded in text)

FIGURES

REFERENCES

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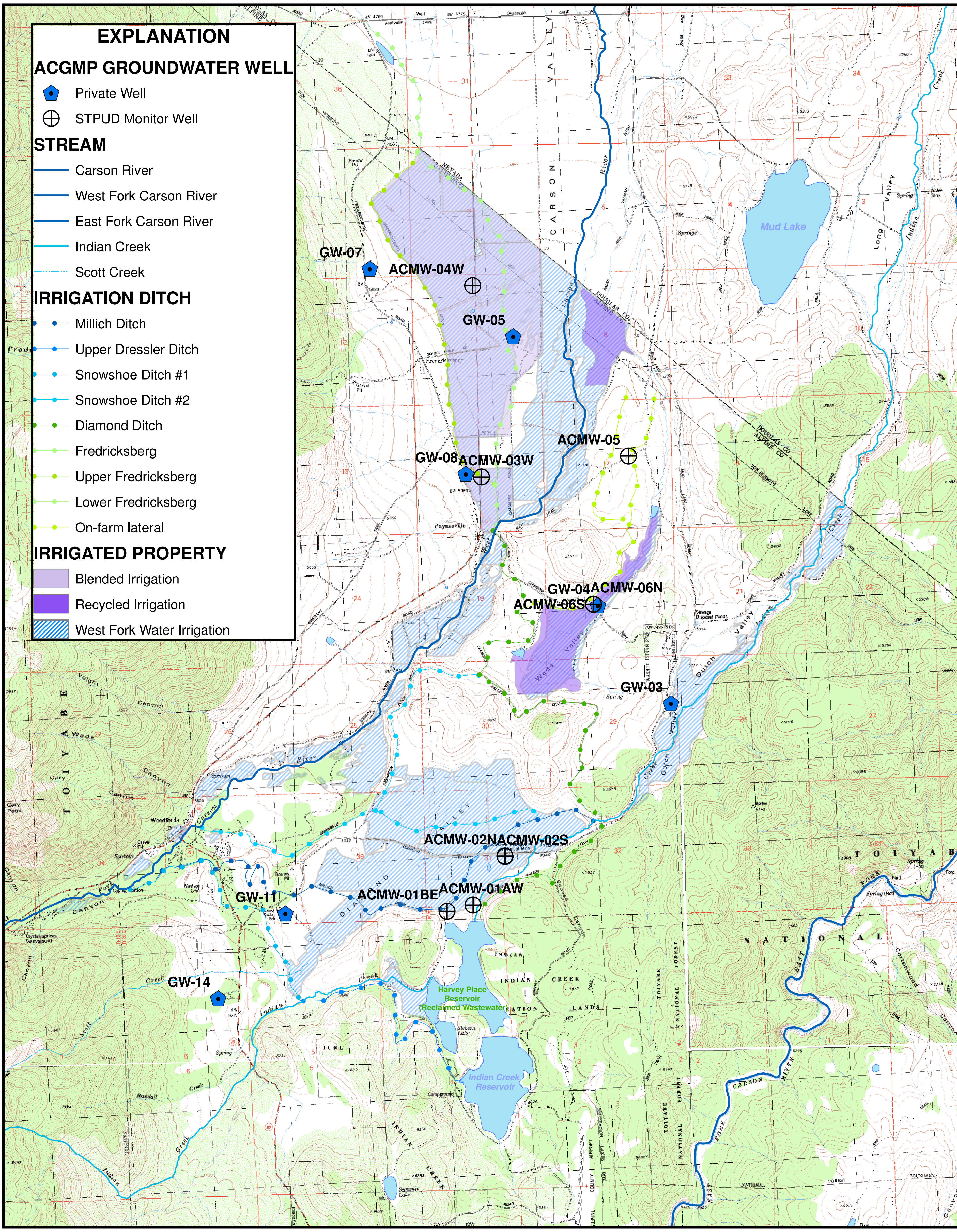

Figure 1.
South Tahoe Public Utility District
Alpine County Groundwater Monitoring Program (ACGMP)
Groundwater Wells and Irrigated Properties

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Scale 1: 24000

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SOUTH TAHOE PUBLIC UTILITY DISTRICT Sewer - 1950 - Water

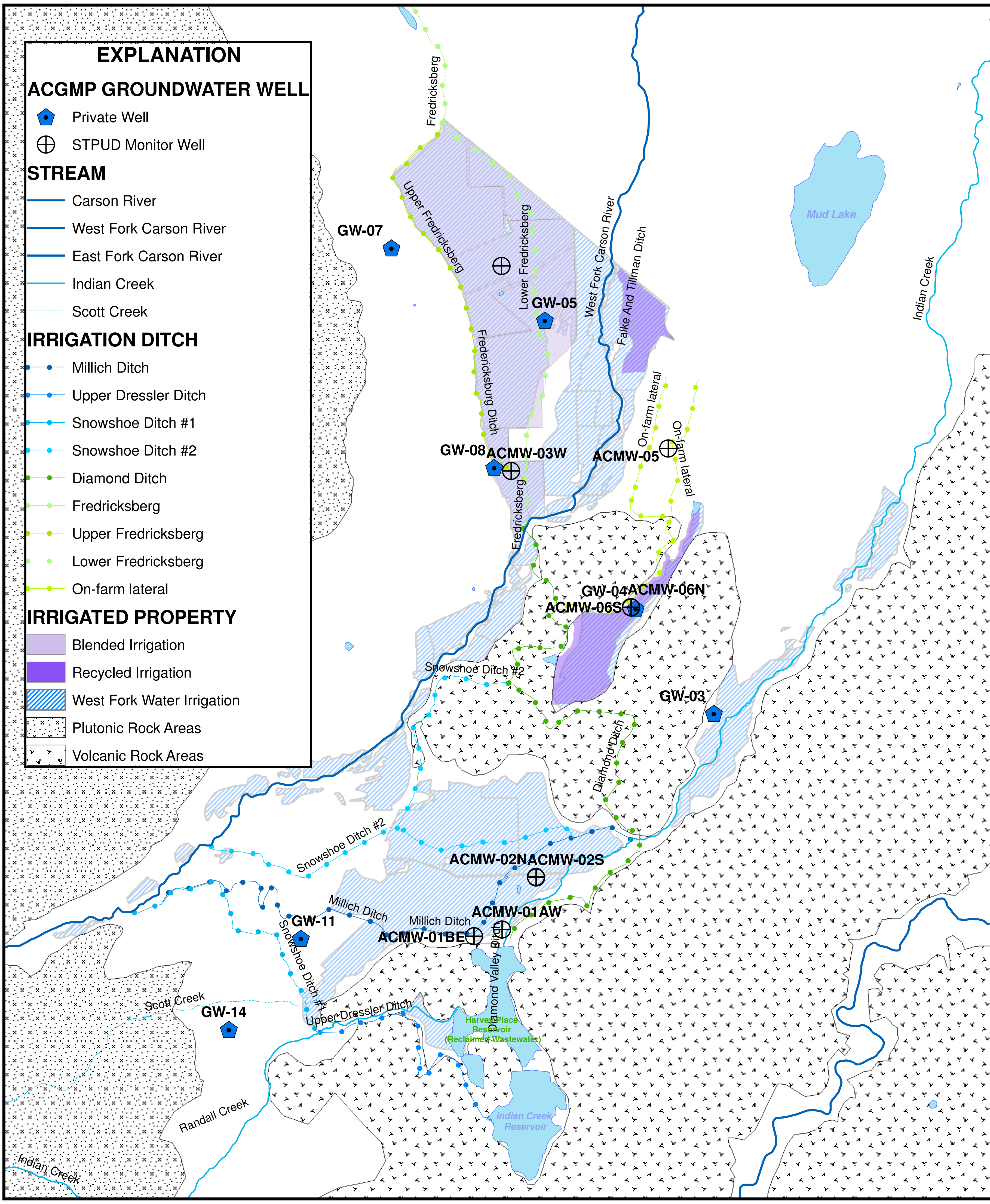

Figure 2.
South Tahoe Public Utility District
Alpine County Groundwater Monitoring Program (ACGMP)
Bedrock Areas

0 10,000 Feet

Scale 1: 24000

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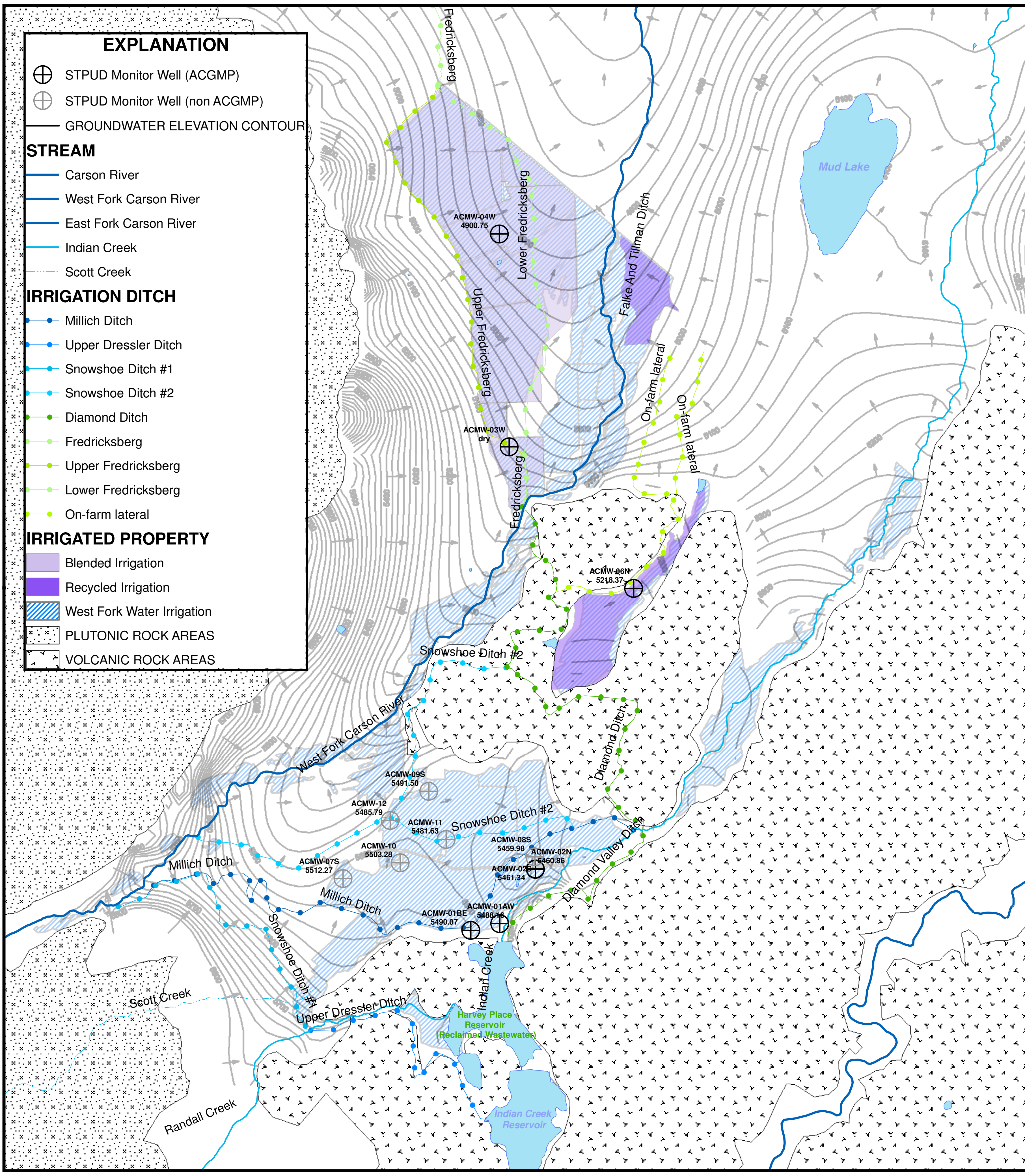

Figure 6.
South Tahoe Public Utility District
Alpine County Groundwater Monitoring Program (ACGMP)
Inferred Groundwater Elevation Contours and
Flow Directions (Nov. 24, 2008)

0 10,000 Feet

Scale 1: 24000

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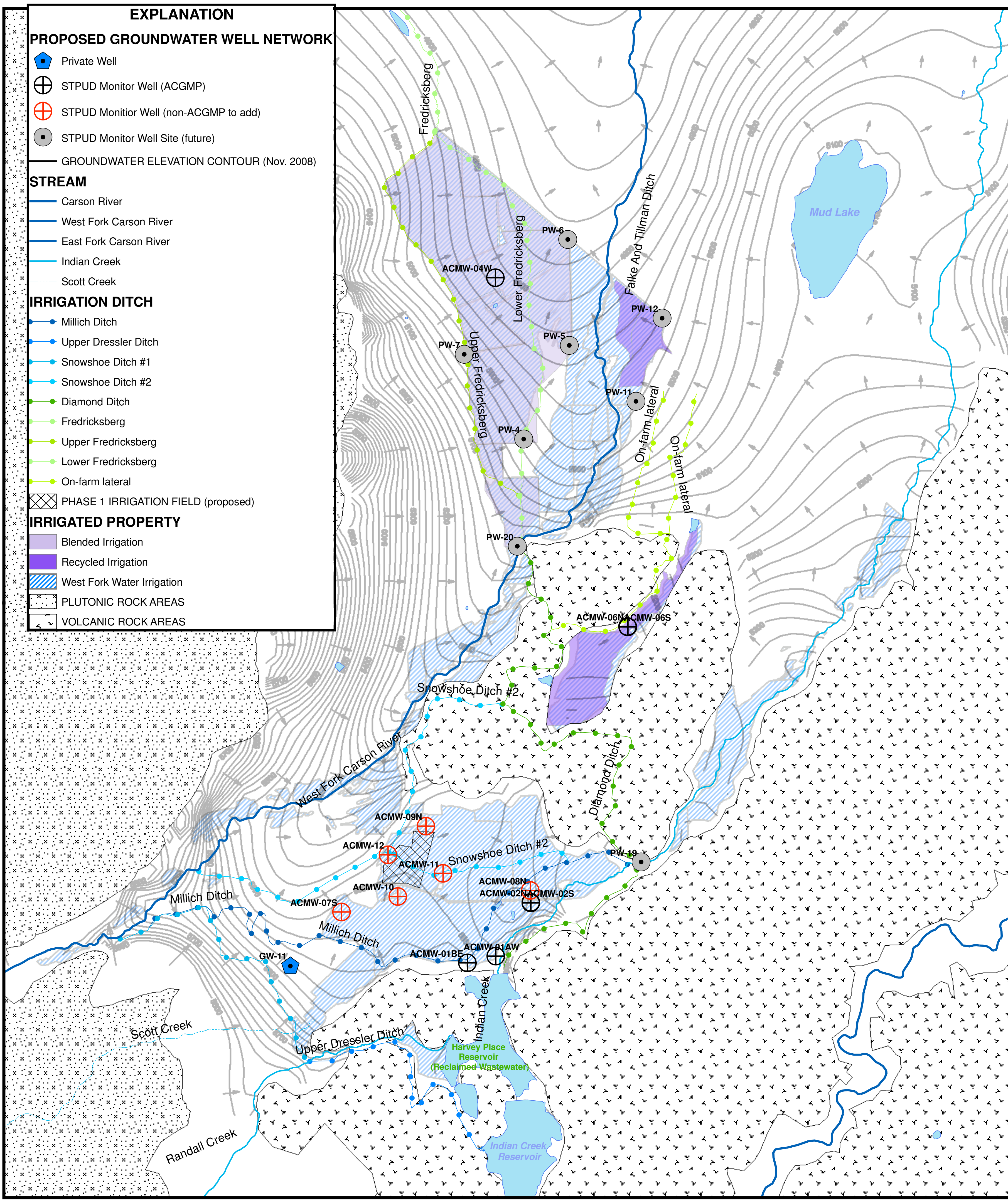

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Figure 7.
South Tahoe Public Utility District
Alpine County Groundwater Monitoring Program (ACGMP)
Recommended Groundwater Well Network

Appendix K - U.S. Fish and Wildlife Service Letter (Chapter 11, Table 11-2)

United States Department of the Interior
FISH AND WILDLIFE SERVICE
Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825

September 16, 2008

Document Number: 080916102854

Garth Alling
Hauge Brueck Associates LLC
Box 10291
Zephyr Cove, NV 89448

Subject: Species List for STPUD Recycled Water Facilities Master Plan EIR

Dear: Mr.

We are sending this official species list in response to your September 16, 2008 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 15, 2008.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division

Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Counties and/or U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 080916102854

Database Last Updated: January 31, 2008

Quad Lists

Listed Species

Fish

Oncorhynchus (=Salmo) clarki henshawi
Lahontan cutthroat trout (T)

Candidate Species

Amphibians

Bufo canorus
Yosemite toad (C)

Rana muscosa
mountain yellow-legged frog (C)

Mammals

Martes pennanti
fisher (C)

Quads Containing Listed, Proposed or Candidate Species:

MARKLEEVILLE (506A)

CARTERS STATION (521C)

MINDEN (522A)

WOODFORDS (522D)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.
(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.
Critical Habitat - Area essential to the conservation of a species.
(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
(C) *Candidate* - Candidate to become a proposed species.
(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online Inventory of Rare and Endangered Plants.

Surveying

Some of the species on your list may not be affected by your project. A trained biologist or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list.

For plant surveys, we recommend using the Guidelines for Conducting and Reporting Botanical Inventories. The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

> Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal consultation with the Service.

  During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.
- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

  Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our critical habitat page for maps.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. More info

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be December 15, 2008.

Appendix L - Calculation Assumptions, Methodology and Results (Chapter 13)

Appendix L - Air Pollutant Emissions Estimates

L.1 Construction Phase

The construction emissions inventory is consistent with the methodologies established by the California Climate Action Registry (CCAR). In addition to well-established emission factors for certain activities and emission estimates based on similar activities in other representative communities; the URBEMIS and EMFAC emissions estimation software programs were used, as recommended by the California Air Resources Board.

This inventory was prepared as a worst-case analysis. For example, it assumes that all emissions from the project are "new," in the sense that, absent the development of the project, these emissions would not occur. Given the global nature of GHG emissions, "new" global GHG emissions are those caused by economic growth and population growth (births); local infrastructure development projects accommodate such growth.

As an example of why these are worst-case emissions, these emissions are estimated assuming that there are no reductions in GHG-generating activities over time. This is clearly unlikely, and presents a conservative analysis, given the expected reductions in GHG emissions from most activities that will take place over the years due to future regulations, greater public awareness and the likely increasing costs of energy.

The following construction phase equipment utilization activity assumptions are based on best judgement of a reasonable representative worst case day for project facility excavation and construction activities. As stated below, it was assumed that a maximum of two sites would be under construction at the same time. For each site four pieces of heavy construction equipment were assumed to be operating simultaneously for most or all of the construction day. In actual practice it is unusual for heavy equipment of operate simultaneously and nearly continuously on relatively restricted project sites during construction, but the calculation were based on those assumptions to determine the highest reasonably attainable emissions rates. A representative assumption of 10 construction personnel at each site was assumed - again this is a reasonable number of personnel to operate the equipment, supervise, inspect, etc. the construction activity. While the exact commuting distance of each worker cannot be accurately known. it was assumed that each worker would drive his own vehicle an average of 20 miles in each direction for commuting purposes.

The overall duration of construction activity is not known at this time. Construction will likely take place in phases over a number of years and take varying periods of time as infrastructure is needed. To assume a total number of worst case construction days on which to base total project-related construction GHG emissions at this time would be unduly speculative.

L.1.1 Construction Equipment Daily Activity Assumptions:

- Two sites under construction simultaneously
- One water/haul truck (8 hours)
- One grader (6 hours)
- One rubber-tired dozer (6 hours)
- One tractor/loader/backhoe (7 hours)

- Ten construction workers at each site commuting in single-occupancy vehicles traveling 40 miles daily round trip

L.1.2 Calculation Tools:

- URBEMIS 2007 Version 9.2.4 for construction equipment emissions
- EMFAC2007 V2.3 Nov 1, 2006 or on road motor vehicle emissions

Table L-1

Estimated Construction Emissions: (pounds per summer day)

	ROG	NOX	CO	SO2	PM10*	PM2.5*	CO2
CONSTRUCTION EQUIPMENT	3.22	26.52	14.16	--	21.34	5.41	2,349.45
WORKER COMMUTES	1.14	1.96	17.29	0.02	2.76	0.54	1,579.38
TOTAL	**4.36**	**28.48**	**31.45**	**0.02**	**24.10**	**5.95**	**3928.83**

* PM emissions include both dust and exhaust emissions.

L.2 Operational Phase

The operational phase of the Master Plan Project is described in Section 2.12. The project includes includes two major features:

- Flood/Emergency Situations - The project includes forty-nine acres of temporary 6-foot containment berms (worst case scenario water level) holding 294 acre-feet of water. It is assumed that there will be an average one flood/emergency situation per year, which will require the use on a single pump operating for a total of 24 days to pump all worst-case scenario waters back to Harvey Place Reservoir.

- Central Point Pivot Systems - The project incorporates the NMP recommended maximum application rate of 66.75 inches per year. It is assumed that irrigation will be done from 5 central pivot systems 15 days per month for 8 months per year, or 5.57 acre-feet per year applied over a total of 120 days.

L.2.1 Operational Phase Equipment Daily Activity Assumptions:

- One water pump with 100 hp diesel engine operating continuously for 24 hours per day for a total of 24 days per year.

- Five electric-powered 25KW central pivot point irrigation systems each operating continuously for 24 hours per day for a total of 120 days per year per system, or a total of 600 operating days per year for five systems. The total electric use per day per system is therefore 600KWH or 3,000 KWH total daily for five systems. The total energy used during 600 total system operating days is 1,800,000 KWH or 1,800 MWH.

