Kirkwood Recirculated Revised Final Environmental Impact Report

Volume 1: EIR and Appendices

Lead Agency:

Alpine County Planning Department

In Cooperation with:

Amador County Planning Department
El Dorado County Planning Department
USDA Forest Service, Eldorado National Forest

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1988 Master Plan Kirkwood Master Plan, Amended 1988
AAQS Ambient Air Resources Board
ACPD Alpine County Planning Department
ACUSD Alpine County Unified School District
AADT Average Annual Daily Traffic
ADT Average Daily Traffic
AFPD Amador Fire Protection District
ALG Ashworth Leininger Groups
APCDs Air Pollution Control Districts
APE Area of Potential Effects
AQRV Air Quality Related Value
BMP Best Management Practices
C Commercial Zone
C_g Clay
CARB California Air Resources Board
CCIC Central California Information Center
CC&R Covenants, Conditions, and Restrictions
CDFG California Department of Fish and Game
CEQA California Environmental Quality Act
CESA California Endangered Species Act
CFR Code of Federal Regulations
CHP California Highway Patrol
CHRIS California Historical Resources Information System
CL_g Clay Loam
CNDDB California Natural Diversity Data Base
CNG Compressed Natural Gas
CNEL Community Noise Equivalent Level
CNPS California Native Plant Society
COD Chemical oxygen demand
COE Corp. of Engineers
CR-H Condominium High Density Residential Zone
CRHR California Register of Historical Resources
CR-M Condominium Medium Density Residential Zone
CVRWQCB Central Valley Regional Water Quality Control Board
CWA Clean Water Act
dB decibels
dBA A-weighted decibels
DMG Division of Mines and Geology
Draft Plan 1998 Draft Kirkwood Specific Plan
EDU Equivalent Dwelling Units
EIR Environmental Impact Report
EIS Environmental Impact Statement

EMT Emergency Medical Technicians
ENF Eldorado National Forest
ESA Environmental Site Assessment
EVC Existing Visual Condition
FERC Federal Energy Regulatory Commission
Forest Service U.S. Department of Agriculture - Forest Service
GBUAPCD Great Basin Unified Air Pollution Control District
gpd gallons per day
gpm gallons per minute
HABS Historic American Building Survey
HAER Historic Architectural and Engineering Record
I/I Infiltration/Inflow
ITE Institute of Traffic Engineers
KIA Kirkwood & Associates, Inc.
KMA Kirkwood Meadow Association
KMPUD Kirkwood Meadow Public Utility District
KOP Key Observation Points
KRMOA Kirkwood Resort Master Owners' Association
KV Kirkwood Valley
KVFD Kirkwood Volunteer Fire Department
kw kilowatts
kwh kilowatt hours
L Lodge Facility
L_{dn} day-night equivalent noise level
L_{eq} equivalent sound level
L_g Loam
LAFCo Alpine County Local Agency Formation Commission
LOS Level of Service
LNG Liquified Natural Gas
LS Less Than Significant
LS_g Loamy Sand
LTBMU Lake Tahoe Basin Management Unit
LUST Leaking Underground Storage Tanks
M Meadow Zone
MCE Maximum Credible Earthquake
MF Multi-Family
MF&C Multi-Family and Commercial
MIS Management Indicator Species
MMDP Mountain Master Development Plan
MOU Memorandum of Understanding
MU Mountain Utilities
MW Megawatt
NAHC California Native American Heritage Commission
NCIC North Central Information Centers
NFS National Forest System
NHPA National Historic Preservation Act
NOP Notice of Preparation
NRCS Natural Resource Conservation Service

NRHP National Register of Historic Places
OHP Office Historic Preservation
OS Open Space and Recreation Zone
PAOT Persons-At-One-Time
PD Planned Development
PG&E Pacific Gas & Electric
PM Particulate matter
PSD Prevention of Significant Deterioration
RS Recreational Site
S_g Sand
SAOT Skiers-At-One-Time
SCL_g Sandy Clay Loam
SCR Selective Catalytic Reduction System
Si_g Silt
SiC_g Silty Clay
$SiCL_g$ Silty Clay Loam
SiL_g Silt Loam
SL_g Sandy Loam
SMZ Streamside Management Zones
SNFPA Sierra Nevada Forest Plan Amendment
S/P Service and Parking Zone
SR Single-Family/Duplex Residential Zone
SR 88 State Route 88
SUP Special Use Permit
TC-TAC Tri-County Technical Advisory Committee
UBC Uniform Building Code
USFWS U.S. Fish and Wildlife Service
VMS Visual Management System
VQL Visual Quality Levels
VQO Visual Quality Objective
WWTP Wastewater Treatment Plant

CHAPTER 1: INTRODUCTION

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

1.1 OVERVIEW

This Recirculated Revised Environmental Impact Report (EIR) discloses the potential environmental impacts of implementing a Proposed Project that includes Kirkwood Mountain Resort's (KMR) draft specific plan (Draft Plan), their proposed ski area mountain master development plan (MMDP), and a planned upgrade of the community's wastewater treatment plant (WWTP). The Draft Plan outlines a course of development for the private land at Kirkwood to establish the community infrastructure, housing, commercial services, and recreational opportunities intended to make Kirkwood a four-season destination resort. The MMDP addresses proposed development, primarily on adjacent National Forest System (NFS) land, to upgrade winter recreational activities including alpine and cross-country skiing, and snowboarding. The WWTP upgrade is designed to meet the increased demand placed on this public utility by projected increases in visitor and resident populations.

Kirkwood is situated on 733 acres of private land located in portions of Alpine, Amador, and El Dorado Counties, California. In addition, approximately 2,129 acres of NFS land is included under KMR's ski area special use permit (SUP), administered by the Eldorado National Forest (ENF), Amador Ranger District.

Since most of the potential impacts associated with implementation of the Proposed Project would occur in Alpine County, the Alpine County Planning Department is the Lead Agency in this EIR process. Amador and El Dorado Counties and other Responsible Agencies are also actively involved in the process, as discussed later in this chapter.

Decisions regarding adoption of the Draft Plan will be made following consideration of this EIR by the Alpine, Amador, and El Dorado County governments. Decisions regarding Forest Service acceptance of the MMDP are subject to further review, as required by the National Environmental Policy Act (NEPA), and will involve ENF decision-makers. The WWTP is in Alpine County, and any required permits and authorizations will come from the county and the Regional Water Quality Control Board.

Specific plans have replaced master plans as the documents guiding community development in California, in accordance with the overarching development guidelines set forth in county general plans. Kirkwood's first master plan was submitted in 1971 when the resort was established and has since been revised periodically. Development at Kirkwood is currently guided by the *Kirkwood Master Plan Amended 1988* (1988 Master Plan), *as revised through subsequent project-specific development agreements*. However, the 1988 Master Plan no longer provides adequate support for site-specific development and does not reflect KMR's vision of the Kirkwood community. KMR began efforts to develop an updated specific plan in 1996. The Draft Plan is the product of that effort.

Specific plans must include text and a diagram or diagrams that specify the following information

(California Government Code, Section 65451):

- The distribution, location, and extent of uses of land, including open space, within the area covered by the plan.

- The proposed distribution, location, and extent and intensity of major components of public and private transportation, sewage, water, drainage, solid waste disposal, energy and other essential facilities proposed within the area covered by the plan and needed to support the land uses described in the plan.

- Standards and criteria by which development will proceed, and standards for the conservation, development, and utilization of natural resources, where applicable.

- A program of implementation measures including regulations, programs, public works projects, and financing measures necessary to implement the specific plan.

- A statement of the relationship of the specific plan to applicable county general plans.