L.2.2 Calculation Tools:

- URBEMIS 2007 Version 9.2.4 for pump equipment emissions

- Greenhouse gas emissions (and sequestration) inventories are not available specifically for for the project region. Electricity is supplied to the project area by PG&E. As reported by PG&E (2007), the carbon dioxide emissions rate of PG&E-owned electric generation was 44 pounds per megawatt-hour (lbs/MWh), while the independently certified CO_2 emissions rate associated with the power sold by PG&E to its customers was 489 lbs/MWh. The national average carbon dioxide emissions rate for power generation was approximately 1,363 lbs/MWh and the California average CO_2 emissions rate was approximately 879 lbs/MWh, as shown in Table L-3.

Table L-2

Comparison of 2005 PG&E, California and U.S. Electricity Production Average Pounds of Carbon Dioxide Emissions per Megawatt Hour

PG&E Average	California Average	U.S. Average
489 lbs/MWh	879 lbs/MWh	1,363 lbs/MWh

Source: PG&E, 2007
California and U.S. rates based on U.S. Environmental Protection Agency eGRID Version 2.1 (updated April 2007 and based on 2004 data).

Total combined air pollutant emissions for the project operation phase, based on URBEMIS and PG&E emissions factors and calculation techniques, are shown in Table L-3.

Table L-3

Estimated Operational Emissions: (pounds per summer day)

	ROG	NOX	CO	SO2	PM10*	PM2.5*	CO2
WATER PUMP	3.37	21.18	11.31	--	1.68	1.55	1,672.12
CENTRAL PIVOT IRRIGATION SYSTEMS (5 TOTAL)	--	--	--	--	--	--	6.13
TOTAL	**3.37**	**21.18**	**11.31**	**--**	**1.68**	**1.55**	**1,678.25**

California and U.S. rates based on U.S. Environmental Protection Agency eGRID Version 2.1 (updated April 2007 and based on 2004 data).

* PM emissions include both dust and exhaust emissions.

Assuming therefore that a total of 1,800 MWH of electric energy is used by the five central pivot point systems during one calendar year, then the total yearly CO_2 emissions would be 440.1 tons (equivalent to 363.7 metric tons).

Appendix M - South Tahoe Public Utility District Recycled Water Facilities Master Plan EIR, Component 11 Migratory Bird Treaty Act Species

Appendix M - South Tahoe Public Utility District Recycled Water Facilities Master Plan EIR, Component 11 Migratory Bird Treaty Act Species

Blackbird, Brewer's, Euphagus cyanocephalus
Blackbird, Red-winged, Agelaius phoeniceus
Bluebird, Mountain, Sialia currucoides
Bushtit, Psaltriparus minimus
Chickadee, Mountain, Parus gambeli
Cowbird, Brown-headed, Molothrus ater
Creeper, Brown, Certhia Americana
Crow, American, Corvus brachyrhynchos
Dove, Mourning, Zenaida macroura
Finch, Cassin's, Carpodacus cassinii
Finch, House, Carpodacus mexicanus
Flicker, Northern, Colaptes auratus
Flycatcher, Dusky, Empidonax oberholseri
Flycatcher, Gray, Empidonax wrightii
Flycatcher, Hammond's, Empidonax hammondii
Flycatcher, Pacific-slope, Empidonax difficilis
Goshawk, Northern, Accipiter gentiles
Grosbeak, Pine, Pinicola enucleator
Hawk, Cooper's, Accipiter cooperii
Hawk, Red-tailed, Buteo jamaicensis
Hawk, Sharp-shinned, Accipiter striatus
Hummingbird, Rufous, Selasphorus rufus
Jay, Steller's, Cyanocitta stelleri
Junco, Dark-eyed, Junco hyemalis
Kestrel, American, Falco sparverius
Nutcracker, Clark's, Nucifraga Columbiana
Nuthatch, Pygmy, Sitta pygmaea
Nuthatch, Red-breasted, Sitta canadensis
Nuthatch, White-breasted, Sitta carolinensis
Owl, Great Horned, Bubo virginianus
Owl, Northern Saw-whet, Aegolius acadicus
Pigeon, Band-tailed, Columba fasciata
Poorwill, Common, Phalaenoptilus nuttallii
Pygmy-Owl, Northern, Glaucidium gnoma
Raven, Common, Corvus corax
Robin, American, Turdus migratorius
Sapsucker, Williamson's, Sphyrapicus thyroideus
Screech-Owl, Western, Otus kennicottii
Sparrow, Song, Melospiza melodia
Sparrow, White-crowned, Zonotrichia leucophrys
Swallow, Tree, Tachycineta bicolor
Swift, Vaux's, Chaetura vauxi
Tanager, Western, Piranga ludoviciana
Thrush, Hermit, Catharus guttatus
Towhee, Spotted, Pipilo maculates
Vireo, Warbling, Vireo gilvus
Warbler, Black-throated Gray, Dendroica nigrescens
Warbler, Hermit, Dendroica occidentalis

Warbler, Townsend's, Dendroica townsendi
Warbler, Yellow, Dendroica petechia
Warbler, Yellow-rumped, Dendroica coronata
Waxwing, Cedar, Bombycilla cedrorum
Wood-Pewee, Western, Contopus sordidulus
Woodpecker, Black-backed, Picoides arcticus
Downy, Picoides pubescens
Hairy, Picoides villosus
Pileated, Dryocopus pileatus
White-headed, Picoides albolarvatus
Wren, Winter, Troglodytes troglodytes

Appendix N - Component 11, 18, and 19 Project Level Environmental Analysis

Appendix N - Guide to Project Level Analysis

To assist the reader in understanding the project-level analysis completed as part of the EIR, this appendix provides a summary for Project Components 11, 18 and 19. These three Project Components comprise Master Plan Projects 1, 2, 11 and 12, which are detailed on pages 9-61 through 9-64 and 10-77 through 10-78 of the *South Tahoe Public Utility District Recycled Water Facilities Master Plan - November 2009* (Stantec 2009). Projects 1, 2, 11 and 12 are analyzed at the project -level because of the need for expedited implementation to resolve the issues of inadequacy with the existing On-Farm Emergency Disposal System (page 13-100, Stantec 2009).

N.1 Project Component Descriptions

N.1.1 Project Component 11 - Construct Irrigation Fields With Pumping Back to HPR

The following project description is on page 2-14 of section 2.6.2.

The District will construct seven irrigation fields, two to contain excess and emergency flows from HPR and five to irrigate with both fresh and recycled water. The two containment fields will be constructed so that the temporarily contained recycled water could be pumped back to HPR when desired and returned to the irrigation distribution system. A new pump station and associated pipeline will be required adjacent to the irrigated area to pump the water back to HPR. The remaining five fields will be irrigated with a central pivot irrigation system that will allow the use of both fresh and recycled water.

Recycled water and freshwater will be dedicated to maintain the fields during non-emergency periods. A levee will surround the containment fields to allow for its deliberate flooding. The volume of recycled water that could be temporarily contained in the fields during an emergency event will depend on the containment area and the height of the levee. A 50-acre field with a one-foot levee could contain over 16 million gallons, or slightly less than four days of discharge from the treatment plant at current flows. The other fields irrigated with central pivot systems will regulate the volume of water applied in accordance with the nutrient management plan. See sub-section 2.12.1 for project-level details.

The irrigation area will consist of two separately diked containment fields, 24 and 25 acres in size, and seven fields, ranging in size from 47 to 120 acres, irrigated by central pivot irrigation systems. Management of the water will comply with the nutrient management plan generated for the Diamond Valley Ranch.

N.1.2 Project Component 18 - Optimize Application Rate on Existing Irrigated Lands

The following project description is on page 2-16 of section 2.6.2.

Project Component 18 comprises Master Plan Project 11 (Prepare Nutrient Management Plans). Nutrient management plans or NMPs will be developed for all portions of the project area that receive recycled water exceeding a Total Nitrogen concentration of 3 mg/L, as required by the California State Water Resources Control Board's (State Board) Recycled Water Policy that was adopted February 2009. The site-specific application rates determined in the NMPs will modify the "effluent contracts" for the contracted irrigators as well as the permits issues by the Regional Water Quality Control Board -Lahontan Region (Lahontan).

The application rate for recycled water used for irrigation on permitted lands is based on the hydraulic loading rate and nutrient needs of the combinations of soil and crop types. Optimization of the application rate is necessary to protect groundwater and surface water resources from possible contamination by nitrogen or other nutrients present in the recycled water and to avoid generation of tailwater. Optimization ensures no losses other than those intended (that is, evapotranspiration and some percolation). The application rate is controlled by soil permeability and the nutrient requirements of the irrigated crops.

To develop a recycled water allocation system that maximizes the volume of applied recycled water and minimizes the threat to ground and surface waters, the soil and crop type in the irrigated areas will be assessed and mapped. These data will be used to develop recycled water application rates that meet crop nutrient needs as well as protect groundwater and surface water resources. The volume of recycled water that is currently applied exceeds the hydraulic loading rate of available permitted lands and results in runoff and tailwater discharges. Implementation of Project Component 18 will alter the application of recycled water on permitted lands.

N.1.3 Project Component 19 - Pursue the Permitting of More Land in Alpine County

The following project description is on page 2-16 of section 2.6.2

Project Component 19 comprises Master Plan Project 12 (Permitting of Recycled Water Use in Diamond Valley). The portion of the Diamond Valley Ranch that will contain the irrigation fields described under Project Component 11 above must be permitted to receive recycled water. Currently, the lands are irrigated utilizing the freshwater rights diverted from the West Fork of the Carson River and Indian Creek.

The ability to use recycled water as a source of irrigation water is an asset to agricultural production. Currently, 1,883 acres are permitted to receive recycled water in Alpine County. Of the 1,833 permitted acres, roughly 75 percent (1,411 acres) use recycled water for irrigation. This acreage is not adequate to receive the 5,200 AF/yr of recycled water currently generated, and less than the 6,400 AF/yr estimated to be generated by the year 2020. Development or other changes to non-agricultural land use in areas currently receiving recycled water will likely result in the loss of permitted acreage. Additional lands will need to be permitted for the application of recycled water if other alternative recycled water uses are not implemented.

N.2 Project-Level (Current Projects) Descriptions

Master Plan Projects 1, 2, 11 and 12 are prioritized for expedited implementation (within the next 5-8 years) to resolve the issues of inadequacy with the On-Farm emergency disposal system (page 13-100, Stantec 2008). Project Components 11, 18 and 19 comprise Master Plan projects 1, 2, 11 and 12, the current projects that require project-level analysis in accordance with CEQA guidelines. The following project-level descriptions are from pages 2-41 through 2-45 of section 2.12.

N.2.1 Master Plan Project 1 – Recycled Water Irrigation Fields on Diamond Valley Ranch and Master Plan Project 2 – HPR Bypass System Pipelines and Ditches

N.2.1.1 Master Plan Project 1

Project Components 11 and 19 will be implemented as part of Master Plan Project 1, Recycled Water Irrigation Fields on Diamond Valley Ranch. Project Component 11 constructs irrigation fields with pumping back to Harvey Place Reservoir and Project Component 19 pursues the permitting of more land in Alpine County to receive recycled water. With completion of Project 1, an additional 904 acres of direct land application of recycled water becomes possible. The irrigation fields will normally be used for surface and aerial irrigation of alfalfa or native pasture grasses as identified in the Diamond Valley Ranch Nutrient Management Plan (Appendix F). Figure 2-6 shows the location of the irrigation fields within the project area. A total of seven irrigation fields are proposed. Five of the seven irrigation fields, approximately 393 acres, will be central pivot irrigation fields. Two other two fields will serve 49 acres of temporary containment area. The remaining approximately 511 acres of water-righted lands will continue to be flood irrigated with fresh water.

An evaluation of the existing recycled water emergency containment facility (On-Farm) determined the need for a new facility that can be utilized in a variety of scenarios and hydrologic conditions. Two of the seven irrigation fields will also function as temporary containment fields or basins. For temporary containment, the impoundment of water could be between one to 60 days in duration. Based on the District's last 20 years of application history, the use of these containment basins would not have been necessary under normal operations, but the January 1997 flood event presented a volume of recycled water that could have resulted in non-compliance with Lahontan water discharge requirements (WDRs) because of inadequate system capacities. Construction of temporary containment will provide the District flexibility to better respond to future temporary containment situations, which generally will be a flood event.

Five of the seven fields will be irrigated with central pivot irrigation and will vary in size from 47 acres to 120 acres. Each central pivot irrigation field is composed of a central hub where the pivot assembly is connected to the irrigation spans. The spans are composed of several segments of pipe joined together and supported by trusses mounted on wheeled towers with sprinklers positioned along its length. The water source is connected to the central hub of the irrigation system thereby allowing the spans to rotate around the pivot point administering the water for irrigation. Different nozzles are available for the controlled release of the water application/irrigation. Nozzle types vary from aerial spray, rotary sprinkler head to drip systems. Initially, the freshwater irrigation will be used to irrigate the existing native grasses present within the Diamond Valley Ranch.

In order to irrigate the central pivot irrigation fields with freshwater, a new pipeline will be required to be installed from the existing freshwater pipeline outfall from ICR located below the Harvey Place Dam, or from the existing pond located behind and west of the ranch house. The pipeline will then be connected to the five central pivot hubs as shown on Figure 2-6. Irrigation of the fields with recycled water will require additional pipeline connections from the proposed HPR bypass pipeline as described below. Alfalfa production will be introduced during recycled water application within the central pivot irrigation fields (see Phase 1B below). Use of the central pivot system on the five irrigation fields will allow for better recovery and management of tailwater. Figure 2-7 depicts the slight relocation and reconfiguration of fields 6 and 7. The fields were reconfigured to protect a cultural resource site identified during site-specific cultural resource investigations.

Two of the seven irrigation fields will be surface irrigated with fresh and recycled waters and will also serve as temporary containment fields for recycled water during times of emergency. Field 1 is 24 acres and Field 2 is 25 acres in size. The fields will be developed on the Diamond Valley Ranch adjacent to Diamond Valley Road. The irrigation fields will slope less than 2 percent~~%~~ to accommodate surface irrigation practices and ~~to~~ will have a common sump pump to facilitate draining and water management. The irrigation area and locations are illustrated in Figure 2-5. The irrigation area consists of two separately diked fields. The fields will be surrounded by a six-foot high berm and diked. Field One will impound 74.6 AF, while Field Two will impound 79.3 AF. Pasture grass or alfalfa will be grown to uptake and metabolize nutrients, salts and water.

Recycled and freshwater water will be dedicated to maintaining the fields during non-emergency periods. The six foot high berm will surround the irrigated area to allow for surface irrigation. The volume of recycled water that can be temporarily contained depends on the containment area and the height of the levee. A 49-acre field with a six-foot levee can contain close to 96 million gallons or 24 days of discharge from the WWTP at current flows.

Project 1 allows for surface and aerial irrigation that can function in all seasons. Initially the fields will be irrigated with existing freshwater rights diverted from the West Fork of the Carson River and Indian Creek. Recycled water will be used for irrigation as demand for application increases. In practice, Fields 1 and 2 will only hold recycled water in times of temporary containment. During normal operations, the fields provides alternative uses such as alfalfa and pasture grass production. To move temporarily contained water from Fields 1 and 2 to the outlet of HPR for redistribution, a pump-back system is necessary (see Master Plan Project 2).

A Nutrient Management Plan (NMP – Appendix F) was prepared for the Diamond Valley Ranch. The recommended crop types are alfalfa and pasture grass and the application rates are 5.99 and 3.03 AF/yr of surface irrigation, respectively. Areas disturbed by trenching will be revegetated as outlined in standard practice SP-8, Repair Road Damage and Revegetate Temporarily Disturbed Sites.

The land is currently not permitted to receive recycled water. Recycled water direct land application permits from Lahontan are required prior to construction of the irrigation fields. Restrictions on the duration of storage may be imposed for groundwater protection, which will affect the required pumping capacity of the irrigation fields pump back station. Irrigation areas will require signage and public notification of the application of recycled water.

Implementation of Project 1 will enable the District to address the need for adequate temporary containment facilities for recycled water and increased operational flexibility for recycled water systems.

Figure N.1 (same as Figure 2.7) Recycled Water Irrigation Fields Study Area (11X17)

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N.2.1.2 Master Plan Project 2

Master Plan Project 2, HPR Bypass System Pipelines and Ditches, will also implement Project Component 11. This part of Project Component 11 will construct pipelines for pumping impounded recycled water back to HPR. The District will construct irrigation fields (Fields 1 and 2 discussed above) so that the temporarily contained recycled water can be pumped back to HPR or the Diamond Ditch and returned to the irrigation distribution system. A new pump station and associated pipeline will be constructed adjacent to the irrigated area in order to pump the water back to HPR.

One of the concerns of the existing recycled water C-line conveyance system is the inability to bypass recycled flows around HPR for maintenance or temporary containment purposes. The new pipelines for the HPR Bypass System include: the HPR Bypass Pipeline, the District Pasture Pipeline, and the HPR/ Irrigation Field Connector Pipeline. The HPR Bypass Pipeline will connect to C-Line near the District Pasture at the Millich Ditch crossing and extend to the Irrigation Fields. The HPR Bypass Pipeline will connect to the HPR through the Irrigation Field Connector pipeline to allow for a secondary method of routing flows to HPR or Diamond Ditch.

The general positioning of the three feasible pipeline alignments A, B and C are illustrated in Figure 2-5. Temporary pumps will be installed at the eastern end of the fields. The pipeline installed under alignments A, B, or C will be a pressure-rated, gravity flow, 18-inch diameter pipe to match the existing C-Line and will be buried to a depth of at least 3.5 feet. Pipeline alignment A is 10,180 linear feet and will required 5,279 cubic yards ($yds^{3)}$ of excavation. Alignment B is 9,050 linear feet and will require 4,693 yds^3 of excavation. Alignment C is 9,645 linear feet and will require 5,001 yds^3 of excavation. The temporary containment fields will be surrounded by a six-foot high berm and diked.

The HPR/Irrigation Fields Connector pipeline is approximately 2,100 feet in length and is planned as 24-inch diameter bidirectional pipeline to connect to the Diamond Valley Ranch Pipeline, an existing 24-inch steel pipeline that provides a method of directing flow from the HPR outlet facility to Diamond Ditch. From the outlet facility recycled water and freshwater can be directed to the Diamond Ditch and to Indian Creek, respectively. The HPR Bypass Pipeline working in conjunction with the HPR/Irrigation Fields Connector, the existing Diamond Valley Ranch Pipeline, and the HPR Outlet Facility will allow recycled water flow to completely bypass HPR and flow into Diamond Ditch. Through implementation of Master Plan Project 2, the District will provide for adequate temporary containment needs and sufficient operational control of the distribution systems.

N.2.1.3 Project Phasing

Master Plan Projects 1 and 2 will be implemented in three phases: Phase 1A, Phase 1B, and Phase 2. Phase 1A (Master Plan Project 1) will i install the five central pivot irrigation sites, along with the freshwater pipeline connections. Phase 1B (Master Plan Project 1) will install the HPR bypass pipeline and connect pipelines to the central pivot irrigation sites to allow for application of recycled water. Phase 2 (remaining portions of Master Plan Projects 1 and 2) will construct the two i temporary containment fields (Field 1 and Field 2) and connect the pipeline to the HPR bypass pipeline to allow for pumping back to HPR.

N.2.2 Master Plan Project 11 – Prepare Nutrient Management Plans

Master Plan Project 11 will implement nutrient management plans that will be developed for all portions of the project area receiving recycled water exceeding Total Nitrogen concentrations of 3 mg/L, as required by the California State Water Resources Control Board's (State Board) Recycled Water Policy (adopted February 2009). Master Plan Project 11 is accomplished through implementation of Project Component 18, Optimize Application Rate on Existing Irrigated Lands. NMPs will be developed in accordance with requirements set forth in the State of California Recycled Water Policy. The NMP recycled water irrigation application rate information will be used to modify the "effluent contract" for each contract irrigator and in turn the Regional Water Quality Control Board - Lahontan Region (Lahontan) permits. The application rate for recycled water used for irrigation on existing permitted lands is based on topography, hydraulic loading rate and nutrient needs of the various combinations of soil and crop types. Optimization of the application rate is required to protect groundwater and surface water resources in the region from possible contamination by nitrogen or other nutrients and salts present in the recycled water. Optimization of application rates also helps avoid generation of tailwater. This optimization ensures there are no loses other than those intended (that is, evapotranspiration and some percolation). The application rate is controlled by soil permeability and the nutrient requirements of the irrigated crops.

To develop a recycled water allocation system that will both maximize the volume of applied recycled water and minimize the threat to groundwater and surface water, the soil and crop types in the irrigated areas must be assessed and mapped. These data are used to develop recycled water application rates that meet crop nutrient needs and protect groundwater and surface water resources. The application rates are detailed in Appendix K of the Master Plan. The volume of recycled water that is currently applied exceeds the hydraulic loading rate of available permitted lands resulting in runoff and tailwater discharges. Implementation of this component will likely result in a reduction in the volume of recycled water that is applied. A groundwater monitoring system to detect nitrogen in the shallow groundwater during temporary containment may be necessary. Implementation of Master Plan Project 11 allows the District to address the potential for nitrate accumulation in groundwater through regulating recycled water application rates.

Wood Rodgers completed the Draft NMP for the Diamond Valley Ranch portion of the project area in March 2009. The purpose of the Draft NMP is to determined the best combination of crop and irrigation methods to maximize recycled water reuse and nutrient uptake while also protecting groundwater and surface water resources. Wood Rodgers initial calculations consider crop consumptive use or irrigation demand, crop capacity for nitrogen uptake and soil permeability to determine the maximum volume of recycled water that can be applied within the Diamond Valley Ranch. The results of the analyses determined that growing alfalfa with surface (flood/furrow) irrigation will maximize recycled water reuse and nutrient uptake. Growing alfalfa with spray irrigation methods will yield a similar application rate with reduced risk of tailwater.

The technical report addressing Assimilative Capacity of the Diamond Valley Ranch is found in Appendix 4 of the NMP. The complete NMP is included in this EIR as Appendix F. Lahontan defines assimilative capacity as "the ability of a [ground] water body to receive and accommodate natural and anthropogenic sources (non-point and point sources), while maintaining water quality standards that are protective of beneficial uses of the water resource"(Lahontan Assimilative Staff Report).

The initially calculated maximum recycled water application rate is 71.89 in/yr, which equates to 5.99 AF/yr for 904 irrigable acres or a total flow of 1,765 Mgal/year or 4.8 MGD. This maximum allowable application rate exceeds the current average discharge from the Districts WWTP. The crop requirements as well as the District's objective to maximize recycled water for irrigation purposes can be met given the site-conditions on the Diamond Valley Ranch portion of the project area. Tailwater management controls are necessary and are outlined in Section 7.0 of the Diamond Valley Ranch NMP and included as part of SP-33, Surface and Ground Water Protection Program.

Based on the assumption that the District intends to reuse the entire annual volume of recycled water, the recommended application rate calculated for growing alfalfa with surface irrigation is 66.80 in/yr or 5.57 AF/yr for the 904 irrigable acres. If the District chooses to be more conservative, aerial irrigation methods for growing alfalfa with spray irrigation methods will be a maximum application rate of 66.75 in/yr or 5.57 AF/yr with minimal resulting tailwater.

Grazing is not recommended under a recycled water regime because of nutrient inputs from manure. As stated in the Grazing Options Tech Memo of the NMP: "Under a treated effluent irrigation regime, irrigating fifteen days per month for eight months, grass hay pasture, with no livestock grazing the [Diamond Valley Ranch] results in an estimated deficit of all major nutrients Nitrogen, Phosphorus and Potassium" (page 6).

N.2.3 Master Plan Project 12 – Permitting for Recycled Water Use in Diamond Valley

Master Plan Project 12 requires the implementation of Project Component 19, the permitting of more land in Alpine County, mainly for use of recycled water in the Diamond Valley. The Irrigation Fields described under Master Plan Project 1 must be permitted to receive recycled water both as irrigation application and as recycled water temporary containment. Implementation of Master Plan Project 12 allows the District to ensure adequate land for future recycled water application even if residential development continues to encroach and if application contracts expire.

The ability to use recycled water as a source of irrigation water is an asset to any production system. Currently, 1,883 acres are permitted to receive recycled water in Alpine County. Of the 1,833 permitted acres, roughly 75 percent (1,411 acres) use recycled water for irrigation. This amount of acreage is not adequate to receive the 5,200 AF/yr of recycled water that is currently generated, much less the 6,498 AF/yr estimated to be generated by the year 2028. Development in areas currently receiving recycled water will likely result in the loss of permitted acreage. Additional lands will need to be permitted for the application of recycled water if other alternative recycled water uses are not implemented.

N.3 Summary of Project-Level Analysis

The following Significant Mitigable impacts and Significant Unavoidable impacts that apply to Project Components 11, 18 and 19 are extracted from the overall analysis completed in environmental resource chapters 4 through 18 in sub-section Environmental Consequences (Impacts) and Recommended Mitigation. Determinations of No Impact or Less than significant Impact are not presented.

Impact: **GEO-2. Will Project Components be subject to ground rupture due to location near a surface trace of an active fault? (Page 6-15 of section 6.6.2)**

Analysis: *Significant Impact; Components 11*

Surface fault rupture associated with seismic activity will result in pipeline damage and/or rupture. Pipe rupture will result in release of recycled water and will cause substantial erosion at the discharge point. Damage to pipelines occurs throughout eastern California and western Nevada in the event of a large earthquake. The existing system as well as components proposed by the Project will be vulnerable to damage. Damage to pipelines is an unavoidable consequence of construction and operation of a recycled water system in a seismically active area.

Temporary containment Component 11 is located on three Alquist-Priolo earthquake fault zones, and crosses the end of a fourth. Surface fault rupture associated with seismic activity could cause a breach in the substrate of the irrigation field or overtopping of the embankment. The impoundments will be designed with additional freeboard to reduce the risk of overtopping in the event of a seismic event. As proposed and illustrated in Figure 2-5, Field 1 and Field 2 will be sized at 24 and 25 acres, respectively. The fields will be surrounded by a six-foot high berm and diked. Implementation of Component 11 is subject to standard practice SP-21, Temporary Containment and Impoundment Siting and Design. Impoundments larger than 50 acre-feet or with embankments more than 25 feet tall are required to meet design requirements of the California Division of Safety of Dams. District temporary containment basins will be sized much smaller than these dimensions.

An off-site alternative for the temporary containment basins and fields was considered but rejected from further analysis. The District considered off-site temporary containment areas during the Master Plan development process and eliminated the Gansberg property, Ace Hereford property and Swake property from further consideration. Criteria for the temporary containment site include:

- Proximity to Recycled Water Inflow Pipeline to Reservoir;
- Ability to receive waters from Harvey Place Reservoir; and
- Suitability of Soils and terrain.

The analysis of off-site alternatives prepared by Matthew Setty in a series of memorandums dated March 2001 is summarized in Chapter 2, Section 2.7.

The potential for damage to facilities is reduced through implementation of SP-17, Pipeline Design Features in Active Fault Zones. The District will design pipelines crossing active faults with isolation valves. Automatic valves will be used whenever feasible. Pipelines will be sited outside of fault zones whenever possible. During final design, engineers will implement standard engineering design features to reduce the effects of a potential pipeline break, but cannot prevent a pipe rupture in the event of a seismic event. The impact remains significant.

Mitigation: *No additional mitigation is possible. Component 11*

After Mitigation: *Significant Impact; Component 11*

No mitigation measures are available for recommendation above and beyond designing and engineering facilities to withstand ground rupture within or in the vicinity of the project area. The situation remains that the faults that run through the project area are considered active and pose the potential to cause ground rupture.

Impact: GW-1. Will the Project Components degrade groundwater quality in the Carson, Wade and Diamond Valleys? (Page 7-19 of section 7.6.2)

Analysis: *Significant Impact; Component 11*

Degradation of groundwater quality will occur if the migration of recycled water into groundwater results from operations of the irrigation and temporary containment fields of Component 11. Implementation of Component 11 will increase access to and application of recycled water and/or irrigation of additional lands with recycled water that contains nutrients in concentrations above those measured in local groundwater sources. If application rates exceed site-specific hydraulic loading levels, recycled water will interact with shallow groundwater sources and groundwater quality could be degraded.

Through implementation of Component 11, Construct irrigation fields with pumping back to HPR, an additional 904 acres of direct land application of recycled water will be possible. The irrigation fields will normally be used for surface and aerial irrigation of alfalfa or native pasture grasses, the crops recommended in the Diamond Valley NMP (see Appendix F). Seven irrigation fields are proposed and are illustrated in Figure 2-6. Five of the seven fields will be central pivot irrigation fields (approximately 334 acres) and two of the fields will be for temporary containment of recycled water (49 acres). The remaining water righted lands will continue to be flood irrigated with freshwater. Application of freshwater is discussed in the analysis for NP-1 and will not result in degradation to groundwater quality.

Component 11 will first (project Phase 1A) construct five irrigation fields, ranging in size from 47 to 120 acres and install central pivot spray systems for irrigation with freshwater. The HPR by-pass system and connecting pipelines to the central pivot irrigation sites will be installed in Phase 1B, which will allow for irrigation with recycled water. Over time the irrigation system will apply recycled water or a blend of fresh and recycled water. Central pivot systems allow for optimized water application and metering of application rates.

The soils in the project area are reported (Wood Rodgers 2008) to be loamy sand, sandy loam and sand, in order of dominance. These soil textures are very conducive to sprinkler or flood/furrow irrigation practices. There was one occurrence of clay loam, which is a layer or accumulation of clay; the clay content is not high enough to meet the criteria as a restrictive layer for infiltration of irrigation water. The misapplication of recycled water will result in the migration of recycled water into shallow groundwater sources and the degradation of groundwater quality.

The Diamond Valley Ranch is currently grazed in the spring through the early fall by approximately 1,000 head of cattle. The Grazing Options Technical Memorandum attached in Appendix F as part of the Diamond Valley Ranch NMP states that the continuation of grazing after the transition to a recycled water irrigation regime will result in a small excess of Nitrogen (630 lb/yr) when considering Nitrogen available in recycled water and manure input measured against crop uptake. The modeled scenario of recycled water irrigation measures the relative impacts of flood irrigation methods for pasture grass and irrigating 15 days per month for eight months of the year to determine relative impacts. Nitrogen loading is notably small considering that current District effluent concentrations can deliver close to 661 pounds of Nitrogen a day. The impact is significant over time, and could contribute to cumulative impacts to groundwater quality.

Phase 2 will construct Field 1 (24 acres) and Field 2 (25 acres) with six foot high berms to allow for the temporary containment of up to 96 million gallons or 24 days of discharge from the WWTP during times of emergency, typically flooding events similar to the January 1997 precipitation event. The HPR bypass system will allow for the pumping of temporarily contained waters back to HPR or to the Diamond Ditch during the period of April 1 through October 15. Increased inputs of recycled water into groundwater could result from the unlined containment fields depending on the timing and duration of containment, altering groundwater levels and potentially increasing Nitrate-Nitrogen concentrations in groundwater if mixing occurs in the unsaturated zone of shallow groundwater sources. Containment of recycled water could be between one and 60 days in duration under a worst-case scenario, according to the District. Based on the District's last 20 years of application history, the emergency use of these temporary containment fields would not have been necessary and thus the future need is inferred to be low.

Project-level investigations, as detailed in section 7.2.5, were completed in November and December of 2008. The Farr West Engineering report is attached in Appendix I-b and presents project-specific conditions and recommendations for Component 11. Water level data indicate that low to virtually impermeable material separates multiple permeable units. The study concludes that the northern portion of Diamond Valley Ranch could receive recycled water for irrigation and temporary containment with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained and poorly sorted material. Movement of recycled water from the shallow alluvial zone to the lower semi-confined and confined alluvial zones are expected to be minimal because of the interbedded alluvial and morainal deposits that form confining layers that will retard infiltration.

However, transmissive losses from the temporary containment fields could occur under the extreme conditions that would warrant the use of the temporary containment fields, and significant impacts to groundwater quality could result if containment duration is prolonged The combination of early spring soil conditions and an emergency event occurring prior to April 1st, the date on which recycled water is permitted to be released from HPR, represents the worst-case scenario for temporary containment. To reduce potential impacts to groundwater resources to a level of less than significant, determination of the maximum duration of containment that site conditions can support is necessary.

Mitigation: **SP-33. Surface and Ground Water Protection Plan**

GW-1A. Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water

GW-1B. Do Not Exceed the Maximum Duration of Temporary Containment (100 Days)

After Mitigation: *Less than Significant Impact; Component 11*

Implementation of standard practice SP-33 and recommended mitigation measures GW-1A and GW-1B will reduce potential impacts to groundwater quality from Component 11 to a level of less than significant.

The District will follow the Surface and Ground Water Protection Plan (SP-33) for continued characterization of groundwater quality for the project area. Should groundwater Nitrate-Nitrogen concentrations approach 7 mg/L, the proposed action concentration level, the District will amend or suspend irrigation with recycled water as appropriate to reduce impacts to groundwater.

In order to determine the hydraulic loading based on nitrogen for the Diamond Valley Ranch NMP,, Wood Rodgers consulted “WTS-1B: General Criteria for Preparing an Effluent Management Plan,” prepared by the Nevada Department of Environmental Protection (NDEP). Wood Rodgers set a conservative “red-flag” threshold level of 7 mg/L for C_p, as is common practice in developing a Nevada Effluent Management Plan (EMP). This was done to insure that the receiving groundwater resource will not be degraded to a point where it is no longer useable (please refer to the Appendix F, Assimilation Capacity-Technical Report 4). The District understands that Lahontan and the State Board can impose a more stringent trigger value if an additional factor of safety is desired.

Recommended mitigation measure GW-1A requires an amendment to the grazing regime and/or manure management to reduce Nitrogen loading if recycled water is used for irrigation. In lieu of amending the grazing timeframes, crop type, and manure management necessary for a nutrient neutral grazing regime, the District will commit to removing cattle from portions of the Diamond Valley Ranch when irrigating with recycled water. The removal of cattle during a recycled water irrigation regime is determined to result in deficiencies in the "whole ranch nutrient balance" for Phosphorus, Potassium, and Nitrogen, which assures the protection of groundwater resources. Balancing Nitrogen inputs with crop uptake, manure inputs will reduce impacts to groundwater quality to a level of less than significant.

Under recommended mitigation measure GW-1B, 100 days is the maximum duration of impoundment of recycled waters that will meet the needs of temporary containment situations without creating impacts to groundwater quality. The investigation of the northern Diamond Valley Ranch portion of the project area, which is the proposed location for irrigation fields and temporary containment suggests that shallow confined layers will retard infiltration from the uppermost portion of the water tables into lower water bearing zones (Farr West Engineering 2009). The study concludes that the northern portion of Diamond Valley Ranch could receive recycled water for irrigation and temporary containment with low infiltration rates into the upper most portion of the shallow alluvial zone because of the generally fine-grained poorly sorted material.

A containment duration of 100 days will meet the needs of the District to temporarily contain up to 96 million gallons of recycled water exported from the WWTP during an emergency situation while protecting groundwater quality of the water bearing unit. The District worked with Farr West Engineering to predict concentrations of mixed waters during a worst case scenario of 100 days of containment during saturated soil conditions, which is typically late May through late July.

A standard one dimensional mass flux equation was used to predict potential groundwater impacts from temporary containment of recycled water of a concentration of 1.53 mg/L of Nitrate-Nitrogen, which is the median concentration measured in the recycled water exported from the WWTP over the previous 20 months. The scenario predicts a resultant Nitrate-Nitrogen concentration of 2.16 mg/L, should mixing occur. This concentration is well below the proposed action level of 7.0 mg/L and the State of California maximum drinking water level of 10.0 mg/L.

An adequate depth to groundwater separating the unlined bottoms of the containment fields from the unsaturated zone of the water table will assure that groundwater quality is protected during times of temporary containment and that potential impacts are reduced to a level of less than significant. This depth of separation and minimized mixing of recycled waters with groundwater will be maintained by restricting the duration of containment to not more than 100 days. Continued groundwater monitoring (SP-33) is necessary to assure groundwater protections and that the District can respond promptly to changes in site conditions.

Analysis: *Significant Impact; Component 19* (Page 7-25 of section 7.6.2)

A number of the Project Components could result in migration of recycled water into groundwater, which could adversely affect groundwater quality. Implementation of Project Component 19 will increase access to and application of recycled water and/or irrigation of additional lands with recycled water that contains nutrients in concentrations above those measured in local groundwater sources. If application rates exceed site-specific hydraulic loading levels, recycled water will interact with shallow groundwater sources and groundwater quality could be degraded. Application component 19 will construct infrastructure for irrigation and application of recycled waters.

SP-33. Surface and Ground Water Protection Plan

GW-1A. Remove Cattle Grazing from Portions of the Diamond Valley Ranch Irrigated with Recycled Water

After Mitigation: *Less than Significant Impact; Component 19*

Component 19 will impact the Diamond Valley Ranch portion of the project area through application of recycled water. The District worked with Wood Rodgers, Inc. to develop a NMP specific to site conditions of the Diamond Valley Ranch and in fulfillment of the State Board's forthcoming Recycled Water Policy. Potential impacts to groundwater quality in the Diamond Valley will reduced to a level of less than significant through adherence to the application rates and volumes calculated for these sites along with implementation of surface and groundwater protection measures and monitoring outlined in the NMP and SP-33. Component 19 pursues permitting of more land in Alpine County. Maximum application rates and volumes recommended for this Project Component is discussed below.

The Diamond Valley Ranch NMP is developed primarily for use by the re-user and secondarily as a reporting mechanism for Lahontan. The purpose of the NMP is to provide guidance for irrigating with recycled water as listed:

- Provide a description of the recycled water delivery system and ancillary system components to inform responsible personnel of the system operation and capabilities;
- Identify responsibilities of the permittee/operator on the operation, maintenance and management of the recycled water reuse on the permitted site;
- Instruct system operators in the purpose and intended operation of components within the irrigation system under normal operating conditions and during emergency conditions, including procedures for emergency response and notification; and
- Annual monitoring and reporting requirements.

Wood Rodgers determined the area of potentially irrigable lands using recycled water on Diamond Valley Ranch as 904 acres. The irrigable acres are delineated in Figure 2 of Appendix F. Areas that are currently irrigated with fresh water and/or have been irrigated historically were considered. Protection of surface water and groundwater quality are incorporated through 25-foot setbacks from the District property lines along Diamond Valley Road, from the center line of irrigation ditches, and from the edge of stream courses. Areas of high groundwater are identified based upon field visits, aerial photography, the results of August 2008 soil sampling and the District's groundwater monitoring data.

The maximum recycled water application rate is calculated at 71.89 inches per year (in/yr), which equates to 5.99 AF/yr for the 904 irrigable acres or a total flow of 1,765 million gallons per year (Mgal/yr) or 4.8 MGD. As stated in the Executive Summary of the Diamond Valley Ranch NMP (Appendix F, p.i), this is the maximum allowable application rate that will meet the crop requirements for alfalfa as well as the District's objective to use the maximum recycled water for irrigation purposes. This application rate currently exceeds the District's average yearly daily flow of 4.0 MGD or 1460 Mgal/yr, which equates 4.95 acre-feet for irrigation each year with no net annual storage in HPR. This average yearly daily flow is reported to Lahontan in quarterly monitoring and annual monitoring reports. This total water volume is then used as the starting point to calculate the total available amount of recycled water that can be applied each month and to develop the Nitrogen balance for maximum assimilative capacity and uptake.

The recommended application rate calculated for growing alfalfa (recommended crop type) with surface irrigation is 66.80 in/yr or 5.99 acre-feet/acre for the 904 irrigable acres. This application rate is very close to the maximum allowable application rate for growing alfalfa with spray irrigation. To be on the conservative side, the District can select an aerial irrigation method for growing alfalfa with spray irrigation, with a maximum application rate of 66.75 in/yr or 5.57 acre-feet/acre with minimal resulting tailwater (reduced surface water impacts as discussed in Chapter 8. Chapter 3.0 of the Diamond Valley Ranch NMP, Recycled Water Irrigation Planning, presents the foundation for evaluating the hydraulic loading levels.

Currently the Diamond Valley Ranch is grazed from late spring through early fall by approximately 1000 head of cattle. Livestock grazing removes nutrient from the project area through harvesting of crop while also providing nutrient input in the form of manure to the system. As stated in the NMP, the level of grazing that is occurring is moderate, dispersed and managed based on available feed. No one portion of the Diamond Valley Ranch study area (as analyzed in the NMP) will be impacted by the production of manure and associated input of nutrients under a freshwater regime. Under a recycled water irrigation regime a small excess of Nitrogen will become available. As discussed above for the analysis of component 11, to continue cattle grazing in the Diamond Valley Ranch under a recycled water irrigation regime, the carrying capacity of the crop must be determined and livestock use be limited to a moderate level on a rotation system (recommended mitigation measure GW-1A)

To reduce potential impacts to groundwater to a level of less than significant, under recommended mitigation measure GW-1A, the District will discontinue cattle grazing under a recycled water irrigation regime. The removal of cattle on the portions of the project area that are irrigated with recycled water will result in a deficit for Phosphorus, Nitrogen and Potassium. The calculations for the “whole ranch nutrient balance” under a recycled water irrigation regime including and excluding inputs from manure are detailed in Grazing Options tech Memo of Appendix F.

The monitoring program implemented under standard practice SP-33 will offer concrete responses when baseline nutrient and salt concentrations from groundwater monitoring wells show degradation of groundwater quality attributable to the recycled water program. Chapter 8.0 of the Diamond Valley NMP outlines monitoring and reporting requirements, including: recycled water volumes; recycled water quality; groundwater quality; Nitrogen balances; standard reporting procedures; emergency reporting; monitoring wells; recycled water sampling; flow monitoring; soils; and vegetation. The plan includes measures to curtail recycled water flows onto the project area either temporarily or permanently, and reduce the impacts to groundwater quality from recycled water application to a less than significant level.

Impact: **BIO-1. Will the Project Components cause loss of individuals or occupied habitat of endangered, threatened, or rare fish, wildlife or plant species directly or indirectly? (Page 11-37 of section 11.6.2)**

Analysis: *Significant Impact; Components 11, 19*

Construction of facilities in native rangeland could affect species of concern, including pygmy rabbit, northern sagebrush lizard, Carson Valley wood nymph, Carson Valley sandhill skipper, Webber's ivesia, and three-bracted onion. The following components have the potential for significant effects on species of concern.

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will result in conversion of rangeland and installation of two temporary containment basins on the Diamond Valley Ranch. Suitable habitat for pygmy rabbits exists in the area of the irrigation fields as well as the alternative HPR bypass pipelines. These areas were surveyed to protocol in January of 2009. No evidence of pygmy rabbits was located during the survey. The area was subsequently surveyed on May 29 for the presence of migratory bird nests and raptor nests. No nesting birds were located within the project area. No other suitable habitat for sensitive species exists in the proposed location of the irrigation fields, temporary containment basins or alternative bypass pipeline alignments.

Component 19 - Pursue Permitting of More Land in Alpine County, may result in conversion of existing pastureland or native rangeland to irrigated pasture which may cause loss of individuals or occupied habitat of sensitive species. Construction of irrigated pasture may create new habitat for sensitive species.

Mitigation: **BIO-1. Conduct Biological Resource Assessments**

SP-25. Sensitive Resource Program

After Mitigation: *Less than Significant Impact; Components 11, 19*

The proposed mitigation will allow the District to avoid or protect biological resources, it cannot be anticipated that the Sensitive Resource Program will allow for full mitigation of impacts that have yet to be determined as the details of the components have not been finalized. The District will compensate, in kind, for disturbance or alteration of habitat that may occur as a result of project implementation. Following implementation of the Standard Practices and recommended mitigation measure BIO-1, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered less than significant after mitigation.