Past drafts of Kirkwood's specific plan, which contained considerable background information pertaining to existing conditions, historic and current environmental analyses, and alternative approaches to such issues as employee housing, electric power generation, and wastewater treatment plant expansion, were condensed by KMR into the current Draft Plan at the request of the three county governments. This document contains only the content required for specific plans pursuant to California Government Code, and the pertinent information for future regulatory control and development activities under the jurisdiction of Alpine, Amador, and El Dorado Counties.

KMR's Draft Plan proposes 1,503 single- and multi-family residential units at buildout, with associated commercial development and supporting infrastructure to accommodate a maximum overnight population of 6,558. Development would largely be complete within 20 years, although the pace of single-family residential construction is difficult to predict and the ultimate overnight population might not be achieved until 2045.

As a condition of the ski area SUP, Kirkwood must submit a master development plan outlining their planned activities on NFS land and any adjoining private land that is part of the ski area. A ski area master development plan documents existing conditions and compares them to resort design guidelines in order to establish the rationale for the expansion and improvement of particular land areas or facilities. A master development plan is not intended to serve as an engineering or construction document; its purpose it to establish the direction of proposed, on-mountain development strategies at a ski area. KMR's MMDP documents long-term plans for investment in the resort's facilities and improvements, primarily on NFS land managed under KMR's permit. Improvement projects outlined in the MMDP involve chairlifts, terrain and trails, infrastructure, and snowmaking facilities.

The proposed WWTP upgrade is necessary to add adequate capacity to existing treatment facilities and insure compliance with applicable discharge regulations. Upgrades proposed in this EIR resulted from research and detailed technical reports commissioned by Kirkwood Meadows Public Utility District (KMPUD) in response to concerns for future wastewater treatment capacity. At present, the wastewater treatment facility is designed to treat 100,000 gallons per day (gpd). The upgraded facility will meet predicted treatment demand of 190,000 gpd and dispose of these additional amounts of effluent through the use of existing and proposed new absorption beds.

Due to the technical nature of the WWTP upgrade, the "best apparent alternative" is proposed, which was developed based on non-monetary and monetary comparisons of several components involved in wastewater treatment options. Other alternatives were identified and studied during development of the proposed upgrade, and these are considered as alternatives in this analysis. Reasons why they were not chosen as the best apparent alternative and included in the Proposed Project are discussed in Chapter 3.

A summary of the EIR is presented in Chapter 2, and subsequent chapters address in detail the Proposed Project (Chapter 3); its environmental setting, potential environmental impacts, and mitigation (Chapter 4); alternatives to the Proposed Project and their impacts and mitigation (Chapter 5); additional required disclosures (Chapter 6); references (Chapter 7); and a list of the people and organizations involved in preparing the EIR (Chapter 8). *Appendices are included in this Volume I of the Final EIR. The Response to Comments on the Draft EIR and the comment letters themselves are in Volume II.*

As this EIR contains significant new information from the previous Draft EIR (Nov.1999) and Final EIR (Nov. 2000), it is being revised and recirculated in accordance with the *Guidelines for Implementation of the California Environmental Quality Act Guidelines* (CEQA Guidelines), Section 15088.5. The revisions made to the previously circulated but not certified Final EIR (Nov. 2000) can be summarized as follows:

- Updated analysis of the current draft specific plan in place of the 1998 draft.
- Inclusion of the MMDP as part of the Proposed Project, with associated alternatives and analyses.
- Inclusion of the WWTP upgrade as part of the Proposed Project, with associated alternatives and analyses.

The comment period for the Recirculated Revised Draft EIR from April 5 ,2002, through May 22, 2002. During that time period, 75 letters were received, 6 from agencies, 7 from organizations, and 62 from individuals. The specific comments included in these letters were responded to in the Response to Comments, Volume II of this Final EIR. Volume II also contains copies of each comment letter in its entirety.

Copies of this EIR are available for review at the offices of the Alpine, Amador, and El Dorado County Planning Departments, the Forest Service's Amador Ranger District Office, and public libraries in Placerville, South Lake Tahoe, Jackson, and Markleeville. Any questions regarding this EIR process should be addressed to:

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The remaining sections of this chapter describe the EIR process and the role of an EIR in decision making. They also provide a brief overview of the project, focusing on project background, description, and the project's relationship to potential development on NFS land in KMR's special use permit area.

1.2 THE ENVIRONMENTAL IMPACT REPORT PROCESS

This EIR has been prepared in accordance with California Environmental Quality Act of 1970 (CEQA) and pursuant to the CEQA Guidelines (as revised). CEQA encourages the protection of all aspects of the environment by requiring state and local agencies to prepare multi-disciplinary environmental impact reports. The six specific objectives of CEQA are (Bass et al. 1996):

- To disclose the significant environmental effects of proposed activities to decision makers and the public.
- To identify ways to avoid or reduce environmental damage.
- To prevent environmental damage by requiring implementation of feasible alternatives or mitigation measures.
- To disclose to the public reasons for agency approval of projects with significant environmental effects.
- To foster interagency coordination in the review of projects.
- To enhance public participation in the planning process.

In accordance with CEQA, a Mitigation Monitoring Program (MMP) *will be prepared and adopted prior to or concurrent with approval of the Specific Plan.* The MMP will identify mitigation measures required by the Lead Agency, the action necessary to implement each measure, the timing of the action, and the entities responsible for implementing, reviewing, and enforcing the action.

Preparation of this Recirculated Revised EIR is one step in this CEQA process. The process was initiated in 1996 when KMR submitted a draft specific plan to the Tri-County Technical Advisory Committee (TC-TAC), a group comprising representatives of the Alpine, Amador, and El Dorado Counties' planning departments and an *ex officio* Forest Service representative. TC-TAC review indicated the need for additional information, which was incorporated into a 1997 Draft Plan. No initial study of potential environmental impacts was completed because the need to prepare an EIR was recognized from the onset.

A Notice of Preparation (NOP) was published on June 25, 1997, formally starting the EIR process. This notice informed agencies and interested parties that an EIR was being prepared and solicited comments on the scope of the EIR. This comment period lasted 30 days from the publication of the NOP. During the written comment period, a scoping meeting was held at Kirkwood on July 11, 1997, providing an additional opportunity for public input on issues and concerns to be addressed in the EIR.

Following consideration of the comments received after the first NOP, KMR decided to withdraw the 1997

draft plan and address concerns raised during the comment process. These involved the need for additional information and some revision of the proposed development. A revised draft plan was released in 1998 and a second NOP was circulated. The 30-day comment period for the second NOP opened on November 20, 1998.

A Draft EIR was prepared following the second NOP review period and published on November 5, 1999. A 60-day comment period followed publication of the Draft EIR. After responses to comments received on the Draft EIR were prepared and appropriate revisions to the document were made, the Final EIR was published in November 2000. At that point, several changes occurred to the project and the project setting, warranting preparation of this Recirculated Revised Draft EIR, in accordance with CEQA Guidelines, Section 15088.5. The Proposed Project addressed in the EIR was expanded to include the MMDP and WWTP upgrade. *Comments were received on the Recirculated Revised Draft EIR and have been addressed as appropriate in this Final EIR. Volume II includes the Response to Comments and the comment letters themselves.*

In addressing the Draft Plan, this EIR is considered a Program EIR as opposed to the more detailed and focused Project EIR. A Program EIR is appropriate under CEQA Guidelines (Section 15168[a]) when the agency proposes a program or series of actions that can be characterized as one large project and are related either (1) geographically, (2) as logical parts in the chain of contemplated actions, (3) in connection with issuance 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 that can be mitigated in similar ways.

Most projects suitable for a Program EIR generally have at least two of the three characteristics listed below (Hernandez et al. 1993). The Draft Plan has all three of these elements.