Impact: **BIO-2. Will the Project Components cause loss of individuals of CNPS List 2, 3, or 4 plant species? (Page 11-41 of section 11.6.2)**

Analysis: *Significant Impact; Components 11, 19*

A search of the CNDDB and the CNPS databases found no records for CNPS List 2, 3, or 4 plant species within the project area. Aerial photographs of the project vicinity indicate the presence of native rangeland that could contain CNPS List 2, 3, or 4 plant species, including rocky or clayey openings in shrub land and woodland, where CNPS List 2, 3, or 4 plant species may occur. Floristic surveys have not been performed for the entirety of the project area and it is necessary to develop a Sensitive Plant Protection Program for potentially significant impacts to BLM Sensitive, CNPS and Nevada Natural Heritage Program Special Status Plant Species.

Mitigation: **SP-26. Sensitive Plant Protection Program**

After Mitigation: *Less than Significant Impact; Components 11, 19*

The standard practice will require the avoidance or protection of listed native plant species. When needed, mitigation will allow the Project to compensate, in kind, for loss of individuals of listed species. Many of the projects outlined in the Master Plan may be implemented in the future. Following implementation of the Sensitive Plant Protection Program, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered less than significant after mitigation.

Impact: **BIO-3. Will the Project Components cause loss of active raptor nests, migratory bird nests, or wildlife nursery sites? (Page 11-42 of section 11.6.2)**

Analysis: *Significant Impact; Components 11,19*

The following project components could have adverse effects on nests or nursery sites.

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will result in conversion of pastureland, the installation of two temporary containment basins and installation of the bypass pipeline from the C-line to the basins. Suitable habitat for pygmy rabbits exists in the area, which was surveyed to protocol in January of 2009. No evidence of pygmy rabbits was located during the survey (HBA 2009). The area was subsequently surveyed on May 29 for the presence of migratory bird nests and raptor nests. No nesting birds were located within the project area. As the last field visit was performed in the winter and spring of 2009, it cannot be determined if new nests or nursery sites that will be impacted as a result of implementation of the project, therefore SP-30 shall be implemented again to ensure no new nests are established prior to commencement of project construction.

Component 19 - Pursue Permitting of More Land in Alpine County, may result in conversion of existing pastureland or native rangeland to irrigated pasture which may cause loss of individuals or occupied habitat including nests and nurseries. See Component 11 above for results of surveys.

Mitigation: **SP-30. Pre-construction Surveys for Migratory Birds ,Nesting Raptors and Wildlife Nurseries**

After Mitigation: *Less than Significant Impact; Components 11, 19*

The standard practice will allow the District to avoid and protect active raptor nests, migratory bird nests as well as nursery sites. Following implementation of the pre-construction surveys, it is unable to be determined if the impact will be reduced to a level of less than significant. This impact is considered less than significant after mitigation.

Impact: **BIO-4. Will the Project Components substantially block or disrupt major fish or wildlife migration or travel corridors? (Page 11-45 of section 11.6.2)**

Analysis: *Significant Impact; Component 11 (Pipelines)*

Implementation of a portion of Component 11 could affect migration or travel corridors and will result in significant impacts:

Component 11 - The Alternative B alignment for the HPR bypass pipeline will cross the Millich Ditch in three locations, which may block the movement of strays of Lahontan cutthroat trout. The Alternative A alignment will not have any interruptions of the Millich Ditch and will not cause any interruptions to wildlife migration. The Alternative

C pipeline alignment will cross the Millich Ditch in one location. These construction activities may result in blockage of movement of strays of Lahontan cutthroat trout that may occupy the Millich Ditch. This impact is considered significant for Alternative B and C HPR bypass pipeline alignments.

Mitigation: **BIO-4A. Fish Passage Structures and Deer Migration Corridors**

BIO-4B. Schedule Construction to Avoid Breeding and Migrating Wildlife

After Mitigation: *Less than Significant Impact; Component 11 (Pipelines)*

The proposed mitigation will require design changes to the Project to facilitate fish and deer passage and limit construction timing to periods when fish are not spawning and when deer are not migrating. These mitigation measures will reduce the Project's potential adverse effects on wildlife movements and breeding to a level of less than significant.

Analysis: *Less than Significant Impact; Component 11 (Irrigation Fields)*

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will result in the construction of temporary containment basins along with a pipeline from the C-line located at the junction of Diamond Valley Road and SR 89. These facilities will not result in any blockage of any stream that will contain migrating fish. The Carson River Deer Heard Management Plan (CDFG 1985) delineates migration corridors on the east side of the Carson River with some smaller corridors denoted through Wade Valley. The proposed location of the irrigation fields are outside the delineated critical winter range. When full, the irrigation fields may present a temporary interruption to the movements of the Carson River Deer Herd, but the duration of such an interruption will be short and the impact will be less than significant.

Construction of the alternative pipeline alignments for the HPR bypass pipeline will not have an impact on wildlife movements as no blockage will occur to deer migration corridors that have been mapped in the area.

Mitigation: *No mitigation is needed. Component 11 (Irrigation Fields)*

Impact: BIO-5. Will the Project Components have a substantial adverse effect on or result in the permanent loss of any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the CDFG or USFWS? (Page 11-48 of section 11.6.2)

Analysis: *Significant Impact; Component 11*

Sensitive wildlife habitats are defined as habitats that provide high suitability for foraging and breeding for state and federal species of special concern and California fully protected species, and important nesting, foraging, and breeding habitat for migratory songbirds and other wildlife. Montane riparian scrub, Modoc/Great Basin riparian forest, and montane freshwater marsh are sensitive wildlife habitats identified within the project area. Section 401, Waters of the State and Section 404 Waters of the U.S. are addressed in BIO-7 below. Existing ditches all have evidence of high transmissive losses which results in seepage of both recycled (Diamond Ditch) and freshwater (Snowshoe Thompson No. 1 and Snowshoe Thompson No. 2). This seepage over time has resulted in the establishment of riparian vegetation on the banks of the earthen portions of the ditches and downslope from the ditches. The proposed improvements to increase capacity and reduce the transmissive losses has the potential to decrease the water available to this established riparian vegetation. The existing vegetation that will be impacted will be minimal and project construction will not reduce the riparian vegetation by 10 percent or more in Alpine County, but will result in the permanent loss of riparian vegetation: this impact is considered significant. Implementation of SP-31 and SP-32 will allow the District to map, avoid and protect sensitive riparian habitat. The District will monitor the recovery and restoration of altered and/or created habitat.

Component 11 - Construct Storage Facility with Pumping Back to HPR will result in the minor removal of riparian vegetation. This vegetation is associated with the transmissive losses associated with Millich Ditch. Due to the size of the area involved with the pipeline alignments, it is not possible for project construction to permanently reduce sensitive habitat by 10 percent or more in Alpine County but will result in the permanent loss of riparian vegetation due to construction activities. Alternative bypass pipeline alignment A crosses Millich Ditch in three locations and would likely result in minor removal of individual Salix bushes. Alternative bypass pipeline alignment C would follow the dirt roadway and would cross the ditch in one location, and would not result in the removal of riparian vegetation. Alternative bypass pipeline alignment B crosses the Millich ditch (which is contained to the culvert under the roadway) and would not result in the removal of riparian vegetation. A Lake or Streambed Alteration agreement would be required to be issued by California Department of Fish and Game for Alternatives A and C due to disturbance to the Millich Ditch and associated minor removal of riparian vegetation.

Mitigation: **SP-31. Pre-construction Marking and Fencing of Sensitive Native Plant Communities**

SP-32. Pre-construction Marking and Fencing of Wetlands and Riparian Habitat

BIO-5A. Map Sensitive Native Plant Communities and Prepare Habitat Restoration Plan

BIO-5B. Monitor Habitat Restoration and Revegetation Sites

After Mitigation: *Less than Significant Impact; Component 11*

The standard practices and proposed mitigation will allow the District to map and protect sensitive native plant communities and riparian habitat. Monitoring of habitat restoration and revegetation sites is also included to ensure the success of restoration activities. After implementation of these mitigation measures, the impact to sensitive plant communities will be less than significant.

Impact: **BIO-7. Will the Project Components have an effect on federally protected wetlands as defined by Section 404 of the CWA or waters of the U.S. through direct removal, filling, hydrological interruption, or other means? (Page 11-51 of section 11.6.2)**

Analysis: *Significant Impact; Components 11, 19*

Wetland delineations have not been performed on District, private or public lands in the locations of the projects and components listed in the Master Plan. Standard Practice

SP-22 Delineate Wetlands, Waters of the United States, and Riparian Habitat, SP-23 Prepare Wetland And Riparian Mitigation And Monitoring Plan, SP-26 Avoid Impacts to Wetland and Riparian Areas and, SP-21 Pre-construction Marking and Fencing of Wetlands and Riparian Habitat will be implemented prior to construction of the proposed components. Due to the fact that the delineations have yet to be performed, the exact extent of impact to wetlands cannot be determined.

Component 11 - - Construct Irrigation Fields with Pumping Back to HPR, includes three alternatives of the HPR bypass pipeline location between the junction of SR 89 and Diamond Valley road and the locations of the proposed irrigation fields.

Of the three alternative alignments shown in Figure 2-5**,** Alignment B crosses the Millich Ditch in three separate locations. Millich ditch conveys fresh water from the West Fork of the Carson River. No survey has been performed to determine if the areas adjacent to the ditch are considered wetlands and waters of the U.S. This ditch and associated riparian habitats that are adjacent, will likely be considered waters of the U.S. and will be directly impacted as a result of project implementation. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and impacts to the adjacent riparian areas/wetlands. This impact is considered significant.

Alternative A alignment follows the shoulder of Diamond Valley Road from the junction of SR 89/Diamond Valley Road to the location of the infiltration basins. No delineations of wetlands have been performed for the three pipeline alignments and impacts to wetlands and waters of the U.S. cannot be ascertained at this time. This impact is considered significant.

Alternative B will cross the Millich Ditch in three locations, as illustrated in Figure 2-5. Details on this crossing are no included in the project description. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and this impact is considered significant.

Alternative C follows the dirt roadway as shown in Figure 2-5 that intersects with the Millich Ditch in one location. Details on this crossing are not included in the project description. Construction activities could result in fill entering waters of the U.S. (Millich Ditch) and this impact is considered significant.

Component 19 - Pursue Permitting of More Land in Alpine County, may result in additional lands that receive recycled water for irrigation purposes. Because these lands have not been identified, they may contain waters of the U.S. and may be impacted. This impact is considered significant.

Mitigation: **SP-23. Delineate Wetlands, Waters of the United States, and Riparian Habitat**

SP-24. Prepare Wetland And Riparian Mitigation And Monitoring Plan

SP-27. Avoid Impacts to Wetland and Riparian Areas

SP-32. Pre-construction Marking and Fencing of Wetlands and Riparian Habitat

BIO-7. Monitor Wetland And Riparian Mitigation Sites

After Mitigation: *Less than Significant Impact; Components 11, 19*

The standard practices and recommended mitigation measure BIO-7 will allow the District to avoid or protect Wetlands and waters of the U.S.: it cannot be anticipated that these measures/practices will allow for full mitigation of impacts that have yet to be determined as the details of the components have not been finalized. Standard practices require the District to compensate, in kind, for disturbance or alteration of wetlands that may occur as a result of project/component implementation. This impact is considered less than significant after mitigation.

Analysis: *Less Than Significant; Component 11 (Irrigation Fields)*

Component 11 - Construct Irrigation Fields with Pumping Back to HPR, will have no impact on wetlands and waters of the U.S. As stated in the USEPA definition of Waters of the U.S. 40 CFR 230.3(s)(7) "Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA are not waters of the United States." Based on this definition, creation of infiltration basins with the use of recycled water are not determined waters of the U.S. and will not have an impact. Created infiltration basins that are immediately adjacent to existing waters of the U.S. may have an impact through the interception of groundwater from the basins to waters of the U.S. (Carson River and Snowshoe Thompson Ditch #2). Inclusion of Standard Practices and compliance with the NMP prepared for the Diamond Valley (Wood Rodgers 2009) ensures less than significant impacts to groundwater from Component 11, and will not result in contaminated groundwater reaching waters of the U.S. and resultant negative effects to associated wetlands. Standard Practice SP-16, Slope Stabilization Design, will ensure the irrigation fields will be contained by berms and adequately maintained to prevent surface flow of recycled water from reaching Indian Creek, the Carson River and/or Snowshoe Thompson Ditch #2. The impact level is considered less than significant for the irrigation fields portion of Component 11.

Mitigation: *No mitigation is needed. Component 11 (Irrigation Fields)*

Impact: ARCH-1. Will the Project Components disturb known potentially eligible National or California Register properties, including archaeological, historical, architectural, and Native American/traditional heritage resources? (Page 15-18 of section 15.6.2)

Analysis: *Significant Impact; Components 11, 18, 19*

Construction of the irrigation systems, irrigation fields and infiltration basins for components 11, 18 and 19 could result in impacts to cultural resources. Ground disturbance associated with the placement of the pipes, irrigation fields and infiltration basins, including the effects of heavy equipment activity and possibly ongoing maintenance activities, will result in the destruction or alteration of known prehistoric and historic archaeological sites.

Table 15-7 shows the number of prehistoric and historic archaeological sites occurring within the project area that must be avoided during construction and operation of components 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22.

Table 15-7

Number of Known Historic and Archaeological Sites Affected by Project Components

Table 15-7				
Prehistoric[1]	Historic[2]	Architectural[3]	Prehistoric/ Historic[4]	Total
13	6	4	4	27

Source: Hauge Brueck Assoc. 2009

Notes: 1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site/rock walls
4 - Site with both prehistoric and historic components

Construction of the impoundment facility for temporary containment (Component 11) could result in impacts to cultural resources. Ground disturbance associated with the placement of pipelines, central pivot systems and impoundments including the effects of heavy equipment activity and possibly ongoing maintenance activities will result in the destruction or alteration of known prehistoric and historic archaeological sites. Table 15-8 shows the number of prehistoric and historic archaeological sites potentially affected by temporary containment Component 11.

Table 15-8 Number of Known Prehistoric and Historic Archaeological Sites Affected by Temporary Containment Components				
Prehistoric[1]	Historic[2]	Architectural[3]	Prehistoric/Historic[4]	Total
3	2	0	2	7

Source: Hauge Brueck Assoc 2009

Notes: 1 - Prehistoric archaeological site
2 - Historic archaeological site
3 - Historic architectural site
4 - Site with both prehistoric and historic components

Mitigation: **ARCH-1. Identification, Evaluation, and Avoidance of Cultural Resources**

After Mitigation: *Less than Significant Impact; Components 11, 18, 19*

Implementation of the Programmatic Agreement (PA), as outlined for mitigation measure ARCH-1, Identification, Evaluation, and Avoidance of Cultural Resources, which presents measures to avoid, reduce, or mitigate impacts, requires: an evaluation of archaeological resources by a qualified archaeologist; a determination of resource significance, consultation with the Washoe Tribe, and resulting management/mitigation recommendations. The treatment of cultural resources to be affected by the Project Components will continue to be addressed under Section 106 process of the National Historic Preservation Act. The PA provides for a phased resource identification, evaluation and data recovery program. Phase I and Phase II have been completed for portions of the project area effected by Project Components 11, 18, and 19. Phase III and Phase IV of the PA will be implemented as necessary prior to and during construction of individual Project Components as determined by National Register significance. Phase III and Phase IV call for the development of a treatment plan and supervision of archaeological monitoring during construction, respectively with involvement of the Washoe Tribe.

These actions apply to all Project Components that result in a physical change to the project area to reduce the impacts to pre-historic and historic archaeological sites to a less than significant level. For impacts identified in California, the PA will be implemented under CEQA. For impacts identified in Nevada, the PA will be implemented under Nevada State Register standards.

Impact: **ARCH-2. Will the Project Components disturb unknown archaeological resources or human remains? (Page 15-21 of section 15.6.2)**

Analysis: *Significant Impact; Components 11, 18, 19*

There is the possibility that surface or subsurface cultural resources not identified during the review of records at the CCIC and the NSM will be encountered during construction or operation/maintenance of pipelines, irrigation systems, irrigation fields, infiltration basins and impoundments, or that there are unexpected effects on known cultural resources.

Mitigation: **ARCH-1. Identification, Evaluation, and Avoidance of Cultural Resources; ARCH-2. Protect Undiscovered Cultural Resource Sites**

After Mitigation: *Less than Significant Impact; Components 11, 18, 19*

An archaeological pedestrian survey as identified in Mitigation Measure ARCH-2**,** Protect Undiscovered Cultural Resource Sites, as well as the preparation of the PA required for measure ARCH-1 in cooperation with the Washoe Tribe**,** will reduce this impact to a less than significant level.

For Project Components 11, 18 and 19, the District will retain an archaeological monitor, who meets Secretary of the Interior standards, to be present during certain phases of project construction and to conduct in-field monitoring in areas of known resources and areas of high archaeological sensitivity. If human remains are discovered, the county coroner must be notified as soon as reasonably possible (CEQA Section 15064.5) and there will be no further disturbance to the site where the remains were found. Treatment of the remains will be dependent on the views of the most-likely-descendent.

Appendix O - Comments Received on Draft EIR

STATE OF CALIFORNIA -- THE RESOURCES AGENCY

ARNOLD SCHWARZENEGGER, Governor

DEPARTMENT OF WATER RESOURCES
1416 NINTH STREET, P.O. BOX 942836
SACRAMENTO, CA 94236-0001
(916) 653-5791

For PURER File

1

JAN 2 7 2009

Mr. Jim Hoggatt
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, California 96150

SCH #2007042116, Notice of Preparation for the South Tahoe Public Utility Recycled Water Facilities Master Plan Draft Environmental Impact Report, January 2009
Alpine County

Dear Mr. Hoggatt:

We have reviewed the subject Notice for this project, which includes the construction of a storm water ditch at the southeast corner of Harvey Place Reservoir and the construction of a spillway channel for Indian Creek Reservoir that conveys reservoir spillage around Harvey Place Reservoir.

1a Indian Creek Dam, No. 1062 and Harvey Place Dam, No. 1062-3 are currently under the jurisdiction of the Division of Safety of Dams. If any alteration to the dams or their appurtenances is anticipated, an alteration application, together with plans and specifications, must be filed with the Division. All dam safety related issues must be resolved prior to approval of the application and the work must be performed under the direction of a civil engineer registered in California. Mark Schultz, our Acting Design Engineering Branch Chief, is responsible for the application process and can be reached at (916) 227-4619.

If you have any questions or need additional information, you may contact Office Engineer Mike Sutliff at (916) 227-4601 or Regional Engineer Mike Zumot at (916) 227-4631.

Sincerely,

Michael Waggoner for

David A. Gutierrez, Chief
Division of Safety of Dams

cc: Ms. Nadell Gayou
Resources Agency Project Coordinator
Environmental Review Section, DPLA
901 P Street
Sacramento, California 95814

Governor's Office of Planning
and Research
State Clearinghouse
Post Office Box 3044
Sacramento, California 95812-3044

State of California—Health and Human Services Agency
California Department of Public Health

MARK B HORTON, MD, MSPH
Director

FILE DURETR

ARNOLD SCHWARZENEGGER
Governor

(2)

August 3, 2009

Jim Hoggatt
South Tahoe PUD
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

RE: South Tahoe PUD Recycled Water Facility Master Plan - SCH#:2007042116

Dear Mr. Hoggatt,

The California Department of Public Health (CDPH), Environmental Review Unit (ERU) is in receipt of the Environmental Impact Report for the above project. As a responsible agency under the California Environmental Quality Act (CEQA), we appreciate the opportunity to comment.

2a The CDPH, Division of Drinking Water and Environmental Management is responsible for issuing water supply permits administered under the Safe Drinking Water Program. A new or amended Water Supply Permit may need to be issued for the above referenced project if it includes an increase in water supply, storage, or treatment of drinking water. These future developments may be subject to separate environmental review.

For questions or information on the Water Supply Permit application process, please contact the CDPH Sacramento District office at (916) 449-5600.

Sincerely,

Bridget Binning
CDPH Environmental Review Unit

Cc:
Project File
David Lancaster

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
(916) 358-2900
http://www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor
DONALD KOCH, Director

(3)

August 12, 2009

Jim Hoggatt
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Dear Mr. Hoggatt:

The Department of Fish and Game (DFG) has reviewed the draft Environmental Impact Report (DEIR) for South Lake Tahoe Public Utility District's Recycled Water Facilities Master Plan (project). The project consists of a combination of actions to dispose of increased amounts of recycled water and associated actions to convey and apply fresh water to Utility District lands. The project is located roughly between Woodfords and the Nevada state line, and includes Diamond Valley, in Alpine County, California, and adjacent areas in Douglas County, Nevada.

Wildlife habitat resources include irrigated pasture, Great Basin scrub, riparian, and forested habitats. Significant natural resources include stream and reservoir habitat for cold water fisheries, deer winter range, and habitat for sensitive species. The West Fork of the Carson River, Indian Creek, Indian Creek Reservoir, and Harvey Place Reservoir are within the project boundaries. The following are our concerns:

Sensitive Species:

3a The DEIR fails to provide mitigation that reduces impacts to sensitive species to a level that is below significance. The DEIR identifies 39 special status species that may be impacted by the project. Table 11-6 further identifies that there will be potential adverse impacts associated with a large number of the project components and these impacts will not be reduced below a level of significance, before or after mitigation.

3b The Federal Endangered Species Act requires that impacts to listed species be reduced to the greatest extent practicable, whereas, the state Endangered Species Act (ESA) requires that the impacts be "fully mitigated". We recommend that the DEIR be revised so that it contains the means to either avoid impacts to state-listed species, or fully mitigate the project's impacts.

Deer:

3c The DEIR fails to discuss the project's potential impacts to migratory deer. The DFG maintains maps of important habitat areas for migratory deer throughout the state. The project site is located in an area designated as winter range for the Carson River deer herd. The Carson River herd has experienced significant loss of winter range habitat over the years. The proposed project is likely to exacerbate the loss of limited winter range habitat. For this reason, we recommend that the DEIR be revised to describe the potential loss of winter range habitat resulting from the conversion of native rangeland to irrigated pasture. We also

3d recommend that the DEIR be revised to contain measures that reduce or mitigate the loss of winter range habitat to a level that is less than significant. Additionally, we recommend that the DEIR be revised to include a discussion of how any proposed water conveyance structures

3e (particularly large ditches) may create barriers to deer movement and how these impacts might be reduced to a level that is not significant.

Water Quality:

The project has the potential to affect water quality in the West Fork of the Carson River, as well as other tributary streams. Degradation of water quality in the West Fork Carson River and other streams may occur as a result of increases in recycled water deposition on currently

3f permitted lands, as well as expansion of the number of acres of permitted lands. Degradation in water quality will have an effect on fish that inhabit these streams.

We recommend that the DEIR be revised to address the potential for recycled water to enter natural freshwater bodies through runoff from irrigated pastures, or via leaks or spills from conveyance facilities. The DEIR should contain a means of either avoiding degradation of water quality, or mitigating the effect below a level that is significant.

Lastly, the DEIR should consider and analyze whether implementation of the proposed project will result in reasonably foreseeable potentially significant impacts subject to regulation by the DFG under Section 1600 et seq. of the Fish and Game Code. In general, such impacts result whenever a proposed project involves work undertaken in or near a river, stream, or lake that flows at least intermittently through a bed or channel, including ephemeral streams and water courses. Impacts triggering regulation by the DFG under these provisions of the Fish and Game Code typically result from activities that:

3g

- Divert, obstruct, or change the natural flow or the bed, channel or bank of any river, stream, or lake;
- Use material from a streambed; or
- Result in the disposal or deposition of debris, waste, or other material where it may pass into any river stream, or lake.

In the event implementation of the proposed project involves such activities, and those activities will result in reasonably foreseeable substantial adverse effects on fish or wildlife, a

3h Lake or Streambed Alteration Agreement (LSAA) will be required by the DFG. Because issuance of a LSAA is subject to review under the California Environmental Quality Act (CEQA), the DEIR should analyze whether the potentially feasible mitigation measures will avoid or substantially reduce impacts requiring a LSAA from the DFG.

This project will have an impact to fish and/or wildlife habitat. Assessment of fees under Public

3i Resources Code Section 21089 and as defined by Fish and Game Code Section 711.4 is necessary. Fees are payable by the project applicant upon filing of the Notice of Determination by the lead agency.

3)

- Pursuant to Public Resources Code Sections 21092 and 21092.2, the DFG requests written notification of proposed actions and pending decisions regarding this project. Written notifications should be directed to this office.

Thank you for the opportunity to review this project. If the DFG can be of further assistance, please contact Mr. Dan Gifford, Staff Environmental Scientist, telephone (209) 369-8851 or, Mr. Jeff Drongesen, Senior Environmental Scientist, telephone (916) 358-2919.

Sincerely,

Kent Smith

Kent Smith
Habitat Conservation Program Manager

cc: Jeff Drongesen
Dan Gifford
Department of Fish and Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

U.S. Fish and Wildlife Service
2800 Cottage Way, Room W2605
Sacramento, CA 95825-1888

4

From: "Jimmie Hoggatt" <jhoggatt@stpud.dst.ca.us>
Subject: **FW: Master plan comments**
Date: August 26, 2009 9:52:44 AM PDT
To: "Anders J. Hauge" <ahauge@haugebrueck.com>, "Garth Alling" <galling@haugebrueck.com>, "Melanie Greene" <mgreene@haugebrueck.com>
Cc: "Richard Solbrig" <rsolbrig@stpud.dst.ca.us>, "Paul Sciuto" <PSciuto@stpud.dst.ca.us>, "Heidi Baugh" <hbaugh@stpud.dst.ca.us>, "Hal Bird" <HBird@stpud.dst.ca.us>

Jim Hoggatt
Engineering Department Manager
jhoggatt@stpud.dst.ca.us
(530)543-6206
(530)541-0614 fax

From: Robert Levy [mailto:roblevy@alpineso.com]
Sent: Wednesday, August 26, 2009 9:36 AM
To: Jimmie Hoggatt
Subject: Master plan comments

Hi Jim,

4a I just wanted to make a comment regarding the river ranch/river view area. I currently own a 19ac property in River Ranch. Since all of our properties had the water rights sold away prior to the subdivision being created, many of us in the area are interested in some of the affluent being used for pasture irrigation. The sage brush is rapidly overtaking most of our pastures so we are interested in flood irrigation.

A pipe or ditch (some of which are still intact) would be an easy solution. Can you please inform me of the districts intent.

Sincerely,

Robert E. Levy

Undersheriff

Alpine County Sheriff's Office

(530) 694-2231 X-354

STPUD Diamond Valley Ranch – Recycled Water Facilities Master Plan EIR – Public Comment - Turtle Rock Park 2 September 2009 – Alpine County, CA

Anders Hauge Presentation start 1315: end 1330

5a Shirley Tabor – 8 years ago when MP started – it was projected there was more effluent coming down the pipeline. Please state as to what flows were projected then, and what is flowing now.

6a Denise Murphy – water sample on Indian Creek – there has been no water for the past two years. Why? Need to know as to why there is no water. Hal response – Indian creek is dry. Now just tailwater in Indian creek down below the dam. STPUD has water rights in Indian Creek too but there is no water. Denise – no water even in spring! This is odd. Hal – we should go for a ride to see where IC comes onto District property.

7a Russ wickwire – Fish Biologist. Fish Indian Creek Reservoir and Indian Creek. What are realistic expectations will be able to meet the delivery. <<insert written comments from Mr. McGuire>> Legal ramifications that STPUD is responsible for: not to fall below minimum pool in ICR and adequate trout environment is to remain. ICR ICR ICR – nothing to do with EIR/Analysis/Setting/ or Proposed Projects/Components in the Master Plan. *Flood waters being stored in ICR?

8a Ed Hinchel – Woodfords. Where does the water come from? It goes from SLT to farmers? Needs clarification of systems that are in operation. Hal provides summary of systems freshwater / recycled water.

9

9a Dan Sedergren - Currently there is insufficient recycled water for ranchers? Is all recycled water being utilized? You expand the land, where does the water come from? SLT is not going to grow! Where is the water going to come from? Water from effluent development is not going to increase. AH – Master Plan has to plan for the future in the event that water flows increase.

9b *Are there controls in place to preclude the addition of new land before the water is available? AH – response: the master plan has the "what ifs" included in the event changes occur in the future.

10a Denise Murphy - Intent to use land that is being purchased is only being used in emergency situations only when I'm not getting water that I need?

11a Russ Wickwire – ICR over the years has less and less water – gets 555af/year. Even with full amount from IC, basically it does not keep up with evaporation and saturation in conveyance system – it goes down lower and lower and lower – soon to be mud puddle.

12a Zach Wood (with Alpine County) – description of components with some triggers and district might annex more land than what is existing. What is the expectation for annexation of lands in the foreseeable future? Where is this described in the document? AH – should an annexation occur by STPUD it would require modification to the Master

12b Plan. Zach – where is this described in the document? 2 levels of master plan – greater

12b master plan if that changes how much input would Alpine County residents get in that process? Subdivision is more tangible to forsee.

13a Dan S. – would Zach's comment (annexation) be included as a trigger?

14a Will Richmond – was oxgenation of ICR discussed in presentation? Will there be a public presentation planned? AH – that was separate process.

15a Russ Wickwire – has fished lake quite a bit. Oxygenation is not functioning properly. Talked with samplers and they stated there is no oxygen in lake. System is not coming on during the daytime.

16a Andy Lovell – trying to understand the irrigation. If it is used in Alpine County – what is it going to be used for? Flood irrigation or spray irrigation? AH – ag use. Andy – what
16b about The Jungle? Is that all flood irrigation? Or Spray? Is it possible to create aerosol
16c and health hazard with spray irrigation.

16d Where is The Jungle???

(17)

09/02/09

Public Comments to S. Tahoe Public Utilities District
Re: Indian Creek Reservoir

17a What are the realistic expectations that the proposed-"future modifications of the present agreement documents" will be able to meet the "delivery volumes and timing (results) that will reflect unsatisfied contractual and other promised results at Indian Creek Reservoir (ICR) before environmental conditions become uncorrectable in the future. This reservoir produces one of the best trout quality and quantity fisheries in California (personal opinion of a CDF & G Fisheries Biologist)

17b How can the District state to support the recreational and trout environment values when earlier they would not take corrective actions early on to correct the potential problems? Some of these situations were contracted documents As early as (1968) when loan monies were given to Cal Dept. Water Resources (Davis-GrunskyAct) and by the Alpine County contract. (1967-first, 2002 last)

17c What are the legal ramifications that STPUD is responsible to correct these legal breaches of contract and verbal promises? Some of these issues include not exceeding a minimum pool elevation, and ensuring adequate trout environment (water temperature, water oxygen, phosphorus levels, etc.)

17d What are the preliminary results of the newly installed Hypolimnitic Oxygenation System acquired to promote higher aquatic oxygen level at ICR?

17e How realistic is it that ICR anglers can expect to catch trout in the near future? Today the lake has a tenuous trout population, but in recent years getting to them has become a problem. The boat anglers have very poor launching opportunities-inoperable cement boat ramp and treacherous/equipment damaging entry points along the lake shore. The shore angler has problems in the summer with a near shore aquatic vegetation barrier around most of the lakes perimeter that discourages anglers from fishing on the lake side of the dense vegetation and the water is too warm for trout in the shallow, inshore area.

17f What has transpired with the promised construction of a new boat ramp on the more launching favorable east shore near the dam?

17g How will the District compensate the Bureau of Land Management for the continuing loss of campers at one of the best public campgrounds in the west (flushing toilets, hot-cold water, showers, heated restrooms and spacious camping sites)? The aesthetics of the lake and the limited boat launching areas has discouraged the anglers as well as the public to camp here (conversation with long term BLM campground hosts and personal observations).

17h Does the District, as it stated in its EIR, expect to continue to enjoy the existing cooperative venture with Alpine County when they don't honor and comply with their mutually agreed upon contract to comply with the minimum lake level and if not corrected soon, it will produce a aesthetic disappointing high sierra trout lake with a deteriorated trout fishery.

17i What is the District doing to promptly increase the quality and quantity of trout waters at ICR?

17j What is the availability of the Districts W. Fork Carson River water allotment (900 af) now being used on the 1400 acre Diamond Valley Ranch that is owned by STPUD for irrigating lands to raise cattle? This water source would solve many problems at ICR but to obtain this commodity may entail a lengthy legal battle with downstream users. Why not start to take the legal steps now before it is too late to save ICR values?

17k What steps are being taken to allow flood waters to be stores in ICR if even for a short period of time until the snow melt is concluded? Let's be ready with all " ducks in order" otherwise we may miss the opportunities as we did in the 2007 flood?

17l Why doesn't the District obtain a loan to purchase an adequate conveyance system to provide better utilization of waters to ICR?

Do you know that Cal Department of Fish and Game's water rights were purchased at Red Lake and Heenan Lake to maintain trout populations, 171 but at the same time release waters below their dams to maintain stream trout populations? These released waters may not have a water rights allotment and could be diverted into ICR.

17m Will the continued ICR environmental deteriorations have a bad public and professional perception on the District's past impressive worldwide reputation as a progressive public utility of the past or will the district rally "around the flag" and promptly correct the ICR environmental issues before it is too late to correct?

Send response to:

Russell Wickwire
20505 State Hwy 89
Markleeville, Ca. 96120

STPUD RECYCLED WATER FACILITIES MASTER PLAN
PUBLIC COMMENT
3 SEPTEMBER 2009 – STPUD BOARD ROOM

No comments.

- Board Comments –

18a Claudio - Can the optimization of application rates be modified? Are there rules? When pursue permitting for more land? What does this involve? AH responds.

19a Jones – anything significant from yesterday's meeting at Turtle Rock Park? AH responds.

20a Paul – one question regarding safety of aerosol from spray irrigation and associated health issues. AH responds. Richard passes out Bently photograph showing cener pivot rigs and hoses.

21a Jones – when this was started there were other items included that were nice to dos. How could we incorporate these into master plan? Can they be done separate?

22

COUNTY OF ALPINE
Board of Supervisors

September 4, 2009

South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Re: Recycled Wastewater Facilities Master Plan Draft Environmental Impact Report

Dear Sirs:

The Alpine County Board of Supervisors appreciates the opportunity to comment on the Recycled Wastewater Facilities Master Plan Draft Environmental Impact Report. As part of the preparation of the DEIR the Board of Supervisors provided comments during the public scoping period. The Board would like to again submit our comments as follows:

22a 1. The County supports optimizing the application rate for recycled water used for irrigation purposes on existing permitted lands in Alpine County.

22b 2. Alpine County has concerns with providing water to irrigators in Nevada. Rather the County urges STPUD to pursue improvements to the infrastructure that would allow for application to existing permitted lands that are not receiving recycled water.

22c 3. Tailwater detention systems should be included in all alternatives.

22d 4. The County supports transferring water rights to ICR to improve water quality and habitat.

22e 5. The County supports using piped irrigation technologies for the application of recycled water.

22f 6. Pressurized water systems are highly desirable in providing efficient delivery of recycled water to permitted areas.

22g 7. The County urges the district to consider expansion of the existing hydrant system to provide additional access points closer to residential development in the Mesa Vista and River Ranch locations.

22h 8. The County supports the recycled water wholesale program for new permitted users only. Maintaining historical relationships with existing permitted irrigators is critical.

22i 9. The County encourages STPUD to work with NDEP regarding any diversion of recycled water to Nevada.

22j 10. The County supports the transfer of water rights to storage in Indian Creek. Increased flows would improve water quality.

22k 11. The County supports transferring water from other locations in the County including Red Lake to improve water quality and habitat.

22l 12. The County supports the development of biomass and/or wetland sod and seed production, native plant nursery and other economic development opportunities.

P.O. Box 158 / 99 Water Street, Markleeville, CA 96120 (530) 694-2287 / Fax (530) 694-2491
email:pknorr@alpinecountyca.gov

22m The County does not have specific comment on the document at this time. The District should be aware that the County will work with the District on permitting and monitoring future Master Plan projects that are under our jurisdiction. Some of the projects described in the DEIR will require entitlements from Alpine County and additional CEQA compliance documentation. The three immediate projects that the District is preparing to implement and are described in project level detail do not require County approvals or further CEQA documentation.

The County hopes that the productive working relationship with the District will continue as the District moves forward with implementation of the Recycled Wastewater Facilities Master Plan.

Sincerely,

Phillip D. Bennett

Phillip D. Bennett, Chair
Alpine County Board of Supervisors

DEPARTMENT OF TRANSPORTATION
P.O. BOX 2048, STOCKTON, CA 95201
(1976 E. DR. MARTIN LUTHER KING JR. BLVD. 95205)
PHONE (209) 948-7112
FAX (209) 948-7164
TTY 711

23

Flex your power!
Be energy efficient!

September 8, 2009

Jim Hoggatt
General Manager
South Tahoe PUD
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

10- ALP-88-PM var
South Tahoe PUD
Recycled Water Facilities
Master Plan
EIR
SCH #2007042116

Dear Mr. Hoggatt:

The Department of Transportation (Caltrans) appreciates the opportunity to review and comment on proposed South Tahoe Public Utilities District Recycled Water Facilities Master Plan Environmental Impact Report. The project proposes three projects to address the reuse and retention of recycled water generated in the South Lake Tahoe area of El Dorado County in Alpine County CA and neighboring Douglas County NV.

23a Caltrans has evaluated Chapter 12 Traffic and Circulation. As this is a planning EIR, Caltrans as a responsible agency has no comment at this time, but reserves comment on any project level environmental study. As several of the proposed water conveyances will cross State Routes 88 and 89 at various locations, an encroachment permit will be required of the lead agency.

If you have any questions or would like to discuss our comments in more detail, please contact Michael Robinson at (209) 948-7575 (e-mail: Michael_robinson@dot.ca.gov) or me at (209) 941-1921.

Sincerely,

for

DANIEL H. BREWER, Chief
Office of Rural Planning & Administration

C: State Clearinghouse

Linda S. Adams
Secretary for Environmental Protection

State Water Resources Control Board

Division of Financial Assistance

1001 I Street, Sacramento, California 95814 • (916) 341-5700
Mailing Address: P.O. Box 944212 • Sacramento, California 94244-2120
FAX (916) 341-5707 • http://www.waterboards.ca.gov

Arnold Schwarzenegger
Governor

24

SEP 8 2009

Mr. Jim Hoggatt
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

Dear Mr. Hoggatt:

DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT (DISTRICT); RECYCLED WATER FACILITIES MASTER PLAN (PROJECT); EL DORADO COUNTY; STATE CLEARINGHOUSE NO. 2007042116

We understand the District is pursuing Clean Water State Revolving Fund (CWSRF) financing for the Master Plan Project 1-Diamond Valley Ranch Emergency Retention/Irrigation Field (CWSRF No. C-06-5611-110), and the Master Plan Project 2-Recycled Effluent Pipeline Reroute (CWSRF No. C-06-5608-110). As a funding agency and a state agency with jurisdiction by law to preserve, enhance, and restore the quality of California's water resources, the State Water Resources Control Board (State Water Board) is providing the following information on the EIR prepared for the Project.

24a

Please provide us with the following documents applicable to the proposed Project: (1) Two copies of the draft and final EIR, (2) a resolution certifying the EIR, adopting a Statement of Overriding Considerations (SOC) and a Mitigation Monitoring and Reporting Program (MMRP), and making California Environmental Quality Act (CEQA) findings, (3) all comments received during the review period and the District response to those comments, (4) the District's adopted MMRP and SOC, and (5) the Notice of Determination filed with the Governor's Office of Planning and Research. In addition, we would appreciate notice of any hearings or meetings held regarding environmental review of any projects to be funded by the State Water Board.

24b

The CWSRF Program is partially funded by the U.S. Environmental Protection Agency (USEPA) and requires additional "CEQA-Plus" environmental documentation and review. Three information sheets are included that further explain the environmental review process and additional federal requirements in the CWSRF Program. The State Water Board can consult directly with agencies responsible for implementing federal environmental laws and regulations. Any environmental issues raised by federal agencies or their representatives will need to be resolved prior to State Water Board approval of a CWSRF funding commitment for the proposed Projects above. For further information on the CWSRF Program, please contact Ms. Michelle L. Jones at (916) 341-6983.

24c

It is important to note that prior to a CWSRF funding commitment, projects are subject to provisions of the Federal Endangered Species Act and must obtain approval from the U.S. Fish and Wildlife Service (USFWS), and/or National Marine Fisheries Service (NMFS) for any potential effects to special status species.

24d Please be advised that the State Water Board can consult with USFWS, and/or NMFS on behalf of the District regarding all federal special status species the Projects above have the potential to impact. The District will need to identify whether these will involve any direct effects from construction activities, or indirect effects, such as growth inducement, that may affect federally-listed threatened, endangered, or candidate species that are known, or have a potential to occur on-site, in the surrounding areas, or in the service area.

24e In addition, CWSRF projects must comply with federal laws pertaining to cultural resources, specifically Section 106 of the National Historic Preservation Act (NHPA). The State Water Board has been delegated responsibility for carrying out the requirements of Section 106 under a Nationwide Programmatic Agreement executed for the CWSRF Program by the USEPA, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.

As stated above, the State Water Board has responsibility for ensuring compliance with Section 106, and the State Water Board Cultural Resources Officer (CRO) consults directly with the California State Historic Preservation Officer (SHPO). SHPO consultation is initiated when sufficient information is provided by the CWSRF applicant for projects having potential impacts to cultural resources. Please contact the State Water Board CRO Ms. Cookie Hirn at (916) 341-5690, to find out more about the requirements, and any questions on beginning the Section 106 compliance process, as applicable. Note that the District will need to identify the Area of Potential Effects (APE), including construction, staging areas, and depth of any excavation.

Please provide the CRO with a copy of a current records search, including maps that show all recorded sites and surveys in relation to the APE for the two project areas. Also include the cultural resources studies that were conducted for previous wastewater treatment plant expansion projects. The APE is three dimensional, and includes all areas that may be affected by these Projects. The APE includes the surface area and extends below ground to the depth of any Project excavations. The records search request should be made for an area larger than the APE. The appropriate area varies for different projects, but should be drawn large enough to provide information on what types of sites may exist in the vicinity.

Native American and Interested Party Consultation is required for Section 106 compliance:

- Project descriptions and maps should be sent to the Native American Heritage Commission (NAHC). The NAHC will provide a list of Native American tribes and individuals that are culturally affiliated with the project areas and recommend they all be contacted.
- Project descriptions and maps should be sent to everyone on the list provided by the NAHC, asking for information on the project areas.
- Similar letters should be sent to local historical organizations.
- Follow-up contact should be made by phone, if possible, and a phone log should be included.

24e Comments from the NAHC, local tribes, and historical organizations affiliated with the Project area, as well as District response to these comments should be included in the submittal to the CRO. The NAHC can be contacted at:

915 Capitol Mall, Room 364
Sacramento, CA 95814
(916) 653-4082

24F Other federal requirements pertinent to the Projects under the CWSRF Program include the following:

A. Compliance with the Migratory Bird Treaty Act (Act): List any birds protected under this Act that may be impacted by the Projects and identify conservation measures to minimize impacts.

Following are specific comments on the EIR:

24g
1. Due to the structure of the Environmental Analysis section, it is difficult to determine whether the Master projects have been adequately evaluated at a project specific level. State Water Board staff requests that the Environmental Analysis section in the Master Plan be restructured to include separate analyses distinct from the programmatic-level analysis for the Projects to be funded by the CWSRF Program. Please include project specific analyses.

24h
2. To comply with Section 106 of the NHPA, please include Record Search maps with all sites and surveys mapped in relation to the project sites and APEs, as well as all staging areas and depths of construction.