- An implementation schedule longer than 3 years.
- General parameters or conditions that will be applied to future activities such as site-specific development proposals.
- A requirement for subsequent agency discretionary approvals for future implementation of the program.

In general, Program EIRs contain less detail than Project EIRs because the impact analysis is constrained by the level of specificity in the project description. In the case of the Draft Plan, the project description generally focuses on broader aspects of the proposed development, which in some cases may set the stage for subsequent site-specific reviews. CEQA Guidelines (15168[c][5]) do, however, indicate that a Program EIR should deal with the effects of the program with as much specificity and comprehensiveness as the available information allows. With this background, many subsequent actions may fall within the scope of the analysis in the Program EIR, thus requiring no further environmental review.

The CEQA Guidelines also address residential projects analyzed under a specific plan EIR with certain distinctions. Section 15182(a) states:

> Exemption. Where a public agency has prepared an EIR on a specific plan after January 1, 1980, no EIR or negative declaration need be prepared for a residential project undertaken pursuant to and in conformity to that specific plan [unless a supplemental or subsequent EIR is triggered under Section 15162 given project changes or new significant impacts].

Therefore, no additional CEQA documentation may need to be prepared for a residential project that is undertaken in conformity with the Draft Plan if it is adopted. CEQA Guidelines Section 15183, which may also be applicable, provides similar coverage for projects consistent with zoning, community plans, and/or general plans.

As discussed above, the MMDP was added to the Proposed Project to allow a comprehensive analysis of KMR's plans in their full context. However, the MMDP will be subject to Forest Service review and acceptance prior to implementation. This will include analysis and disclosure of the MMDP's environmental effects in accordance with NEPA prior to any Forest Service decisions. No decisions regarding the MMDP will be made on the basis of this CEQA process.

Regarding the WWTP upgrade, the project design has been finalized since the publication of the previous CEQA documents discussed above. As a result, there is now adequate, project-specific information to allow a comprehensive analysis of this aspect of the Proposed Project. As it addresses the WWTP upgrade, this can be considered a Project EIR, and no further CEQA analysis is anticipated.

1.2.1 Discretionary Actions

Defining the Proposed Project under CEQA to include the Draft Plan, the MMDP, and the WWTP upgrade is an appropriate alternative to a joint EIR/EIS. CEQA recommends, but does not require, joint documents (CEQA Guidelines, Sections 15222 and 15226). CEQA also encourages cooperation between local and federal agencies, and extensive cooperation with the Forest Service has occurred through this process. Rather than specify that the environmental document take the form of a joint EIR/EIS, CEQA requires that the document's content comprehensively analyze the impacts, direct, indirect, and cumulative, of discretionary decisions. Defining the project under CEQA to include the Draft Plan, the MMDP, and the WWTP upgrade as a combined project ensures that the impacts will be comprehensively analyzed, and therefore satisfies the requirements of CEQA. There is no legal mandate to prepare a joint document.

From a CEQA compliance perspective, specific elements of the Proposed Project will be reviewed in the context of impacts disclosed in this EIR. If the EIR indicates that an element has the potential to cause significant environmental impacts, the Lead Agency must determine whether (1) the impacts have been avoided or reduced by mitigation measures or alternatives required by the Lead Agency, or (2) the impacts would be avoided or reduced by mitigation measures or alternatives which should be adopted by another agency. These conclusions must be documented in either a Negative Declaration or, if the Lead Agency deems necessary, in additional CEQA documentation tiered to this document (Bass et al. 1996). If, in the third case, mitigation measures and alternatives are not feasible, the Lead Agency could develop a Statement of Overriding Considerations explaining which benefits outweigh the significant environmental impacts and justify approval of the project.

As discussed in the introduction to this chapter, the Alpine County Planning Department is the Lead Agency in this EIR process. The Amador and El Dorado County planning agencies are Responsible Agencies, as are other regulatory agencies. Responsible Agencies must actively participate in the Lead Agency's CEQA process, including document review and use of the document in making decisions regarding the project.

Responsible Agencies have the authority to require changes in the project to lessen or avoid impacts, or to refuse the project in order to avoid impacts. However, this authority is limited to the portions of the project that they will be called on to carry out or approve (CEQA Guidelines, Sections 15041[b] and 15042).

A number of other government agencies have jurisdiction over specific resources that may be affected by the Proposed Project but do not have a legal authority to approve or carry out the project. These are considered Trustee Agencies (Bass et al. 1996). They include state agencies such as the California Department of Fish and Game who hold resources in trust for the people of California. A number of other government agencies, including the Forest Service, have jurisdiction by law over specific resources which may be affected by the Proposed Project. They are involved in the process through NOP responses and EIR review. They may also provide data and reports to consulting resource specialists. In this case, the Forest Service has been actively involved, primarily as an *ex officio* member of TC-TAC.

1.3 Brief Overview of the Proposed Project

1.3.1 Kirkwood Background

Kirkwood lies in a remote, high Sierra valley, about 35 miles southwest of Lake Tahoe. Following several years of study by private entities and the Forest Service to determine the suitability of the area for ski resort development, Kirkwood's original master plan was submitted to the Forest Service and accepted in 1971. Kirkwood opened for skiing in December 1972, with four chairlifts, a surface lift, and a lodge. Development of on-site power generation and wastewater treatment facilities was required in order to support the resort.

In 1972, the Sierra Club sued the Forest Service (Sierra Club et al. v. Cliff et al. 1972) in an effort to stop the resort development. The resulting court action required preparation of a comprehensive Environmental Impact Statement (EIS) in compliance with NEPA, and an EIR in compliance with CEQA. The EIS was published in 1973 under the direction of the Forest Service, while the EIR was certified by Alpine County in 1974. These documents established definitive development parameters for the project.

KMR has installed additional ski lifts since 1972, and the resort currently operates 10 chairlifts and three surface lifts. Commercial development includes two day lodges with restaurants, bars, ski sales, rental shops, and related services. Other commercial development at the south end of the resort includes a small general store and post office, Kirkwood Reservations, a real estate office, the Cornice Café, the Lodge at Kirkwood, and the Mountain Club. Commercial development on the north side of SR 88 includes a service station, a restaurant in the old Kirkwood Inn, and a cross-country skiing facility that accommodates up to 370 people. Existing commercial space at Kirkwood that is to remain at buildout equals 71,000 square feet. As of *November*, 2001, existing residential development at Kirkwood includes *173* single-family and duplex units, and *381* multi-family units. Further detail concerning existing conditions at the resort is included in Chapter 4 of this EIR.

1.3.1.1 The Evolution of Master Planning

The original 1971 master plan was amended in 1981 and again in 1988. The 1988 Master Plan, adopted by all three counties, shifted land use locations and densities within the resort to accommodate a maximum

overnight population of 6,558 people at buildout. It emphasized short-term rather than resident accommodations–condominiums and lodges as opposed to single-family units–and called for commercial development dispersed throughout the valley. The 1988 Master Plan included six zoning classifications, each of which encompassed loosely defined pods designated for development.

Pods zoned for commercial use were located at the north end of the valley, north of SR 88, along the west side of the meadow fronting Kirkwood Meadows Drive, and at the south end of the meadow. Kirkwood North included medium- and high-density condominium zones and a Highway Center, including 21,500 square feet of village support facilities (information/check-in, service station, restaurant) as well as lodging units and facilities for cross-country skiing and horseback riding. On the west side of Kirkwood, commercial development revolved around a Day Skier Center (now referred to as the Timber Creek Center) at the convergence of Lifts 7 and 9 and two proposed lifts. The current Mountain Village at the south end of the valley encompasses the spirit of the development envisioned in the 1988 Master Plan, though more condominium development in the Village was proposed in the earlier planning document.