24i
3. Mitigation measures GW-1A and GW-1B state that the District will "Determine a Nutrient Neutral Grazing Regime for the Diamond Valley Ranch" and "Determine Maximum Duration for Temporary Containment." Note that mitigation can not be deferred to a future date, as stated by CEQA Guidelines Section 15126.4(b). Please correct mitigation measures GW-1A and GW-1B to include specific, feasible actions that will improve adverse environmental conditions, be measurable to allow monitoring, and be enforceable, as stated by CEQA Guidelines Section 15370.

24j
4. Mitigation Measure BIO-1 includes a requirement to conduct biological resource assessments. This measure is being applied to Components 11 and 19 that make up Master Plan 1 and 2. In order for Master Plan Projects 1 and 2 to be evaluated at project-level analyses, all mitigation measures for the Master Plan Projects have to include specific, feasible actions that will improve adverse environmental conditions, be measurable to allow monitoring, and must be enforceable as stated by CEQA Guidelines Section 15370. Change mitigation measure BIO-1 to comply with CEQA Guidelines Section 15370.

24K

5. Standard Practice (SP)-30) Pre-construction Surveys for Nesting Raptors and Wildlife Nurseries is being applied to Master Plan Projects 1 and 2. SP-30 is not feasible mitigation for this impact. As stated earlier, mitigation includes specific, feasible actions that will improve adverse environmental conditions, be measurable to allow monitoring, and must be enforceable, as stated by CEQA Guidelines Section 15370. Change mitigation measure SP-30 to comply with CEQA Guidelines Section 15370.

24L

6. Page 13-16 states that "Sensitive receptors are located over one half mile from the closest sensitive receptors and odor complaints will not cause odor complaints." Please clarify this statement to correctly reflect the location of sensitive receptors from the project sites, and the potential to receive odor complaints caused by the Project.

State Water Board staff has no further comments on the EIR at this time. Thank you once again for the opportunity to review the District's EIR. If you have any questions or concerns, please feel free to contact me at (916) 327-9401, or contact Ms. Justine Herrig at (916) 327-9117.

Sincerely,

Lisa Lee
Environmental Scientist

Enclosures (3)

cc: State Clearinghouse
(Re: SCH# 2007042116)
P.O. Box 3044
Sacramento, CA 95812-3044

bcc: Lauma Jurkevics, DFA
Cookie Hirn, DFA
Lisa Lee, DFA
Kyle Ochendusko, DFA
Justine Herrig, DFA
Michelle Jones, DFA
Pete Mizera, DFA

S:\Databases Web & IT\Regional Programs Unit\SCH\2009\SouthLakeTahoePUD.docpm9-8

California Regional Water Quality Control Board
Lahontan Region

Linda S. Adams
Secretary for Environmental Protection

2501 Lake Tahoe Boulevard, South Lake Tahoe, California 96150
(530) 542-5400 • Fax (530) 544-2271
www.waterboards.ca.gov/lahontan

Arnold Schwarzenegger
Governor

25

September 9, 2009

Paul Sciuto
Assistant General Manager
South Tahoe Public Utility District
1275 Meadow Crest Drive
South Lake Tahoe, CA 96150

REVIEW OF THE DRAFT ENVIRONMENTAL IMPACT REPORT FOR SOUTH TAHOE PUBLIC UTILITY DISTRICT RECYCLED WATER FACILITIES MASTER PLAN, (WDID 6A095900700).

The California Regional Water Quality Control Board, Lahontan Region (Water Board) staff reviewed the Environmental Impact Report (EIR). We limited our review to looking at the three project level descriptions in the EIR which we believe are the following (as listed on page 1-5) by EIR Project number.

11. Construct irrigation fields with pumping back to Harvey Place Reservoir
18. Optimized application rate on existing irrigated lands
19. Pursue permitting of more land in Alpine County.

The following are our comments on the three projects.

25a For the construction of irrigation fields with the ability to pump back to Harvey Place Reservoir and to pursue additional permitting of more land in Alpine County (item numbers 11 and 19), the Water Board will require a Report of Waste Discharge that will describe field conditions and how the pumping will be done. Individual waste discharge requirements will be produced for all new fields that will be irrigated with recycled wastewater.

25b For the optimized application rate on existing irrigated land, the Water Board staff has reviewed the Nutrient Management Plan. The Nutrient Management plan may need to be adjusted to comply with California laws, which will be reflected in Waste Discharge Requirements. Our main concern is in Section 4.2 *Nutrient Balance Comparison* section, the last sentence states, "The drinking water standard (threshold) is 10 mg/l, however the DISTRICT feels that it is prudent to monitor for a "trigger threshold" of 7 mg/l allowing for alternative management opportunities prior to reaching the regulatory threshold." The Water Board will use the trigger of a statistically significant increase in

25b nitrate as nitrogen or other constituent of concern (in the recycled wastewater) contributed from the use of recycled wastewater as a trigger to consider alternative management opportunities.

If the District wishes to maintain that the 7mg/l is prudent for the Water Board to use as a trigger for response, then the California Environmental Quality Act document should include an analysis to support the use of 7mg/l as an acceptable threshold. This analysis must consider other sources, alternatives and reasonable control measures. Otherwise we encourage the Nutrient Management plan in the EIR reflect that the Water Boards may impose more stringent trigger-valves than proposed in the EIR.

If you have questions regarding this matter please contact me at (530) 542-5467, or Alan Miller, Chief, North Basin Regulatory Unit, at (530) 542-5430.

Robert Tucker

Robert Tucker
Water Resource Control Engineer

cc: Richard Solbrig, General Manager STPUD
Hal Bird, STPUD

RTT/clhT: eir comments
File: STPUD WDID 6A095900700

Cal / EPA

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION
2501 LAKE TAHOE BOULEVARD
SOUTH LAKE TAHOE, CA 96150

RECEIVED
SEP 09 2009
By

PAUL SCIUTO
ASSISTANT GENERAL MANAGER
SOUTH TAHOE PUBLIC UTILITY DISTRICT
1275 MEADOW CREST DRIVE
SOUTH LAKE TAHOE, CA 96150

26

COMMENT FORM

South Tahoe Public Utility District

RECYCLED WATER FACILITIES MASTER PLAN
ENVIRONMENTAL IMPACT REPORT

South Tahoe Public Comments for the Master Plan

PLEASE PRINT

NAME: Russ Wickwire	**ORGANIZATION:** Retired
ADDRESS: 20505 HWY 89	**CITY:** Markleeville
STATE: CA **ZIP:** 96120	**PHONE:** 530-694-2399
EMAIL: horsefeathers@gbis.com	

HOW DID YOU HEAR ABOUT THIS MEETING? X NEWSPAPER ___ RADIO ___ TV ___ LETTER ___ WORD OF MOUTH ___ WEBSITE ___ OTHER

COMMENTS:

ATTN: If convenient for you please include these comments along with my earlier comments (written & verbal) at the 9/2/09 public meeting at Turtle Rock Park – Markleeville.

26a Why shouldn't STPUD provide at least part of their W. Carson R. allotment (900 AF) designated for the District's Diamond Valley Ranch (1400 acres) to augment the Indian Creek Reservoir to suppliment the inadequate 555 AF/year water allotment because that amount is not sufficient enough to raise the lake level above the contracted (Alpine County & Cal. Dept Water Resources-Davis Grunsky Act loan) minimum lake level due to the conveyance system's seepage and the evaporation rate ~~loss~~ that is greater than the inflow. Each year the lake level drops further ~~than the~~ than the 25% its already below the legal minimum level.

9/09/09 as indicated during this meeting.

SEND COMMENTS BY 09/06/2009 TO:

MAILING ADDRESS:	**South Tahoe Public Utility District** **1275 Meadow Crest Drive** **South Lake Tahoe, CA 96150**	**E-MAIL ADDRESS:** **FAX:**	**jhoggatt@stpud.dst.ca.us** **530-541-0614**

27

Draft Board Workshop Notes

Board Workshop Wednesday, July 22, 2009 at the District Boardroom.

These notes were compiled by Richard Solbrig and Ernie Claudio

Attendees: Richard Solbrig, Mary Lou Mosbacher, Dale Rise, Ernie Claudio, Jim Jones, Eric Schafer, John Runnels, Peggy Cocores, Ken Kurtzweiler, John Cefalu, Chris Cefalu, Todd Williams, Mary Jane Sanchez.

1. **Solar Energy**:
   a. **Return on Investment (ROI):** The District will continue to consider green projects, with an appropriate ROI required before pursuing them.
   b. **Smaller Installations:** It was mentioned that the District might invest in some smaller more cost effective solar units in order to gain experience with solar technology.
   c. **Security:** Check on Homeland security grants for fencing to protect solar installations.
   d. **Customer Survey:** Director Schafer suggested a question be placed on the next customer survey about their willingness to invest in solar energy.
   e. **Passive Solar:** Passive solar should be considered for new District projects.
   f. **Future Plans:** It was suggested that a budget item for solar be included in the 10/15/25 year plans.
   g. **Power Purchase Agreement (PPA):** Check with companies offering PPA's on a regular basis to see if the deals are getting better.
   h. **Energy Buy-Back Cap:** The State will be requiring that local power providers buy back surplus solar energy from its customers. Check to see where the cap is.

2. **Water Meters:**
   a. **Water Auditor:** Complete a detailed description of the duties of the Water Auditor and the associated costs.
   b. **Future Plans:** Include a budget items for water meter installations in the 10/15/25 year plans.
   c. **Future Plans:** Include a budget items for water line replacements in the 10/15/25 year plans.
   d. **Public Outreach:** Inform the District customers about the water meter law, the costs and the schedule.
   e. **Water Rates:** Complete at water rate study by January 2010.
   f. **Water Audit:** It was suggested that the District audit the current commercial users to see if any users are wasting water.

3. **Budget Savings Cost Measures:**
   a. **Travel Costs:** It was suggested that we look into the possibility of reducing some of the travel expensed associated with non-required training events and information seminars.
   b. **Medical Costs:** It was suggested the District examine different options to reduce medical costs when the current MOU's are doe to expire. For example, the possibility of raising the healthcare co-pay with the incentive of a $100 bonus for each employee who does not have a doctor's visit for that month. This is being done at the Lake Oroville Area PUD.
   c. **Agenda Meetings:** It was suggested that we look into the possibility of having some agenda meetings without attorney services.
   d. **Changing Auditors:** It was suggested that we look into the possible benefits of changing auditors every five years.

4. **Use of Consultants:**
   a. **Limited Term Retirees:** It was suggested that we look into the possibility of using the limited term hiring of a retiree instead of using a consultant.
   b. **Consultant Pool:** It was suggest that we look into the possibility of using a consultant pool with reduced rates.

5. **Legal Services RFP:**
   a. **Legal Services RFP:** It was suggested that we put out and RFP for legal services for non-special venues.
   b. **Ad Hoc Committee:** It was suggested that we create an ad-hoc committee to define the scope of services and the desired time period for these legal services.

6. **Need for additional workshops was acknowledged.**

Agenda Item Questions

Consent Calendar:

7. **Item B** – Unpaid Assessments:
   a. How often is this done?
   b. What percent of these monies are we expecting to recover?
   c. Can we end up in court because of a dispute over Prop.218?
8. **Item D** – GIS Maintenance and Development:
   a. How is this mapping system different than the InfaMap system?
   b. Will the District need the services of this contractor next year?
   c. How many "third-party" software purchases are needed?
   d. Is the development of the "synchronize" tool a one-time cost?
   e. What advantage does a GPS location of waters meters have over the system the District presently uses?
   f. Who presently updates the GIS table for customer accounts?

g. How many times is the permit table in GIS updated annually?

h. How many times is the easement table in GIS updated annually?

i. After the Engineering Specialist are trained will the District need any future updating services from this contractor?

j. Who will cover the costs of renting a laser rangefinder if the contractor needs one?

k. How long will it take to complete the GPS Survey (item 3.10)?

l. In the past, how has the District been updating hydrant locations and attributes?

m. How much will it cost to deploy the ArcReader access tool?

n. How often has the District needed to edit the service lateral line data?

9. **Item E** – 2009 Water Meter Installation Project

a. What are the present estimated costs for: 1) meter purchase, 2) meter installation, 3) engineering?

Payment of Claims:

Page	Vendor	Department	Description	Amount	Question
10	Pacific Mechanical	Engineer – Eff. Eval	Rep. Exp. Pumps	$43,525	What is being done here?
15	Underwater Resources	Gen. Admin. – ICR TMDL	Const Retainage	$7,925	What are they doing?
16	Winzler & Kelly Consult.	Operations – Map UG Utilities	Plant GIS	$8,551	How many more payments?

Recycled Water Facilities Master Plan
ENVIRONMENTAL IMPACT REPORT

The application and use of recycled water in the Tahoe Basin is forbidden because of the hazarders associated with this material. The use of sprinkler to apply recycled water in Alpine county is mentioned twice (see attachments) in EIR report. Applying recycled water to the ground is one
27a thing, applying it to the atmosphere, where it can blow miles down-wind, is potentially dangerous. Does the District want to assume this liability?

Table 6. Monthly Average Total Precipitation for Markleeville, CA (WRCC 2008)

Month	Average P (in)
January	3.72
February	3.14
March	2.10
April	1.29
May	0.99
June	0.60
July	0.39
August	0.46
September	0.47
October	0.93
November	2.11
December	3.01
Annual total=	19.20

4.1.5.2 Irrigation Method Efficiency

Irrigation efficiency varies with the method chosen for distribution. For the initial development of this NMP, surface (flood/furrow) irrigation and spray irrigation (hand/wheel lines or center-pivot sprinklers) were analyzed. The efficiency rates are listed in Table 7 (Metcalf and Eddy 1991).

Table 7. Irrigation Efficiency (Metcalf and Eddy 1991)

Irrigation Method	Efficiency (%)
Surface	65
Spray	70

4.1.6 Limiting Factor Determination

The hydraulic loading rates based on irrigation water, nitrogen limits, and soil permeability were calculated for the following four combinations:

- alfalfa/surface
- alfalfa/spray
- pasture grass/surface, and
- pasture grass/spray.

There were three loading rates (consumption, nitrogen, and permeability) calculated for each of the four combinations listed above. The comparison of the three hydraulic loading rates ensures that the quantity of recycled water applied to the crops will adequately fulfill specific crop requirements, safely percolate through the soil profile, and protect groundwater. In comparing these hydraulic loading rates, the lowest value of the three (maximum allowable application rate of recycled water) is the primary limiting factor. Please see Section 5.0 Hydraulic Loading for more in-depth discussion.

Harvey Channel is to direct Indian Creek flows (exceeding the conveyance capacity of the Upper Dressler Ditch) around the Harvey Place Reservoir. The Upper and Lower Harvey Channels carry freshwater only and enter Indian Creek below the dam of the Harvey Place Reservoir.

27b WHAT IRRIGATION METHOD WILL BE USED FOR THE PASTURE LAND?

The configuration of the irrigation and associated minor grading will need to include a means of continuing the ability to spill very high flow rates (induced by flood or snowmelt) out of the Harvey Channel. Alternatively, the Upper Harvey Channel could be enlarged to contain the peak flow rate induced by a 100-year storm event with berms to prevent recycled water from entering the channel. A variation on this project component will be to irrigate the District Pasture with freshwater if the Diamond Valley Ranch is irrigated with recycled water. In this case the water rights from the District Pasture will be used to resume irrigating the District Pasture and a portion of the water rights of Diamond Valley Ranch will be used for storage in ICR. The basis of this variation is that the original water rights for irrigating the District Pasture were transferred to storage in ICR. Since the District Pasture is no longer irrigated, it may be desirable to resume irrigating to restore the land as a pasture.

30. *Irrigate the "Jungle" with Recycled Water*

The District obtained land known as the "Jungle" with its purchase of the Diamond Valley Ranch. The jungle is located northwest of the Snowshoe Thompson No. 2 Ditch and north of the Millich Ditch. At its nearest point the jungle is approximately 1,100 feet from the West Fork of the Carson River. The jungle is not currently irrigated and is characterized as sloping and bottom valley land. There are approximately 150 acres that will be irrigated with recycled water once infrastructure is constructed to convey water to this area. The need for additional lands may arise from loss of lands currently irrigated with recycled water due to subdivision or some other cause, or by increased annual volume of recycled water resulting from growth in the District's service territory. Spray irrigation methods will be utilized as the irrigation method. Water will be supplied under pressure from a pipeline branching off the existing C-Line or from the proposed pressurized line that would pump water back to Harvey Place Reservoir (Component 11).

31. *Divert Stormwater Flow Away from Harvey Place Reservoir to Indian Creek Reservoir*

This project component constructs a ditch near the southeast corner of the Harvey Place Reservoir to intercept stormwater and drainage flows that currently flow into the Harvey Place Reservoir and divert them to ICR. The purpose will be to reduce stormwater flow into the Harvey Place Reservoir thereby increasing the available recycled water storage volume of the Harvey Place Reservoir. Another benefit of this project component will be to increase the amount of freshwater entering ICR. A method of sediment control may be necessary to reduce sediment loading in ICR. This component will be implemented only if recycled water volume increases and additional storage volume for recycled water in Harvey Place Reservoir is needed, or if additional freshwater is needed in ICR to improve water quality and meet

10

Appendix P - Response to Comments Received on Draft EIR

Appendix P - Response to Comments Received on Draft EIR

Table P-1				
Comment Number	**Date**	**Commenter Name**	**Comment Summary**	**Response to Comment**
1a	1/27/2009	David Gutierrez, Cheif, Division of Safety of Dams, California Department of Water Resources	Indian Creek Dam and Harvey Place Dam are currently under the jurisdiction of the Division of Safety of Dams. If an alteration is anticipated an alteration application together with plans and specifications must be filed with the Division.	The District acknowledges that prior to alternations to Harvey Place Dam or Indian Creek Dam the District will submit an alteration application, specifications and plans to the Department of Water Resources, Division of Safety of Dams.
2a	8/3/2009	Bridget Binning, California Department of Public Health, Environmental Review Unit	CDPH, Division of Drinking Water and Environmental Management is responsible for issuing water supply permits. A new or amended permit may need to be issued for the above referenced project if it includes an increase in water supply, storage, or treatment of drinking water.	The projects that comprise the Recycled Water Facilities Master Plan do not modify the supply, storage or treatment of drinking water and thus do not require new of amended permits. The District will apply for a new of amended permit if future project-level analysis determines an increase in water supply, storage or treatment of drinking water that was not determined during programmatic-level analysis. The project level analysis completed for project components 11, 18 and 19 concludes that there are no environmental impact on water supply, as detailed in Chapter 9 of the EIR.
3a	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	DEIR fails to provide mitigation that reduces impacts to sensitive species to a level that is below significance. Table 11-6 identifies potential adverse impacts associated with a large number of the project components and these impacts will not be reduced below a level of significance, before or after mitigation.	The EIR was modified to expand Mitigation Measures BIO-1 and BIO-5A to protect biological resources as outlined in Appendix D. Based on these modifications the determinations were revised to state the impacts will be reduced to less than significant.
3b	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	Recommend DEIR be revised so that it contains the means to either avoid impacts to state-listed species, or fully mitigate the project's impacts.	The EIR has been revised to avoid or mitigate the projects impacts as described in response to comment 3a.

Table P-1

Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
3c	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	DEIR fails to discuss the project's potential impacts to migratory deer. The project site is located in an area designated as winter range for the Carson River deer herd. The proposed project is likely to exacerbate the loss of limited winter range habitat. Recommended that the DEIR be revised to describe the potential loss of winter range habitat resulting from the conversion of native rangeland to irrigated pasture.	The analysis in Chapter 11 has been revised to include modifications to the analysis and clarifications of mitigation measure BIO-4A (Page D-55) for bridges over existing conveyance facilities to allow for passage of migrating deer resulting in a less than significant impact. Loss of winter range was included in the DEIR analysis and determined that no significant impact would result to deer populations. Discussions with DFG clarified that no conversion winter range would occur, but that projects may be implemented in winter range habitat. A summary of DFG meetings and consulatation is included in Appendix K. Loss of habitats would be offset as defined by SP-25 as outlined in Appendix D and will result in less than significant impacts.
3d	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	Recommend DEIR be revised to contain measures that reduce or mitigate the loss of winter range habitat for deer.	See Comment 3c.
3e	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	Recommend DEIR be revised to include a discussion of how any proposed water conveyance structures may create barriers to deer movement and how those impacts may be reduced.	See Comment 3c.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
3f	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	Recommend DEIR be revised to address the potential for recycled water to enter natural freshwater bodies through runoff from irrigated pastures, or via leaks or spills from conveyance facilities. DEIR should contain measures to either avoid water quality degradation, or mitigate the effect below a level that is significant.	The potential for recycled water to enter freshwater bodies is less than significant through implementation of standard practices that are required by law or committed to by the District as part of the project component. These standard practices include: SP-11 Erosion Control/Stormwater Pollution Prevention Plan (outlines protection of water bodies during construction and operations); SP-17 Pipeline Design Features in Active Fault Zones (requires automatic shut off valves to control and isolate impacts from pipe breaks); SP-21 Temporary Containment and Impoundment Siting and Design (requires adequate freeboard to reduce risk of overtopping during a seismic event); SP-33 Surface and Groundwater Protection Plan (implements tailwater management and containment practices, 25 foot setbacks and buffers for surface water quality protection, release prevention and public protection strategies, and monitoring actions); SP-34 Application and Temporary Containment Infrastructure Maintenance and Monitoring (Visual inspection after high runoff events and periodic maintenance to prevent degradation of surface water quality from slope or levee failure or impoundment spills); and SP-35 Conveyance Infrastructure Maintenance Plan (annual inspections of pipelines and periodic maintenance to prevent degradation of surface water quality from pipeline failure).

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
3g	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	DEIR should consider whether implementation of the proposed project will result in reasonably foreseeable potentially significant impacts subject to regulation by CDFG under Section 1600 et seq. of Fish and Game Code.	Projects that potentially impact rivers, streams or lakes require the issuance of a Lake or Streambed Alteration Agreement (LSAA) from CDFG. This agreement is required by law and is a standard practice of the Recycled Water Facilities Master Plan. Projects 1, 2, 12 will not require a LSAA. Future Master Plan projects may require a LSAA. The district will comply with this requirement. See comment 3h below.
3h	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	In the event implementation will result in reasonably foreseeable substantial adverse effects on fish or wildlife , a Lake or Streambed Alteration Agreement (LSAA) will be required. DEIR should analyze potentially feasible mitigation measures to avoid or substantially reduce impacts requiring a LSAA from theCDFG.	The EIR has been revised to include modifications to the analysis stating whether the actions will require a LSAA. Implementation of Component 11will require a LSAA to be issued by CDFG for bypass pipeline alternative alignments A and C. The EIR includes language clarifying this requirement on Page 11-49.
3i	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	This project will have impacts to fish and/or wildlife habitat. Assessment of fees under Public Resources Code Section 21089 and as defined by Fish and Game Code Section 711.4 is necessary. Fees are payable by project applicant upon filing NOD.	Upon filing the Notice of Determination (NOD), fees will be paid to CDFG in accordance with Public Resources Code Section 21089 as defined by Fish and Game Code Section 711.4
3j	8/12/2009	Kent Smith, Habitat Conservation Program Manager, California Department of Fish and Game	Pursuant to Public Resources Code Sections 21092 and 21092.2 the CDFG requests written notification of proposed actions and pending decisions.	In compliance with Public Resources Code Section 21092 and 21092.2 CDFG will receive written notification of the proposed actions and pending decision required for adoption and execution of the Recycled Water Facilities Master Plan.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
4a	8/26/2009	Robert Levy, Undersherrif, Alpine County Sheriff's Office	Owns 19 acres in River Ranch - since properties water rights were sold away prior to the subdivision being created, many are interested in some of the effluent being used for pasture irrigation. Sage brush is overtaking pastures so interested in flood irrigation. A pipe or ditch would be an easy solution. Can you please inform me of District's intent.	The application of recycled water in the River Ranch area is not a project of the Recycled Water Facilities Master Plan. The comment will be provided to the District Board for their consideration. Future modification of the Master Plan requires environmental documentation and public scoping. The District's intent is outlined in the Sections 9 through 13 of the Recycled Water Facilities Master Plan. Component 6 - provide Pressurized Recycled Water to the Ranchettes addresses this comment.
5a	9/2/2009	Shirley Tabor	Eight years ago it was projected more effluent coming down the pipe. Please state what flows were projected then, and what is flowing now.	Section 5 of the Recycled Water Facilities Master Plan outlines three different methods used for the projection of flows through 2028 and presents annual flows for years 1997 through 2006.
6a	9/2/2010	Denise Murphy	There has been no water in Indian Creek for two years. Why?	There are no flows in Indian Creek because of drought conditions.
7a	9/2/2011	Russ Wickwire	What are the realistic expectations that the District will be able to meet delivery (fish in ICR and Indian Creek). What are the legal ramifications that District is responsible for maintaining minimum pool elevation of water in ICR and the District's responsibility to maintain adequate trout habitat. Flood waters being stored in ICR?	Comment does not raise significant environmental issues related to the Recycled Water Facilities Master Plan and no response is required. Two project components of the master plan, Component 17 - Increase Snowshoe Thompson No. 1 Conveyance Capacity and Component 24 - Transfer Additional Water Rights to Storage in Indian Creek Reservoir would provide for additional flows to reach ICR, which could potentially raise the water levels in ICR and subsequently enhance the water quality and habitat of the fresh water fishery. The concern over management of ICR has been submitted to the District Management for consideration.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
8a	9/2/2012	Ed Hinchel	Where does the water come from? It goes from SLT to farmers? Needs clarification of systems in operation.	The recycled water is Secondary-23 treated wastewater generated from the District's Wastewater Treatment Plant (WWTP) located in South Lake Tahoe, CA and managed in accordance with the Waste Discharge Requirements from the State Water Resources Control Board. Board Order R6T-2004-0010. The recycled water is delivered to Alpine County ranchers under contract with the District.
9a	9/2/2013	Dan Sedergren	Currently there is insufficient recycled water for ranchers? Is all recycled water being used? You expand the land, where does the water come from? Water from effluent development is not going to increase.	The recycled water volume supplied by the District's WWTP is used in its entirety. Please see the analysis in Section 5 of the Recycled Water Facilities Master Plan, which calculates the current supply and demand as well as the protected supply and demand.
9b	9/2/2014	Dan Sedergren	Are there controls in place to preclude the addition of new land before the water is available?	The Recycled Water Facilities Master Plan does not include the provision for the acquisition of new lands, but does provide for the permitting of lands owned by the District and irrigators in Nevada to received recycled water (Project Components 1, 2 and 19).
10a	9/2/2015	Denise Murphey	Is it the intent of the District to use land that is being purchased to only be utilized in emergency situations and not when I'm not getting water that I need?	Indian Creek contains freshwater that is not used for District irrigation activities. Seven irrigation fields will be constructed on Diamond Valley Ranch. Two of the seven fields will also be developed for temporary containment for recycled water in the event of a flood (Project Component 11). The Diamond Valley Ranch will continue to be irrigated freshwater and grazed with cattle. Upon completion of Component 11, the fields will be irrigated with recycled water exported from the plant in South Lake Tahoe (WWTP) and the cattle will be removed. See pages 2-41 through 2-43 of the EIR for a complete description of the project.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
11a	9/2/2016	Russ Wickwire	ICR has less and less water. Even with full amount in Indian Creek, basically it does not keep up with evaporation and saturation in conveyance system.	See response to comment 7a.
12a	9/2/2017	Zach Wood	Description of components with some triggers and District might annex more land than what is existing. What is the expectation of lands to be annexed in the foreseeable future?	The annexation of additional lands into the South Tahoe PUD service boundary is not anticipated and not included as a trigger in the Recycled Water Facilities Master Plan.
12b	9/2/2018	Zach Wood, Alpine County Planning Department	Where is this in the document? Two levels of Master Plan - greater Master Plan if that changes how much input would Alpine County residents get in that process? Subdivision is more tangible to foresee.	Modifications of the Recycled Water Facilities Master Plan requires public scoping and noticing and the incorporation of comments from Alpine County residents into the planning process. The District intends on updating the Recycled Water Facilities Master Plan on a regular basis.
13a	9/2/2019	Dan Sedergren	Would annexation be included as a trigger?	See Comment 12a. Annexation is not included as a trigger.
14a	9/2/2020	Will Richmond	Was oxygenation of ICR discussed in presentation? Will there be a public presentation planned?	The ICR oxygenation system was processed under a separate environmental document (Mitigated Negative Declaration, Clearinghouse number 2007102083). Public presentations are planned by the District.
15a	9/2/2021	Russ Wickwire	Oxygenation is not functioning properly in lake. No oxygen in lake according to samplers.	Evidence was not provided that the oxygenation system is not functioning properly in Indian Creek Reservoir. The oxygenation system is not a part of this Master Plan. This comment is being provided to District Management. Please contact District Management at 530.544.6474.
16a	9/2/2022	Andy Lovell	Trying to understand the irrigation. If it is used in Alpine County - what is it going to be used for? Flood or spray irrigation?	Recycled water will be used for surface, aerial and subsurface irrigation depending on the location of the application. See as outlined Chapter 2 of the EIR for project descriptions and locations.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
16b	9/2/2023	Andy Lovell	What about The Jungle? Is that all flood irrigation or spray?	Project Component 30 - Irrigate the Jungle with recycled water utilizing spray irrigation as the method of water application. As described in Chapter 2 of the EIR (page 2-18), the jungle will be irrigated will recycled water. The irrigation method will be determined as part of the Nutrient Management Plan (NMP)prepared for project-level analysis of Project Component 30. Application methods are dependent on specific site characteristics, such as topography, soils, and crop management.
16c	9/2/2024	Andy Lovell	Is it possible to create aerosol and health hazard with spray irrigation?	It is possible to create aerosol using spray irrigation. The State of California Water Resources Control Board permits the use of recycled water for irrigation. Chapter 10 of the EIR identifies the Alpine County School complex as a sensitive receptor in close proximity to the District's Pasture. Subsurface irrigation measures and buffer areas (Project Component 16) are proposed in this area to prevent exposure of sensitive receptors to recycled water aerosols. The temporary containment areas and application areas (Project Component 11) using spray or flood irrigation methods will be fenced and signed to prevent unauthorized access. These standard practices are outlined in SP-33 Surface and Ground water Protection Plan
16d	9/2/2025	Andy Lovell	Where is The Jungle?	Figure 2-4 shows the location of Project Component 30 Irrigate the Jungle with Recycled Water.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
17a	9/2/2026	Russ Wickwire	What are the realistic expectations that the proposed future modifications of the present agreement documents will be able to meet the delivery volumes and timing that will reflect unsatisfied contractual and other promised results at ICR before environmental conditions become uncorrectable in the future.	The ICR oxygenation system was processed under a separate environmental document (Mitigated Negative Declaration, Clearinghouse number 2007102083). The comment does not address the Recycled Facilities Master Plan or specific analyses contained in the EIR. Please contact Hal Bird at the District office (530-544-6474) for further information. No response is required.
17b	9/2/2027	Russ Wickwire	How can the District state to support the recreational and trout environment values when earlier they would not take corrective actions early on to correct potential problems?	See response to comment 17a.
17c	9/2/2028	Russ Wickwire	What are the legal ramifications that District is responsible to correct these legal breaches of contract and verbal promises?	See response to comment 17a.
17d	9/2/2029	Russ Wickwire	What are the preliminary results of the newly installed Hyporlimnitic Oxygenation System acquired to promote higher aquatic oxygen level at ICR?	See response to comment 17a.
17e	9/2/2030	Russ Wickwire	How realistic is it that ICR anglers can expect to catch trout in the near future? Boat anglers have very poor launching opportunities and shore anglers have problems with a near shore aquatic vegetation barrier.	See response to comment 17a.
17f	9/2/2031	Russ Wickwire	What has transpired with the promised construction of a new boat ramp on the more launching favorable east shore near the dam?	See response to comment 17a.
17g	9/2/2032	Russ Wickwire	How will the District compensate the BLM for the continuing loss of campers at one of the best public campgrounds in the west?	See response to comment 17a.

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Comment Number	**Date**	**Commenter Name**	**Comment Summary**	**Response to Comment**
17h	9/2/2033	Russ Wickwire	Does the District, as it stated in the EIR, expect to continue to enjoy the existing cooperative venture with Alpine County when they don't honor and comply with their mutually agreed upon contract to comply with the minimum lake level, it will produce an aseptic disappointing high sierra trout lake with a deteriorated trout fishery.	See response to comment 17a.
17i	9/2/2034	Russ Wickwire	What is the District doing to promptly increase the quality and quantity of trout waters at ICR.	See response to comment 7a.
17j	9/2/2035	Russ Wickwire	What is the availability of the Districts W. Fork Carson River water allotment now being used on the 1400 acre Diamond Valley Ranch that is owned by District for irrigating lands to raise cattle?	See response to comment 17a.
17k	9/2/2036	Russ Wickwire	What steps are being taken to allow flood waters to be stored in ICR if even for a short period of time until the snow melt is concluded?	See response to comment 17a.
17l	9/2/2037	Russ Wickwire	Why doesn't the District obtain a loan to purchase an adequate conveyance system to provide better utilization of waters to ICR?	See response to comment 17a.
17m	9/2/2038	Russ Wickwire	Will the continued ICR environmental deteriorations have a bad public and professional perception on the District's past impressive worldwide reputation as a progressive public utility of the past or will the District rally "around the flag: and promptly correct the ICR environmental issues before it is too late?	See response to comment 17a.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
18a	9/3/2009	Ernie Claudio, District Board Member	Can optimization of application rates be modified? Are there rules? When pursue permitting for more land? What does this involve?	Nutrient Management Plans (NMPs) will be generated for each Project Component that involves the application of recycled water.. NMPs determine the optimal application rate based on site-specific characteristics. Permitting of additional land requires the approval from California Water Quality Control Board Lahontan Region (Lahontan), California Department of Fish and Game (CDFG), US Fish and Wildlife Service (USFWS) and Alpine County depending on the specific location.
19a	9/3/2010	Jim Jones, District Board Member	Anything significant from yesterday's meeting?	Comment numbers 5 through 16 summarize the verbal public comments recorded at the Turtle Rock Park public meeting.
20a	9/3/2011	Paul Sciuto, District Assistant General Manager	One question regarding safety of aerosol from spray irrigation and associated health issues.	See response to comment 16c.
21a	9/3/2012	Jim Jones, District Board Member	When this was started there were other items included that were nice to dos. How could we incorporate these into Master Plan? Can they be done separate?	Modification to the Recycled Water Facilities Master Plan requires appropriate environmental documentation with appropriate scoping and review in compliance with CEQA.
22a	9/4/2009	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports optimizing the application rate for recycled water for irrigation purposes on existing permitted lands in Alpine County.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project Components 18 will optimize the application rate of recycled water on existing permitted lands in Alpine County.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
22b	9/4/2010	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County has concerns with providing water to irrigators in NV. The County urges the District to pursue improvements to infrastructure that would allow for application to existing permitted lands that are not receiving recycled water.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project components 4, 5 and 6 will improve conveyance systems to existing permitted lands in Alpine County, which will allow for additional application of recycled water in the Fredricksburg System, Wade Valley and the Rachettes. Project component 1 pursues application of recycled water to new non-irrigated, permitted land in Alpine County.
22c	9/4/2011	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	Tailwater detention systems should be included in all alternatives.	The comment will be provided to the District Board for their consideration. Component 21-Develop Tailwater Control Systems is included in Alternative 2 - Master Plan Projects. The District's Board has the option to include this Project Component in Alternative 3 and 4. SP-33 - Surface and Ground Water Protection Plan, which will be implemented as part of the adopted alternative that includes Tailwater Management and Containment Practices as required for compliance with Lahontan's waste discharge requirements and with the Nutrient Management Plan (NMP) prepared for the Diamond Valley portion of the project area (pages D-39 and D-40).
22d	9/4/2012	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports transferring water rights to ICR to improve water quality and habitat.	The comment will be provided to the District Board for their consideration. Alternatives 2 and 4 include Project Component 14, Transfer Additional Water Rights to Storage in ICR.
22e	9/4/2013	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports using piped irrigation technologies for the application of recycled water.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project components 3, 4, 5, 6, 11, 14 and 22 will incorporate piped irrigation technologies for the application of recycled water.

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Comment Number	**Date**	**Commenter Name**	**Comment Summary**	**Response to Comment**
22f	9/4/2014	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	Pressurized water systems are highly desirable in providing efficient delivery of recycled water to permitted areas.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project components 4, 5 and 6 will implement pressurized water systems to provide recycled water to the Fredericksburg system, Wade Valley and Ranchettes.
22g	9/4/2015	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County urges the District to consider expansion of the existing hydrant system to provide additional access points closer to residential development in the Mesa Vista and River Ranch locations.	The comment will be provided to the District Board for their consideration. The comment is outside the scope of this EIR.
22h	9/4/2016	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports the recycled water wholesale program for new permitted uses only. Maintaining historical relationships with existing permitted irrigators is critical.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR.
22i	9/4/2017	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County encourages District to work with NDEP regarding any diversion of recycled water to NV.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Diversion of recycled water to irrigators in Nevada will require the coordination with NDEP, which is the surface and ground water regulatory agency for the State. Regulations and process are disclosed in Chapters 7, 8 and 9 of the EIR.
22j	9/4/2018	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports the transfer of water rights to storage in Indian Creek. Increased flows would improve water quality.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project component 24 will pursue the transfer of additional water rights to storage in ICR.
22k	9/4/2019	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports transferring water from other locations in the County including Red Lake to improve water quality and habitat.	The comment will be provided to the District Board for their consideration. The comment is outside the scope of this EIR.
22l	9/4/2020	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	The County supports the development of biomass and/or wetland sod and seed production, native plant nursery and other economic development opportunities.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. Project components 12 13 will pursue growing biomass crops and wetland seed and sod production, respectively.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
22m	9/4/2021	Phillip D. Bennett, Chair, Alpine County Board of Supervisors	No specific comments on the document at this time. The County will work with District on permitting and monitoring future Master Plan projects that are under their jurisdiction. Some projects in DEIR will require entitlements from Alpine County and additional CEQA compliance documentation. The three immediate projects proposed do not require County approvals or further CEQA documentation.	The comment will be provided to the District Board for their consideration. The comment does not suggest modification of the EIR. The comment is noted in support of the adequacy of project-level analysis for Project components 11, 18 and 19.
23a	9/8/2009	Daniel H. Brewer, Chief, Office of Rural Planning & Administration, California Department of Transportation	Caltrans has no comment at this time, but reserves the right to comment on any project level environmental study. As several of the proposed water conveyances will cross State Routes 88 and 89 at various locations, an encroachment permit will be required by lead agency.	The District will apply for encroachment permits within the California Department of Transportation right-of-ways prior to construction.
24a	9/8/2010	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Please provide them with: 1) Two copies of DEIR and FEIR 2) A resolution certifying the EIR, SOC, and a MMRP, making CEQA findings 3) All comments received during the review period and District's response 4) District's adopted MMRP and SOC 5) NOD filed with OPR In addition notice of any hearings or meetings.	The District is pursuing Clean Water State Revolving Fund financing for the Recycled Water Facilities Master Plan Project 1 and Project 2 and will provide the the required information to State Water Resources Control Board.
24b	9/8/2011	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	The Clean Water State Revolving Fund (CWSRF) is partially funded by USEPA and requires additional "CEQA-Plus" environmental documentation and review. Any environmental issues raised must be resolved prior to commitment of CWSRF funding.	The District will provide the CEQA-Plus environmental documentation for each project requiring federal funding. The CEQA-Plus document for Projects 1, 2, 11 and 12 is provided in Appendix N.

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Comment Number	**Date**	**Commenter Name**	**Comment Summary**	**Response to Comment**
24c	9/8/2012	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Prior to funding projects are subject to provisions of the FESA and must obtain approval from USFWS and/or National Marine Fisheries Service (NMFS).	Approval from USFWS is not required because the analysis for Impact BIO-1 determined that no impacts to sensitive species will occur from construction and operation of Project Component 11. Other components of the project to be implemented in the future may impact special status species and will require approval from USFS and/or NMFS.
24d	9/8/2013	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	State Board can consult with USFWS on behalf of the District regarding federal special status species.	The District acknowledges the State l Board may consult with USFWS regarding special status species. Future projects will be evaluated on a project basis at the appropriate time in the processing of the project.
24e	9/8/2014	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	CWSRF projects must comply with federal laws pertaining to cultural resources, specifically Section 106 of the NHPA and the State Water Board Cultural Resources Officer who consults directly with SHPO. Please provide CRO with a copy of current records search. The District will need to identify the Area of Potential Effects (APE). Native American and Interested Party Consultation is required for 106 compliance.	The District will provide, as a part of the grant application, a current (2009) records search and the identification of the Area of Potential Effects. Section 15.2.1 of the EIR identifies that the analysis for existing projects which require federal funding are based on field studies and archival research. The District agrees to comply with any required future consultation.
24f	9/8/2015	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Compliance with the Migratory Bird Treaty Act is required. Please provide a list of any birds protected under this Act that may be impacted by the project and identify conservation measures to minimize impacts.	The new appendix (Appendix M) provides a list of migratory birds that could be present in the area. SP-30 outlines protection measures for migratory birds. Impacts to migratory birds will be less than significant based on implementation of BIO-1, BIO-4B and SP-30.

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24g	9/8/2016	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Specific to the EIR - due to the structure of the Environmental Analysis section it is difficult to determine whether the Master projects have been adequately evaluated at a project specific level. Request that the Environmental Analysis section in the Master Plan be restructured to include separate analyses distinct from the programmatic-level analysis for the Projects to be funded by the CWSRF Program.	The new appendix (Appendix N), extracts the project-specific analysis of the significant impacts for Components 11, 18 and 19 from environmental resource Chapters 4 through 18.These project components comprise Recycled Water Facilities Master Plan Projects 1, 2, 11 and 12. Appendix N copies the project-specific analysis to assist the reviewer in extracting the information pertinent to project components 11, 18 and 19. The appendix does not present new data or analysis not provided in the resource chapters. The conclusions remain the same.
24h	9/8/2017	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Please include Record Search maps with all sites and surveys mapped in relation to the project sites and APES, as well as all staging areas and depths of construction.	Record searches will be conducted prior to implementation of each component to assure the most recent information is used. See Comment 24e and 24g.
24i	9/8/2018	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Mitigation measures GW-1A and GW-1B state the District will "Determine a Nutrient Neutral Grazing Regimen for the Diamond Valley Ranch and "Determine Maximum Duration for Temporary Containment." Mitigation cannot be deferred to a future date as stated by CEQA Guidelines Section 15126.4(b). Please correct mitigation measures to include specific, feasible actions that will improve adverse environmental conditions, be measurable to allow monitoring, and be enforceable, as stated by CEQA Guidelines Section 15370.	Recommended Mitigation Measures GW-1A and GW-1B are revised to include specific, feasible actions to improve adverse environmental impacts. SP-33 Surface and Ground Water Protection Plan outlines the applicable monitoring actions. The District will not graze cattle on portions of the Diamond Valley Ranch that are irrigated with recycled water (GW-1A) and the District will not temporarily contain recycled waters for a time period that exceeds 100 days (GW-1B). Mitigation Measure GW-1A requires that the District cease cattle grazing in areas of Diamond Valley Ranch when irrigating with recycled water. The removal of cattle grazing under a recycled water

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
				irrigation regime assures the protection of groundwater resources. See the Grazing Tech Memo in Appendix F for the detailed analysis. SP-34 Surface and Ground Water Protection Plan outlines the applicable monitoring actions. Mitigation Measure GW-1B requires that the District engineer the temporary containment fields (Project Component 11) in such a manner that groundwater resources are protected. The District requires a temporary containment period of no less than 24 days for impoundment of approximately 95 million gallons of recycled water. The ideal containment duration is between one and 60 days to allow for management decisions. The soil hydraulic conductivity's determined for this portion of the project area may not allow for this extended period of containment without potential impact to groundwater resources. The District is required to engineer the fields in a way that assures that temporarily contained recycled water does not reach potentially high ground water levels. SP-34 Surface and Ground Water Protection Plan outlines the applicable monitoring actions.