As planning for development of specific subareas evolved, the developers in some instances requested approval from the appropriate county to vary from particular terms of the 1988 Master Plan. Following county staff review for consistency with CEQA, the appropriate county General Plan, and the 1988 Master Plan, several such requests were granted. These included:

- *A 1996 master plan amendment adding 13 single-family units in the East Meadows 3 subarea.*
- *A 1997 development agreement altering the authorized unit density in Mountain Village.*
- *A 1998 development agreement authorizing 18 duplex and 10 single-family units rather than up to 85 condominium units in the Juniper Ridge subarea.*
- *A 2000 master plan amendment rezoning a parking area to allow construction of the community recreation center.*
- *Three 2001 development agreements authorizing 38 multi-family and 7 single-family/duplex units rather than up to 75 condominium units in the Palisades subarea.*

This type of revision to a community Master Plan or Specific Plan is standard practice in community planning (see section 2.2.2), but it is limited to specific developments. Once the broader view of a community's future changes, more fundamental amendment of the guiding plan is required. This was the situation that arose at Kirkwood during the 1990s.

In response to evolving ideas regarding the kind of community desired, KMR undertook revisions of the 1988 Master Plan. While these drafts retained many of the elements of the 1988 Master Plan, including the capacity to accommodate the maximum overnight population of 6,558 people, they also contained refinements that were largely directed by TC-TAC and by public and agency comments on successive drafts. The end result of this process is the current Draft Plan.

1.3.2 PROPOSED PROJECT

The following subsections briefly describe the three components of the Proposed Project at Kirkwood.

1.3.2.1 Draft Plan

The desire to develop a more pedestrian-oriented and environmentally sensitive community motivated revisions to the 1988 Master Plan. Changes included shifting some residential and commercial development away from Kirkwood North to the Mountain Village and the Timber Creek Village. The Ski-In/Ski-Out residential subarea surrounding Timber Creek Village was added to help focus skier activities at a major access point for on-mountain facilities. With these changes, the majority of residents and visitors would be within walking distance of commercial services, creating a centralized, pedestrian-oriented community and reducing traffic at Kirkwood. Designated boundaries for development areas were expanded to more accurately reflect the future desired condition of Kirkwood and to produce refined boundaries for the subareas. Land-use categories were altered, and a population-based method of assigning density to each subarea was introduced, providing developers more flexibility in matching unit types to market demand. Also, the number of single-family units relative to condominium units increased. Comprehensive analysis of key utility infrastructure was completed and incorporated into subsequent revisions.

Some of the major elements found in earlier master plans and retained in the Draft Plan include the following:

- Kirkwood Meadow as permanent open space.
- Single-family residential development at the east and west sides of the meadow (in the northern portion of Kirkwood but south of SR 88).
- A Highway Center north of SR 88, to include commercial uses.
- The Timber Creek Village at the west side of Kirkwood, with a parking area, commercial uses, and multi-family development.
- Service facilities across from the Timber Creek Village to include a maintenance facility, school site, microwave receiving station, fire station, parking, and wastewater treatment plant.
- The Mountain Village comprising commercial and residential uses at the south end of the resort (including condominiums, parking, and commercial space).

The Draft Plan has revised some of these elements and provided detail on others to produce the following, more focused plans:

- Reduction of land use densities at the north end of Kirkwood at SR 88 (Kirkwood North) to limit commercial uses to a concentrated area adjacent to the highway. The remaining private lands would be developed with single-family residential units, with contingencies for a bed-and-breakfast establishment.
- New Ski-In/Ski-Out residential developments in the vicinity of the Timber Creek Village on the west side of Kirkwood, with some high-density condominiums at the base of the Timber Creek Village on the west side of Kirkwood Meadows Drive, and scattered single-family development.
- A mixed-use Mountain Village at the south end of Kirkwood Meadow that would include ground-floor commercial uses clustered around a central plaza and upper-story condominiums. Outdoor

seating areas would be provided in the plaza and deck areas.

- Maintaining skiing as the major winter recreational activity, while expanding the range of summer recreation options with the promotion of hiking, biking, running, tennis, equestrian activities and other outdoor summer sports.

- Catering to the conference trade and sponsoring cultural events.

- Increasing the amount of allowable commercial space in Kirkwood to ensure that adequate retail and office space can be constructed to provide necessary community support services.

Changes to the current Draft Plan since publication of the Final EIR in 2000 include:

- Elimination of the proposed golf course.

- Elimination of the proposed parking lot at Kirkwood North.

- Inclusion of a new land-use type, Open Space/Recreation-Facilities Allowed, in order to accommodate recreation structures such as tennis courts and playgrounds and to set undeveloped open space apart.

1.3.2.2Mountain Master Development Plan

The Draft Plan addresses only the 733 acres of privately held lands within the Kirkwood community. KMR has prepared a mountain master development plan (MMDP) addressing primarily their proposed development of the adjoining 2,129 acres of NFS lands used under Forest Service permit. Any changes involving federal land fall under the jurisdiction of the Forest Service and are subject to environmental review in compliance with NEPA. Subsequent operation of the ski area is subject to the terms and conditions set forth in the MMDP and the Forest Service permit.

The proposed MMDP includes improvements to and/or construction of lifts, trails, on-mountain guest facilities, snowmaking and associated on-mountain infrastructure installations, ski patrol facilities, and snowplay areas. On- and off-mountain capacities would increase in accordance with the Forest Service provisions set forth in the *Kirkwood Winter Sports Development Final Environmental Statement* (Forest Service 1973). Capacity limits set by the Forest Service restrict infrastructure and utilities to accommodate no more than 11,800 persons-at-one-time (PAOT). This MMDP has been designed to accommodate 10,800 PAOT.

The currently proposed MMDP includes:

- Expanding skiing and snowboarding facilities to accommodate approximately 9,300 guests.
- Upgrading, shortening, or relocating seven existing chairlifts, and constructing five new chairlifts.
- Adding 56 acres of snowmaking coverage, bringing the total to approximately 192 acres.
- Increasing developed ski trails from 568 to 781 acres.
- Providing more on-mountain services with the addition of the Caples Crest Restaurant.
- Elimination of previously proposed development of the Martin Point area.

1.3.2.3 Wastewater Treatment Plant Upgrades and Expansions

Expanding the community's wastewater treatment facilities to accommodate a maximum monthly flow of 190,000 gpd has been recommended to meet demand at buildout (Kennedy/Jenks 1998). Presently, maximum monthly flows are estimated at 90,000–100,000 gpd. Technological advances that increase operating efficiency and reduce construction disturbance impacts have been designed and incorporated into the original treatment facilities plan upgrade, and are presented in this EIR as the proposed WWTP upgrade.

The currently proposed upgrade to the KMPUD wastewater treatment facility includes:

- Biological treatment through use of membrane bioreactor process (MBR).
- Two new absorption beds in the Chair 7 parking area and three additional beds in the vehicle maintenance shop area.
- A second 320 kw generator to meet additional power needs at the treatment plant.

In the event of delays to the proposed major upgrade, the following interim improvements are being considered. These improvements would increase capacity to 120,000 gpd.

- Converting the existing aerobic digester into an additional aeration basin, increasing capacity from 50,000 to 75,000 gallons.
- Purchasing and installing a 25-HP blower.
- Replacing air diffusers in the existing digester with additional, higher capacity diffusers.
- Providing additional return activated sludge (RAS) pumping capacity so that all RAS is returned to anoxic basins.
- Providing mechanical mixers in the anoxic basins.
- Providing the necessary piping and electrical facilities to accommodate the foregoing facilities.

Previously proposed projects for the treatment of effluent that have been eliminated from the currently proposed WWTP upgrades include:

- The option of directly discharging treated effluent to Kirkwood Creek.
- Construction of new absorption beds in the East Meadows area.

More detailed descriptions of the project elements contained within the Draft Plan, the MMDP, and the WWTP upgrade follow in Chapter 3.

CHAPTER 2: SUMMARY

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

2.1 Introduction

This chapter summarizes the Environmental Impact Report (EIR) for the Kirkwood Mountain Resort (KMR) proposed development project (Proposed Project), which includes the Draft Kirkwood Specific Plan (Draft Plan), the Mountain Master Development Plan (MMDP), and the wastewater treatment plant (WWTP) upgrade as its components. This summary includes a brief description of each component, a summary of the public involvement process and the issues raised in regard to the projects, an outline of the alternatives, a discussion of significance criteria for various types of impacts, an impact summary including a table with mitigation measures, a list of significant and unavoidable adverse impacts, and a discussion of cumulative impacts.

2.2 Project Description

Chapter 1 outlines the environmental review process, the history of Kirkwood, the evolution of master planning for the community, and the three components of proposed development. Chapter 3 provides a detailed description of these three development components. This section briefly outlines key points detailed in those chapters.

2.2.1 LOCATION

Kirkwood is 35 miles south of Lake Tahoe and comprises parts of Alpine, Amador, and El Dorado Counties. The area addressed in the Draft Plan is private land belonging to KMR and other private entities. Eldorado National Forest (ENF) land adjacent to the resort is used by Kirkwood residents and visitors for winter recreation under a ski-area special use permit (SUP) issued by the Forest Service. Proposed development of this area is described in the MMDP. The WWTP is located on private land at Kirkwood.

2.2.2 TYPE

The Proposed Project includes the implementation of the Draft Plan, prepared by KMR to guide the development of Kirkwood, and the associated WWTP upgrade. It also includes consideration of the proposed MMDP. However, development on public land is subject to further review by the Forest Service under NEPA. This process is explained in more detail in Chapter 1.

Specific Plans are mandated under California law, succeeding the master plans required previously.

Specific Plans are an intermediate step between county General Plans and site-specific development plans, reflecting planning at the community level. *The shift from Specific Plans to site-specific development plans may entail minor revisions to Specific Plans, which take the form of plan amendments or project-specific development agreements.* The Draft Plan would replace the *Kirkwood Master Plan Amended 1988* (1988 Master Plan) currently in force, and the MMDP will guide development on National Forest System (NFS) land.

The Alpine County Planning Department is the Lead Agency in the EIR process. Amador and El Dorado Counties are Responsible Agencies. Responsible Agencies must actively participate in the Lead Agency's CEQA process, including document review and use of the document in making decisions regarding the project.

Once finalized and adopted by the three counties involved, the Draft Plan will document plans, policies, and regulations that will guide development at Kirkwood through buildout of the plan, pending subsequent amendment. These policies and regulations will supplement others that may be applicable at the county level.

Part of the Draft Plan review process is analysis and disclosure of a proposed project's environmental impacts in accordance with procedures required by CEQA. This EIR documents the required analysis and disclosure.

Because this EIR evaluates impacts associated with a conceptual plan, a Program EIR is the appropriate type of analysis. A Program EIR analyzes the broad environmental effects of a proposed plan but recognizes that site-specific environmental review may be required for particular aspects of the plan once they are approved for implementation. This EIR will provide a basis for environmental review of individual development projects at Kirkwood in the future, resulting in either Negative Declarations or other CEQA documentation tiered to this EIR.

To ensure comprehensive analysis of environmental impacts, the project analyzed in this EIR includes the Draft Plan, the proposed MMDP, and the WWTP upgrade.

2.2.3 SIZE

Kirkwood Mountain Resort is comprised of both private and public land. KMR owns approximately 527 acres of the resort, or 72 percent of the private land, primarily in the base area. The remaining 205 acres of private land is owned by various individuals or entities. Approximately 2,129 acres of NFS land is contained in an SUP administered by the Amador Ranger District, ENF. The majority of lifts and on-mountain facilities occur on public land.

The planning area addressed in the Draft Plan is the contiguous 733 acres on the valley floor owned by KMR and other private entities. The Draft Plan projects an ultimate overnight population limited to 6,558 people. A wintertime limit of 11,800 persons-at-one-time (PAOT) would remain in force. The summertime PAOT limit of 6,558 would be allowed to increase to 9,800 during the duration of an approved special event only, and would return to the 6,558 PAOT following the event. The overnight population would be accommodated in 1,503 residential units of various types. Commercial space at buildout is projected to be 194,300 square feet. Community infrastructure (service facilities, roads, parking, and paths) and open space would occupy the remainder of the planning area.

The MMDP addresses proposed development projects on the 2,129 acres of NFS land. KMR's SUP authorizes "constructing, operating, and maintaining a winter sports resort, including food services, retail sales, and other ancillary facilities. . ."(Forest Service 1971).

2.2.4 Intended Use of the Draft Plan

The Draft Plan was prepared to update the 1988 Master Plan, with the objective of establishing Kirkwood as a four-season, destination resort that also preserves and blends with the area's unique natural setting. Skiing would remain the major attraction, but other winter and summer recreational opportunities would be developed as well.

In an effort to make the development more pedestrian oriented and environmentally sensitive, the Draft Plan calls for residential and commercial development clustered around the Mountain Village at the south end of the valley. Secondary clusters would occur in the Timber Creek Village on the west side of the meadow and at Kirkwood North, across SR 88. The residential areas surrounding these clusters would incorporate relatively large lot sizes, creating a medium-density residential buffer. The majority of residents and visitors would be within walking distance of commercial services, resulting in the preservation of more open space and less traffic.

2.2.5 Intended Use of the MMDP and WWTP expansion plans

The MMDP outlines proposed development projects on NFS land, which follow four planning requisites maintained by Kirkwood and reviewed by the Forest Service. The MMDP provides the strategic planning focus for development at Kirkwood, which aims at balancing the facility capacity with the user demand.

Providing residents and visitors with quality, year-round recreational opportunities in an environmentally sustainable manner supports the goals and objectives of the Forest Service and ensures that Kirkwood remains an economically competitive resort community.

The *Wastewater Facilities Plan* (Kennedy/Jenks 1998) developed alternatives for wastewater facilities expansion, compared these alternatives based on a monetary and non-monetary cost factor basis, and determined the best apparent alternative. Designs that included technological improvements to the best apparent alternative were prepared by ECO:LOGIC and are proposed as the WWTP upgrade.

The WWTP upgrade would meet the increase in demand expected to accompany future population increases at Kirkwood.

2.3 Areas of Concern

CEQA requires agencies responsible for the environmental review process to solicit agency and public input on environmental concerns through a scoping process and to respond to these concerns in the environmental document. Under CEQA, agencies are required to distribute a Notice of Preparation (NOP) to the public and to responsible, trustee, and other agencies as appropriate. The scoping process for this project and the concerns identified are discussed below.

The NEPA process also incorporates scoping early in the analysis process to determine the extent of environmental analysis needed to address the identified key issues and to develop alternatives. The NEPA scoping process associated with the MMDP began on July, 26, 1999.

The preparation of this EIR was initiated when an NOP was published on June 25, 1997, formally beginning the EIR process and soliciting public and agency comment on Kirkwood's Draft Plan. The NOP was followed by a 30-day comment period. In addition to the open period for written comments, a public scoping meeting was held on July 11, 1997, at Kirkwood to allow an additional opportunity for the public to request information and submit comments on the project. A 60-day comment period followed publication of the Draft EIR on November 5, 1999.

In consideration of further Tri-County Technical Advisory Committee (TC-TAC) review and comments received in response to the first NOP, KMR decided to withdraw the 1997 plan and address some of the major concerns associated with it. Following submittal of the Draft Plan in 1998, a second NOP was published on November 20, 1998. Responses to comments on the Draft EIR were addressed in a Final EIR published in November 2000. This Final EIR was released for public review through mid-December 2000. Comment letters received on that document are included in the following comprehensive list of issues.