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Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
24j	9/8/2019	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Mitigation Measure BIO-1 includes a requirement to conduct biological resource assessments. This measure is being applied to Components 11 and 19 that make up Master Plan 1 and 2. In order for Master Plan Projects 1 and 2 to be evaluated at project-level analyses, all mitigation measures for the Master Plan Projects have to include specific, feasible actions that will improve adverse environmental conditions, be measurable to allow monitoring, and must be enforceable as stated by CEQA Section 15370. Change BIO-1 to comply with CEQA.	A resource assessment was performed in April 2009 for the Component 11 project area. Component 11 has been removed from Mitigation Measure BIO-1. Information has been inserted into BIO-3 Impact section discussing survey results for the Component 11 and 19 project area. Due to the fact that surveys were performed in winter/spring of 2009, additional surveys shall be performed in Accordance with SP-30 prior to the commencement of construction to ensure no new nests/nursery sites are established and impacted.
24k	9/8/2020	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	SP-30 is being applied to Master Plan Projects 1 and 2. SP-30 Is not feasible mitigation for this impact. Change mitigation measure SP-30 to comply with CEQA Guidelines Sections 15370.	See comment 24j
24l	9/8/2021	Lisa Lee, Environmental Scientist, Division of Financial Assistance, California State Resources Control Board	Pages 13-16 states that "Sensitive receptors are located over one half mile from the closest sensitive receptors and odor complaints will not cause odor complaints." Please clarify this statement to correctly reflect the location of sensitive receptors from projects sites, and the potential to receive odor complaints caused by the Project.	The statement has been revised to clarify: "Sensitive receptors (located at the Alpine County School and associated residential neighborhood) are located over one half mile from the proposed location of the containment and irrigation fields. Odor complaints are not expected due to distance and the location of the irrigation fields being downwind from the receptors."

Table P-1

Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
25a	9/9/2009	Robert Tucker, Water Resource Control Engineer, California Regional Water Quality Control Board, Lahontan Region	The Water Board will require a Report of Waste Discharge that will describe field conditions and how the pumping will be done for the construction of irrigation fields with the ability to pump back to HPR. The Nutrient Management Plan may need to be adjusted to comply with CA laws, which will be reflected in the Waste Discharge Requirements. Main concern is Section 4.2 the last sentence states, "The drinking water standard (threshold) is 10 mg/l however the DISTRICT feels that it is prudent to monitor for a "trigger threshold" of 7 mg/l allowing for alternative management opportunities prior to reaching the regulatory threshold." The Water Board will use the trigger of a statistically significant increase in nitrate as nitrogen or other constituent of concern contributed from the use of recycled wastewater as a trigger to consider alternative management opportunities. If District wishes to maintain that the 7 mg/l is prudent for the Water Board to use as a trigger for response, then the CEQA document should include an analysis to support the use of 7 mg/l as acceptable threshold. This analysis must consider other sources, alternative and reasonable control measures. Otherwise we encourage a NMP that reflect Water Boards may impose more stringent trigger values than proposed in the EIR.	Appendix F contains the NMP for Diamond Valley Ranch, the portion of project area on which the temporary containment fields will be constructed. Existing conditions of the Diamond Valley Ranch are detailed in this report. Groundwater monitoring results for the Diamond Valley Ranch are referenced to Appendices I and J. This portion of the project area is not currently permitted to receive recycled water. Lahontan will issue renewed waste discharge requirements during project permitting, which include the monitoring and reporting requirements for the project. A Report of Waste Discharge will be completed and submitted in accordance with the conditions of project permitting. The suggested clarifying text was inserted into the Diamond Valley NMP, attached in Appendix F. This text updates language in the EIR on pages 7-21, D-39 and D-47. The text does not change the conclusions of the analysis, but clarifies the discretionary action that may be taken by Lahontan. The text is: "In order to determine the hydraulic loading based on nitrogen, Wood Rodgers consulted "WTS-1B: General Criteria for Preparing an Effluent Management Plan," prepared by the Nevada Department of Environmental Protection (NDEP). Capacity Technical Report, Appendix 4). The DISTRICT understands that State Water Boards may impose a more stringent trigger value if an additional factor of safety is desired."

Table P-1				
Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
26a	9/9/2010	Russ Wickwire	The District should provide part of their West fork of the Carson River allotment for the DV Ranch to augment the ICR inadequate 555 AF/yr water allotment because that amount is not sufficient to raise the lake level above the contracted minimum due to the conveyance system leakage and evaporation. Each year the lake level drops lower and lower below the 25% level already below the legal minimum.	Comment is outside the scope of this EIR and does not address specific deficiencies in the analysis nor does it address Recycled Water Facilities Master Plan. No response is necessary.

Table P-1				
Comment Number	Date	Commenter Name	Comment Summary	Response to Comment
27a	7/7/2009	Ernie Claudio, District Board Member	Use of sprinkler to apply recycled water in Alpine county is potentially dangerous.	Sensitive receptors (located at the Alpine County School and associated residential neighborhood) are located over one half mile from the closest sensitive receptors proposed location of the containment and irrigation fields. Odor complaints are not expected due to distance and the location of the irrigation fields being downwind from the receptors. Please see impact AQ-3 in EIR Chapter 13 for detailed analysis (page 13-16). In Alpine County, the State of California Title-22 regulations will apply. The recycled water produced by the District conforms to the state of California's recycled water regulations, which are contained in Title 22 of the California Code of Regulations (Title 22, California Code of Regulations §60301, et seq.). Untreated wastewater contains bacteria, viruses, and parasites that must be removed to allow safe use of recycled water. Title 22 criteria are intended to prevent exposure to these organisms by any of the possible mechanisms: skin contact; ingestion; inhalation of infectious agents in water; or by direct contact with a contaminated object. Recycled water is treated to an appropriate level to protect surface water and to prevent transmission of pathogens through aerosols (small particles of water suspended in air) from spray irrigation. Conventional and widely practiced water and wastewater treatment processes are capable of reducing microorganisms to acceptable levels. Please see page 10-2 for a discussion of the regulations as they pertain to public health and safety.
27b	7/7/2010	Ernie Claudio, District Board Member	What irrigation method will be used for the pasture land?	Project Component 29, Irrigate the District Pasture Land, is described on page 2-17 of the EIR. A combination of aerial and surface irrigation is proposed.

Appendix Q - CEQA-Plus Form

INSTRUCTIONS AND GUIDANCE FOR
"ENVIRONMENTAL COMPLIANCE INFORMATION"

Introduction:

Detailed information, including statutes and guidelines on the California Environmental Quality Act (CEQA), can be obtained at http://ceres.ca.gov/ceqa. A CEQA Process Flowchart that shows interaction points between lead and responsible agencies can be found at http://ceres.ca.gov/topic/env_law/ceqa/flowchart/index.html. In addition, State Water Board environmental staff is available to answer questions about the CEQA process. Please contact your assigned Project Manager to be directed to an appropriate environmental staff person for further clarification.

CEQA Checklist:

All projects coming to the State Water Board for funding are considered "projects" under CEQA because the State Water Board is providing discretionary approval for that funding.

The types of CEQA documents that might apply to an applicant's project include one of the following: 1. Notice of Exemption; 2. Initial Study/Negative Declaration (or Mitigated Negative Declaration with a Mitigation Monitoring and Reporting Program [MMRP]); or 3. Environmental Impact Report (EIR) with an MMRP. The applicant must determine the appropriate document for its project and submit the additional supporting information listed under the applicable section of the CEQA Checklist. Please submit two copies of all documents. If the applicant is using a CEQA document that is older than five years, the applicant must re-evaluate environmental and project conditions, and develop and submit an updated document based on the results of that re-evaluation.

The applicant must ensure the CEQA document is specific to the project for which funding is being requested. Tier I CEQA documents, such as Program or Master Plan EIRs, may not be suitable for satisfying State Water Board requirements if these documents are not project-specific. Instead, the applicant should be submitting a Tier II CEQA document that is project-specific. If this Tier II CEQA document references pertinent environmental and mitigation information contained in the Tier I CEQA document, then the applicant must submit both documents. *[NOTE: Tier I and Tier II documents refer to documents as defined under CEQA. Although the same terminology is used, these documents do not relate to the Tier I and Tier II level of reviews under the CWSRF Program.]*

Each applicant, if it is a public agency, is responsible for approving the CEQA documents it uses regardless of whether or not it is a lead agency under CEQA. Non-profit organizations, however, shall only be responsible for approving the applicable project mitigation measures identified in the MMRP. For purposes of State Water Board funding, all public agencies applying for this funding shall file either a Notice of Exemption or a Notice of Determination with the Governor's Office of Planning and Research (State Clearinghouse). Stamped copies of these notices shall be submitted with the rest of the environmental documents.

If the CEQA document is linked to a National Environmental Policy Act (NEPA) document (such as an Environmental Assessment or an Environmental Impact Statement), then the applicant shall submit the additional corresponding NEPA items with either a Finding of No Significant Impact, or a Record of Decision made by the lead agency under NEPA.

Note that additional information may be requested from the applicant after review of all the environmental documents to ensure the State Water Board can complete its own CEQA compliance.

Federal Information:

CEQA requires full disclosure of all aspects of the project, including impacts and mitigation measures that are not only regulated by state agencies, but also by federal agencies. Early consultation with state and federal agencies in the CEQA process will assist in minimizing changes to the project when funding is being requested from the State Water Board. For the items that follow the CEQA Checklist, the applicant shall provide the information and/or reference any applicable sections from the documents being submitted to assist with environmental staff's CEQA review, as well as to provide applicant guidance on any potential concerns, and to assist with federal coordination as needed.

1. Federal Endangered Species Act (ESA), Section 7:

For further information on the federal ESA relating to law, regulation, policy, and notices, go to http://www.fws.gov/endangered/policy/index.html and http://www.nmfs.noaa.gov/pr/laws/esa/. Note that compliance with both state and federal ESA is required of projects having the potential to impact special status species. Although overlap exists between the federal and state ESAs, there might be additional or more restrictive state requirements. For further information on the state ESA, go to http://www.dfg.ca.gov/habcon/cesa/.

2. National Historic Preservation Act, Section 106:

The NHPA focuses on federal compliance. In addition, CEQA requires that impacts to cultural and historic resources be analyzed. The "CEQA and Archeological Resources" section from the Governor's Office of Planning and Research CEQA Technical Advice Series states that the lead agency obtains a current records search from the appropriate California Historical Resources File System Information Center. In addition, the Native American Heritage Commission (NAHC) will provide a list of Native American tribes to be contacted and that are culturally affiliated with a project area.

The NAHC can be contacted at:

915 Capitol Mall, Room 364
Sacramento, CA 95814
(916) 653-4082

3. Clean Air Act:

For CWSRF financed projects, we recommend including a general conformity section in the CEQA documents so that another public review process will not be needed, should a conformity determination be required. The applicant should check with its air quality management district and review the State Air Resources Board California air emissions map for information on the State Implementation Plan. For information on the analysis steps involved in evaluating conformity, please contact the environmental staff person through the assigned Project Manager.

4. Coastal Zone Management Act:

For affected areas, refer to http://coastalmanagement.noaa.gov/mystate/docs/StateCZBoundaries.pdf. For additional information please refer to http://www.coastal.ca.gov/ccatc.html and/or http://www.bcdc.ca.gov/.

5. Farmland Protection Policy Act:

The Natural Resources Conservation Service provides information on the Farmland Protection Policy Act at http://www.nrcs.usda.gov/programs/fppa. Please see the following website regarding the Williamson Act http://www.consrv.ca.gov/dlrp/lca.

6. Floodplain Management - Executive Order 11988:

Each agency shall provide leadership and take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities. Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain. The generally established standard for risk is the flooding level that is expected to occur every 100 years. If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain. The agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains. For further information, please consult the following web link: http://www.epa.gov/owow/wetlands/regs/eo11988.html.

7. Migratory Bird Treaty Act (MBTA):

The MBTA, along with subsequent amendments to this Act, provides legal protection for almost all breeding bird species occurring in the United States and must be addressed in CEQA. The MBTA restricts the killing, taking, collecting and selling or purchasing of native bird species or their parts, nests, or eggs. The treaty allows hunting of certain game bird species, for specific periods, as determined by federal and state governments. In the CEQA document, each agency must make a finding that a project will comply with the MBTA. For further information, please consult the following web link: http://www.fws.gov/laws/lawsdigest/migtrea.html.

8. Protection of Wetlands – Executive Order 11990:

Projects, regardless of funding, must get approval for any temporary or permanent disturbance to federal and state waters, wetlands, and vernal pools. The permitting process is usually through the

U.S. Army Corps of Engineers (USACOE), can be lengthy and may ultimately require project alterations to avoid wetlands. Applicants must consult with USACOE early in the planning process if any portion of the project site contains wetlands, or other federal waters. The USACOE Wetland Delineation Manual is available at: http://www.wetlands.com/regs/tlpge02e.htm. Also note that the Water Boards are involved in providing approvals through a 401 Water Quality Certification and/or Waste Discharge Requirements (http://www.waterboards.ca.gov/water_issues/programs/cwa401/index.shtml).

9. Wild and Scenic Rivers Act:

There are construction restrictions or prohibitions for projects near or on a "wild and scenic river." A listing of designated "wild and scenic rivers" can be obtained at http://www.rivers.gov/wildriverslist.html . Watershed information can be obtained through the "Watershed Browser" at: http://cwp.resources.ca.gov/map_tools.php.

10. Source Water Protection:

For more information, please visit: http://epa.gov/region09/water/groundwater/ssa.html.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)
CHECKLIST FOR THE APPLICANT
What to Submit to your State Water Board's Project Manager

If project is covered under a **CEQA Categorical or Statutory Exemption**, submit a copy of the following:

- ❑ **Notice of Exemption (filed with the Governor's Office of Planning and Research)**
- ❑ **List of Best Management Practices (BMPs) and their locations, if project implements BMPs**
- ❑ **Map of the project area**

If project is covered under a **Negative Declaration**, submit a copy of the following:

- ❑ **Draft and Final Initial Study/Negative Declaration**
  (or Mitigated Negative Declaration, if applicable)
  - ❑ Comments and Responses to the Draft
  - ❑ Mitigation Monitoring and Reporting Program (if using a Mitigated Negative Declaration)
- ❑ **Resolution approving the CEQA documents**
  - ❑ Adopting the Negative Declaration
  - ❑ Making CEQA Findings
- ❑ **Notice of Determination (filed with the Governor's Office of Planning and Research)**

If project is covered under an **Environmental Impact Report (EIR)**, submit a copy of the following:

- ❑ **Draft and Final EIR**
  - ❑ Comments and Responses to the Draft
  - ❑ Mitigation Monitoring and Reporting Program (MMRP)
- ❑ **Resolution approving the CEQA documents**
  - ❑ Certifying the EIR and adopting the MMRP
  - ❑ Making CEQA Findings
  - ❑ Adopting a Statement of Overriding Considerations for any adverse impact(s) that cannot be avoided or fully mitigated if project is implemented
- ❑ **Notice of Determination (filed with the Governor's Office of Planning and Research)**

If EIR is a joint CEQA/National Environmental Policy Act document (EIR/Environmental Impact Statement or EIR/Environmental Assessment), submit the applicable Record of Decision and/or Finding of No Significant Impact.

State Water Resources Control Board (State Water Board)
Clean Water State Revolving Fund Program

Evaluation Form for Environmental Review and Federal Coordination

1. **<u>Federal Endangered Species Act:</u>**
Does the project involve any direct effects from construction activities, or indirect effects such as growth inducement that may affect federally listed threatened or endangered species that are known, or have a potential, to occur on-site, in the surrounding area, or in the service area?

☐ No. Discuss why the project will not impact any federally listed special status species:

____
____
____
____
____
____

☐ Yes. Include information on federally listed species that could potentially be affected by this project and any proposed avoidance and compensation measures so that the State Water Board can initiate informal/formal consultation with the applicable federally designated agency. Document any previous ESA consultations that may have occurred with the project.

Attach project-level biological surveys, evaluations analyzing the project's direct and indirect effects on special-status species, and a current species list for the project area.

2. **<u>National Historic Preservation Act:</u>**
Identify the Area of Potential Effects (APE), including construction, staging areas, and depth of any excavation. (Note that the APE is three dimensional and includes all areas that may be affected by the project, including the surface area and extending below ground to the depth of any project excavations.)

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____
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____

Attach a current records search with maps showing all sites and surveys drawn in relation to the project area, and records of Native American consultation.

3. **<u>Clean Air Act:</u> Is the project subject to a State Implementation Plan (SIP) conformity determination?**

☐ No. The project is in an attainment or unclassified area.

☐ Yes. The project is in a nonattainment area or attainment area subject to maintenance plans. Include information to indicate the nonattainment designation (e.g. moderate, serious or severe), if applicable. If estimated emissions (below) are above the federal de minimis levels, but the project is sized to meet only the needs of current population projections that are used in the approved SIP for air quality, then quantitatively indicate how the proposed capacity increase was calculated using population projections.

Air Basin Name:____

Provide the estimated project construction and operational air emissions (in tons per year) in the chart below, and attach supporting calculations.

Attach any air quality studies that may have been done for the project.

Pollutant	Status (Attainment, Nonattainment or Unclassified)	Threshold of Significance for the Area (if applicable)	Construction Emissions (Tons/Year)	Operation Emissions (Tons/Year)
Carbon Monoxide (CO)				
Ozone (O_3)				
Oxides of Nitrogen (NO_x)				
Particulate Matter ($PM_{2.5}$)				
Particulate Matter (PM_{10})				
Reactive Organic Gases (ROG)				
Sulfur Dioxide (SO_2)				
Volatile Organic Compounds (VOC)				

4. **<u>Coastal Zone Management Act:</u>**
Is any portion of the project site located within the coastal zone?

☐ No. The project is not within the coastal zone.

☐ Yes. Describe the project location with respect to coastal areas, and the status of the coastal zone permit:

____
____
____
____
____
____

5. <u>Farmland Protection Policy Act:</u>
Is any portion of the project site located on important farmland?

☐ No. The project will not impact farmland.

☐ Yes. Include information on the acreage that would be converted from important farmland to other uses. Indicate if any portion of the project site is located within Williamson Act control and the amount of affected acreage:

____
____
____
____
____
____

6. <u>Flood Plain Management:</u>
Is any portion of the project site located within a 100-year floodplain as depicted on a floodplain map or otherwise designated by the Federal Emergency Management Agency?

☐ No. Provide a description of the project location with respect to streams and potential floodplains:

____
____
____

☐ Yes. Describe the floodplain, and include a floodplain map and a floodplains/wetlands assessment. Describe any measures and/or project design modifications that would minimize or avoid flood damage by the project:

____
____
____
____

7. <u>Migratory Bird Treaty Act:</u>
Will the project affect protected migratory birds that are known, or have a potential, to occur on-site, in the surrounding area, or in the service area?

☐No.

☐Yes. Discuss the impacts (such as noise and vibration impacts, modification of habitat) to migratory birds that may be directly or indirectly affected by the project and mitigation measures to reduce or eliminate these impacts. Include a list of all migratory birds that could occur where the project is located:

____
____
____

8. Protection of Wetlands:
Does any portion of the project area contain areas that should be evaluated for wetland delineation or require a permit from the U.S. Army Corps of Engineers?

☐ No. Provide the basis for such a determination:

☐ Yes. Describe the impacts to wetlands, potential wetland areas, and other surface waters, and the avoidance, minimization, and mitigation measures to reduce such impacts. Provide the status of the permit and information on permit requirements:

9. Wild and Scenic Rivers Act:
Is any portion of the project located within a wild and scenic river?

☐ No. The project will not impact a wild and scenic river.

☐ Yes. Identify the wild and scenic river watershed and project location relative to the affected wild and scenic river:

Identify watershed where the project is located:___________________________________

10. Source Water Protection:
Is the project located in an area designated by the U.S. Environmental Protection Agency, Region 9, as a Sole Source Aquifer?

☐ No. The project is not within the boundaries of a sole source aquifer.

☐ Yes. Identify the aquifer (e.g., Santa Margarita Aquifer, Scott's Valley, the Fresno County Aquifer, the Campo/Cottonwood Creek Aquifer or the Ocotillo-Coyote Wells Aquifer):

Appendix R - Correspondence

HAUGE BRUECK
ASSOCIATES

MEMORANDUM

TO: STPUD Recycled Water Facilities Master Plan EIR File

FROM: Hauge Brueck Associates

DATE: November 6, 2009

SUBJECT: South Tahoe Public Utility District, Recycled Water Facilities Master Plan, EIR Meeting and Field Visit Summary with California Department of Fish and Game

September 21, 2009 Meeting:
HBA staff (Anders Hauge and Garth Alling) and District Staff (Hal Bird) met with California Department of Fish and Game staff at the Region 6 office in Rancho Cordova on September 21, 2009 to discuss comments on the Draft EIR prepared on the STPUD Recycled Water Facilities Master Plan.

Issues discussed were significant and unavoidable impacts identified in the EIR. The following issues were discussed:

- Deer winter range in the project area and impacts to deer movement
- Lentic and lotic enviornments as a result of groundwater quality degridation
- Clarification of the master plan and master plan projects

It was determined the CDFG would reivew the existing mitigation measures and modify accordinly. An additional site visit was set for October 1, 2009.

October 1, 2009 Site Visit:
A field visit was performed with staff of the District, HBA and CDGF to view the project area and to discuss project related impacts. Site specific project areas were visitied to determine the suitabiltiy of the habitat and to reivew/discuss future impacts to the enviornment from project implementation. Mitigation ratios were discussed for impacts to stream/riparian habitats and areas were reviewed for future restoration and mitigation.

Subseqeuent to the field meeting, DFG provided HBA with revised mitigations noting impacts would be less than significant after mitigation with the new changes.