Development adjacent to Kirkwood Meadow Association (KMA) subdivision:

- Sensitive plant species near Danburg Drive.
- Land use effect of the Ski-In/Ski-Out planning element in two single family/duplex residential zones.
- Traffic noise.
- Adequacy of parking.
- Increased traffic volumes on Kirkwood Meadows Drive, SR 88, Danburg Drive.
- Visual effect of development on current open space.

Kirkwood Lake and the surrounding area:

- Impact of development north of SR 88 on air quality.
- Potential ecological damage to Kirkwood Lake, including impacts to water quality and fish, as well as vegetation and wildlife around the lake.
- The lake's recreational carrying capacity from human activity.
- Aesthetic value of Kirkwood Lake area.
- Emigrant Trail artifacts.

Development north of SR 88:

- Potential ecological damage, including erosion and impacts to water quality, vegetation, and wildlife habitat.
- Land use impact.
- Visual impacts on SR 88.
- Transportation-related impacts, including increased traffic noise, traffic flow problems on SR 88, and access problems from Kirkwood North to the rest of the community south of SR 88.
- Aesthetic values.

Increased population at Kirkwood:

- Potential negative effects on air quality.
- Increased traffic congestion on SR 88 and the SR 88/Kirkwood Meadows Drive intersection.

- Potential socioeconomic impacts, including an increased demand for employee housing, public services, and utilities.

Water and air pollution issues:

- Recent contamination of soils and shallow groundwater from spills and leakage of MTBE-contaminated petroleum products that had occurred historically from surface and subsurface storage tanks at the maintenance shop and powerhouse sites. The fuel additive, MTBE has a secondary MCL of 5ug/L due to its unacceptable taste and odor properties and potential health effects. It also warrants special concern due to its high rate of transmissivity through soils.
- Temporary closure of one shallow production well (Well #2) as a result of increasing (but not yet above-standards) concentrations of MTBE in the pumped water supply.
- Effects on air quality from KMPUD's installation of a diesel-powered generator at their wastewater treatment facility.

This Recirculated Revised Final EIR addresses these additional concerns as well as those raised in comments on the Recirculated Revised Draft EIR, published in March, 2002. Comments received on the Draft EIR have been responded to, and the Response to Comments is included in Volume II of this Final EIR.

2.4 Brief Description of Alternatives

2.4.1 Alternatives to the Draft Plan

The range of potential, viable alternatives to the Draft Plan was limited by the fact that the community of Kirkwood is already well established. The starting point for development is not a blank slate, and past development dictates future development to a degree. However, some alternative scenarios are required by CEQA, and others were suggested by public and agency comments in response to the NOP and by TC-TAC review of the Draft Plan. These alternatives are summarized in the text and Table 2.1 below.

2.4.1.1 Alternative A – No Project

If the Draft Plan or an alternative Specific Plan were not adopted, the 1988 Master Plan would remain KMR's planning document. This scenario constitutes the No-Project Alternative required by CEQA. However, in accordance with CEQA regulations, impacts of the No-Project Alternative and others are compared to current conditions in this analysis.

The No-Project Alternative would retain the 6,558 limit on maximum overnight population. The No-Project Alternative also retains a Mountain Village with concentrated commercial and multi-family residential development at the south end of the valley. Other elements permitted under the No-Project Alternative include a day-skier center (Timber Creek Village), a service area, and retention of Kirkwood Meadow as open space. This plan also includes commercial and residential development north of SR 88, but the No-Project Alternative would result in a relatively high density development north of the highway.

The No-Project Alternative would result in a dispersed development with less of a pedestrian orientation. A higher proportion of the commercial development slated for the Kirkwood community would be focused north of SR 88. The mix of housing and lodging types would lead to a relatively slow buildout rate. There

are no restrictions in the existing Master Plan or Forest Service SUP that would limit Kirkwood's summer population. The summer PAOT of 2,200 used in the 1973 EIS was an estimate for assessing impacts, and is not included as a restriction in the Forest Service SUP.

The No-Project Alternative calls for *324* single-family/duplex units and *829* multi-family units, which include 102 employee housing units. The No-Project Alternative also contains provisions for an additional 260 lodging/hotel units and 160,000 square feet of commercial space. This figure underestimates total commercial square footage, as some facilities such as a riding stable and a cross-country ski facility are listed as separate elements.

The 1988 Master Plan is not as detailed and comprehensive as the Draft Plan, which limits the degree to which some impacts can be assessed. Should the No-Project Alternative be selected, these issues would need to be rectified. The No-Project Alternative is described in greater detail in Chapter 5, section 5.1.2.1.

2.4.1.2 Alternative B – Reduced Kirkwood North and Resort-wide Residential Development

This alternative was developed to respond to two broad issues raised during scoping and TC-TAC review of the Draft Plan: specific concerns regarding residential development north of SR 88, and overall concerns associated with population growth in the valley.

This alternative would eliminate single-family/duplex residential development in Kirkwood North and convert this area to open space, thereby eliminating an estimated 18 single-family residential units with a potential overnight population of 98. This alternative would also limit additional single- and multi-family residential development throughout the valley to reduce the ultimate overnight population. The total potential overnight population under this alternative would be 5,196, a 20 percent reduction from the Proposed Project.

In all other respects, this alternative would be the same as the Proposed Project. Additional details on this alternative are provided in Chapter 5, section 5.1.2.2.

2.4.1.3 Alternative C – Clustered Kirkwood North Residential Development

This alternative was developed in response to the range of issues regarding residential development north of SR 88, with the objective of clustering development in order to reduce disturbance effects. The alternative would change the proposed zoning of the Kirkwood North single-family residential area to multi-family residential. The same potential population would be retained in this area under the change in zoning, and would result in a net increase in the number of units in Kirkwood North due to the lower number of residents per unit. However, fewer buildings would be constructed because several units would be contained in each structure. Projected maximum overnight population would reach 6,539.

In all other respects, this alternative would be the same as the Proposed Project. Additional details on Alternative C are given in Chapter 5, section 5.1.2.3.

2.4.1.4 Alternative D – Reduced Kirkwood North and Ski-In/Ski-Out North Development

This alternative was also developed to address concerns regarding Kirkwood North and overall population growth in the valley, with a focus on the density of development in the Ski-In/Ski-Out North subarea. This concern centers on impacts to scenic resources, soils and geology, vegetation, wildlife, and water quality. Of the concerns addressed, this alternative emphasizes reduced development density in the Ski-In/Ski-Out

North subarea.

Approximately 39 multi-family units would be eliminated in Ski-In/Ski-Out North. At Kirkwood North, the single-family units would be reduced to 12 from the 18 units proposed in the Draft Plan. The number of multi-family units in this subarea would be reduced to 40 units from the 68 proposed under the Draft Plan.

A total of 1,413 units could be developed under this alternative, with a projected maximum overnight population of 6,169.

In all other respects, this alternative would be the same as the Proposed Project. Additional details on Alternative D are given in Chapter 5, section 5.1.2.4.

2.4.1.5 Alternative E – Reduced Kirkwood North and Ski-In/Ski-Out Development and Unit Relocation

This alternative was designed to respond to development at Kirkwood North, density of development in the Ski-In/Ski-Out North subarea, and overall population growth in the valley. Of these issues, this alternative emphasizes reduced development at Kirkwood North and Ski-In/Ski-Out North, and relocates a portion of these units to the Mountain Village subarea.

Development in the Kirkwood North subarea would be reduced through the elimination of all proposed single-family units and conversion of this area to open space. Other reductions to Kirkwood North development would limit multi-family units to 40.

Ski-In/Ski-Out North development would be reduced by 59 multi-family units relative to the Draft Plan. Twenty of these units would be relocated to the Mountain Village, effectively redistributed into one or more yet-to-be constructed lodge units and focusing 43 percent of unit development in the Mountain Village.

The Ski-in/Ski-out South subarea would be reduced by five single-family units in order to shift development downhill and reduce visual impacts.

As under Alternative D, a total of 1,413 units could be developed under this alternative, with a projected maximum overnight population of 6,142.

In all other respects, this alternative would be the same as the Proposed Project. Additional details on Alternative E are given in Chapter 5, section 5.1.2.5.

Table 2.1. Comparison of Alternatives to Kirkwood Draft Plan.

Project objectives and elements.	Proposed Project-Draft Plan	Alt. A - No Project.	Alt. B - Reduced Kirkwood North and Resort-wide Residential Development.	Alt. C - Clustered Kirkwood North Residential Development.	Alt. D - Reduced Kirkwood North and Ski-In/Ski-Out North Development.	Alt E - Reduced Kirkwood North and Ski-In/Ski-Out North Development and Unit Relocation.
Issues Addressed	Develop community infrastructure and resort facilities to support year-round recreation.	Management continues as defined in 1988 Master Plan.	Kirkwood North development and overall population growth in the valley.	Amount of area in Kirkwood North impacted by development.	Kirkwood North development and unit density reductions in Ski-In/Ski-Out North.	Kirkwood North development and unit density in Ski-In/Ski-Out North, with development concentrated in Mountain Village.
Key Components	Provide amenities for a four-season resort. Concentrate development at Mountain Village and Timber Creek Village. As before, maintain Kirkwood Meadow as open space.	Development north of Highway 88 continues. West-side development limited to already approved projects. No summer PAOT limit.	No single-family development in Kirkwood North, convert area to open space. Reduce projected development and associated population by 20 percent.	Change to multi-family units in Kirkwood North. Population remains the same, but more units are built (less people per unit).	Reduce development in Kirkwood North and multi-family in Ski-In/Ski-Out North.	Convert single-family area in Kirkwood North to open space. Move 28 multi-family units to space in already-proposed multi-family & commercial zone in Village.
Commercial Space	Total = 215,000 square feet. Kirkwood North = 12,000 new. (68% Mountain Village, 14% Timber Creek Village, 9% Kirkwood North, 9% contingent on identified needs).	160,000 square feet (not including horse stable and cross-country ski facility).	Same as proposed in Draft Plan.	Same as proposed in Draft Plan.	Same as proposed in Draft Plan.	Same as proposed in Draft Plan.
Housing Units (sf = single-family, mf = multi-	425 sf, 1,078 mf. Total units = 1,503. Max. overnight pop. = 6,528.	*324* sf, *1,089* mf. Total units = 1,413. Max.	324 sf, 878 mf. Total units = 1,202. Max.	407 sf, 1,106 mf. Total units = 1,513. Max.	419 sf, 994 mf. Total units = 1,413. Max.	402 sf, 1,011 mf. Total units = 1,413. Max. overnight pop. = 6,142.

family) and Maximum Overnight Population	overnight pop. = *5,525.*	overnight pop. = *5,196*.	overnight pop. = 6,539.	overnight pop. = 6,169.

2.4.2 ALTERNATIVES TO THE MMDP

2.4.2.1MMDP Alternative A - No Project

A no-action alternative is required by NEPA, and this no-action alternative is considered as the No-Project Alternative in this EIR. This alternative would involve a continuation of existing management practices without any facilities improvements. Kirkwood would continue to operate at the established Comfortable Carrying Capacity (CCC) of 6,200 guests.

2.4.2.2MMDP Alternative B - No Additional Emigrant Valley Development

This alternative was developed in response to concerns over the potential effects to the Emigrant Trail and the setting of the trail within the Emigrant Valley. Alternative B excludes all on-mountain development components of the proposed MMDP planned to occur in Emigrant Valley. Excluded project elements include: the Covered Wagon surface lift, the Thimble Peak lift, and the multi-purpose trail from Caples Crest to the bottom of the Sunrise lift. Ski patrol stations, snowfencing, and related infrastructure associated with these facilities will also be excluded.

2.4.3 ALTERNATIVES TO THE WASTEWATER TREATMENT PLANT UPGRADE

Alternatives to the WWTP upgrade project were considered in the *Wastewater Facilities Plan* (Kennedy/Jenks 1998), which investigated different components of wastewater treatment systems. The best combination of treatment components, based on monetary and non-monetary criteria, were combined into the "best apparent alternative". Several processes are involved in wastewater treatment, some of which are dependant on the type of biological treatment system being used. The best apparent alternative is represented by the WWTP upgrade proposal described in Chapter 3. The best apparent alternative was derived from the most favorable combination of projects compared in the Kennedy/Jenks report. Two other alternatives to the proposed WWTP upgrades, described in section 5.1.1.4, identify alternate treatment systems compared but found to be less favorable or infeasible. Therefore they were not chosen for the proposed WWTP upgrade and were not analyzed in detail in this EIR. Integrated in these alternatives is an associated combination of all the projects required to complete a wastewater treatment system, including such processes as flow equalization, denitrification, filtration, screening, sludge dewatering, and effluent disposal, and facilities such as offices and support areas. In all alternatives, the continued use of absorption beds for effluent disposal was chosen over direct discharge.

2.4.3.1WWTP Alternative A- No Project

Under Alternative A only the interim improvements to the wastewater treatment facilities would occur. These items, outlined in Chapter 3, section 3.5.3.2 of the WWTP project description, are necessary in order to meet the demand capacity of up to120,000 gpd. A second phase of interim improvements, which involves repairs to existing storage tanks, would allow increased emergency treatment capacity of 140,000 gpd. Implementing these improvements would avoid potential system failure in the event that demands exceed 100,000 gpd, the current upper limit of system reliability.

2.4.3.2WWTP Alternative B - Extended Aeration Activated Sludge

This is the existing wastewater treatment method at Kirkwood. It is known to be effective and the original facilities were designed in anticipation of future expansions. Associated processes include in-line flow equalization, secondary clarification, filtration, and aerobic digestion. The main disadvantage of expanding this current process relates to space requirements for these associated treatment processes. Twice as much

tank volume would be required to meet projected ultimate buildout flows, and construction of new basins would be required to accommodate the flow equalization and denitrification processes. These additions would significantly add to the cost and disturbance area of the expansion project. As noted above, this alternative was not considered feasible and therefore was not analyzed in detail in this EIR.

2.4.3.3 WWTP Alternative C - Deep Shaft

The major advantages of this process over the extended aeration method are less space required for treatment and high efficiency, allowing for better accommodation of increased peak flows. However, drilling of the shafts would be required, and construction of new basins overlying the shafts would be necessary. Unlike the MBR system in the best apparent alternative, the deep shaft system would still require new construction of basins, clarifiers, and filters, thus reducing its cost-effectiveness and increasing the disturbance area of the expansion project. As noted above, this alternative was not considered feasible and therefore was not analyzed in detail in this EIR.

2.5 Significance Determination

A significant effect on the environment is generally defined as a substantial or potentially substantial adverse change in the physical environment (CEQA Guidelines, Section 15358). The environment refers to the physical conditions that exist within the area affected by a proposed project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance (CEQA, Section 21060.5). The area that will be affected refers to the area in which significant effects would occur either directly or indirectly as a result of the project (CEQA Guidelines, Section 15360).

CEQA sets forth certain mandatory findings of significance. According to CEQA, a project would have a significant effect if it caused a "substantial, or potentially substantial, change in the environment" (CEQA, Section 21068). If a project's possible environmental effects are individually limited but cumulatively considerable when viewed in connection with past, current, and reasonably foreseeable future projects, the project would be deemed to have a significant cumulative effect. Also, if the project would have environmental effects that directly or indirectly cause substantial adverse effects on human beings, the project would be deemed to have a significant effect. A potential impact is considered significant if the Lead Agency determines that any of the mandatory findings of significance apply.

CEQA distinguishes among three levels of significance related to project connected impacts (Table 2.2). An additional "beneficial" category may be applied to those impacts which would actually result in positive changes. While this classification is not required by CEQA, beneficial impacts are a useful addition to the range of information disclosed to the public. Including beneficial impacts in a CEQA document subject to public review can also serve to notify the public of the basis of an agency's intention for approving the project based on a statement of overriding considerations.

CEQA Guidelines provide general standards for determining the significance of various types of impacts. Table 2.3 provides broad but discipline-specific standards for determining significance of impacts as provided by the CEQA Guidelines. CEQA also designates de facto thresholds of significance based on established standards of other participating agencies. These de facto thresholds are identified in each resource section of Chapter 4 under the heading of Regulatory Setting.

Table 2.2. Significance levels specified by CEQA Guidelines.

Level of Impact	Criteria
Less Than Significant	Results in no substantial adverse change to existing environmental conditions.
Significant	Constitutes substantial adverse change to existing environmental conditions that can be mitigated to less-than-significant levels by implementing specified mitigation measures or alternatives.
Significant and Unavoidable	Constitutes substantial adverse change to existing environmental conditions that cannot be fully mitigated by implementing all feasible mitigation measures and alternatives.
Beneficial	Results in a positive change to environmental conditions.

Source: Modified after Bass et al. (1996).

Table 2.3. Impacts normally considered significant under CEQA Guidelines.

Resource	Type of Activity
Geologic Resources	· Expose people or structures to major geologic hazards.
Water	· Substantially degrade water quality. · Contaminate a public water supply. · Substantially degrade or deplete groundwater recharge. · Cause substantial flooding, erosion, or siltation. · Lead to a violation of existing water quality standards.
Vegetation, Fish and Wildlife	· Substantially affect an endangered, rare, or threatened species of animal or plant or the habitat of the species. · Substantially interfere with the movement of resident or migratory fish or wildlife. · Substantially diminish habitat for fish, wildlife, or plants.
Air Quality	· Violate any ambient air quality standard, contribute substantially to an existing or projected air quality violation, or expose sensitive receptors to substantial pollutant concentrations.
Cultural	· Disrupt or adversely affect a prehistoric archaeological site or a property of historic or cultural significance to a community or ethnic or social group, or a paleontological site.
Land Use	· Conflict with adopted environmental plans and goals of the local community. · Displace a large number of people. · Disrupt or divide the physical arrangement of an established community. · Conflict with established recreational, educational, religious, or scientific uses.
Agricultural	· Convert prime agricultural land to nonagricultural use or impair productivity or prime agricultural land. · Conflict with thresholds for farmland conversion established by the State Department of Conservation.
Traffic and Noise	· Cause a traffic increase that is substantial in relation to existing street traffic load and capacity. · Substantially increase ambient noise levels, or exceed local or state standards.
Visual	· Have a substantial, demonstrable, negative aesthetic effect.
Growth Inducement	· Induce substantial growth or concentration of population. · Extend a sewer trunk line with capacity to serve new development.
Public Services	· Breach published national, state, or local standards relating to solid waste or litter control. · Encourage activities requiring large amounts of fuel, water, or energy.

· Use fuel, water, or energy wastefully.
· Create a potential public health hazard or expose people or animals and plants to hazards.
· Interfere with emergency response plans or emergency evacuation.

Source: CEQA Guidelines 1999, Appendix G; Bass et al. 1998.

In addition to the guidelines set forth by CEQA, Lead Agencies may develop thresholds of significance for each environmental impact typically associated with projects they review (Bass et al. 1996). A threshold is a quantitative or qualitative standard or set of criteria for a particular resource. This standard is used to compare the environmental setting of the resource with and without the project impact to determine whether the impact is significant.

These standards were added to the significance criteria employed in this analysis. Table 2.4 outlines the resulting criteria, used to determine the significance of environmental impacts potentially resulting from implementation of the Proposed Project.

Table 2.4. Discipline-specific significance thresholds identified by resource specialists.

Discipline	Significance criteria
Geology, Soils, and Geologic Hazards	
	· Compliance with local ordinances, including those governing construction practices. · Compliance with other relevant criteria, including ENF Land and Resource Management objectives. · Incidence magnitude, duration, and quality and quantity of the resource. · The likelihood of an event occurring, as well as the magnitude of the event and its consequences. · The magnitude and extent of the impact to soils, including duration of the impact.
Water Resources	
	The project was assumed to have a significant impact on water resources if it would: · Substantially degrade surface water quality in Kirkwood Creek, Caples Creek, the Silver Fork American River, or any other downstream water body; · Degrade water quality in Kirkwood Lake; · Utilize a quantifiable percentage of the assimilative capacity of the Silver Fork American River; · Substantially degrade groundwater quality within the Kirkwood basin; · Interfere with groundwater recharge or deplete groundwater resources in a manner or to a degree that would reduce or exceed the safe yield of the aquifer, or reduce downstream flows to the extent that the water rights of other users would be adversely affected; · Cause or exacerbate any water-related hazards, such as flooding, or subsidence caused by excessive groundwater withdrawals; · Alter the existing drainage patterns or channels of the site or area in a manner which could result in any substantial adverse increases in flooding, erosion, or siltation; · Cause contamination in any public water supply; or, · Cause any potentially significant adverse cumulative effects, including cumulative watershed impacts.
Biological Resources	
Aquatic Resources	Criteria for significant impacts are described below: · Mitigable ground disturbance occurring within the riparian zone/floodplain or under 100 feet from a fishery-supporting water body.

· Non-mitigable ground disturbance occurring within the floodplain or within 100 feet of a fishery-supporting water body. This would include ground disturbance greater than 1 acre occurring immediately adjacent to perennial streams supporting fisheries.

Wildlife Resources

The criteria for identifying a significant impact to wildlife resources includes the following:
· Activities which will impact sensitive wildlife either through direct displacement or mortality.
· Loss of critical wildlife habitat through conversion of native vegetation or open lands to other uses, resulting in secondary displacement of wildlife.
· Conversion of habitat to types which will disrupt migration patterns.
· Loss of habitat through conversion to types which will disrupt prey availability, thus causing a "ripple effect" through the food chain and leading to secondary impacts on wildlife.
· Activities which facilitate a change in the species of wildlife occupying the Kirkwood area, causing a shift in species composition away from native species and towards species naturalized or adapted to human environments.
· Direct and indirect impacts on a rare, endangered, or threatened animal species or its habitat.
· Substantial interference with the movement of resident or migratory wildlife.
· A substantial reduction in the habitat of wildlife and plants.

Wetland Resources

The criteria for identifying a significant impact to wetland resources include the following:
· Losses of wetlands or other waters of the U.S. through the placement of dredged or fill material.
· Loss of vegetative cover such that wetland systems and streams would be degraded through siltation.
· Impacts that encroach on the flood plain of streams and limit their ability to buffer flooding.

Vegetation Resources

The criteria for identifying a significant impact to vegetation resources include the following:
· Impacts to federal or state listed threatened or endangered species.
· Impacts to rare species listed in the California Native Plant Society's (CNPS) Inventory of Rare and endangered Vascular Plants of California, especially impacts that could contribute to the listing of such species under the federal or state Endangered Species Act.

· Loss of vegetative cover through disturbance such that other resources would be substantially affected, i.e., water quality, wildlife habitat, visual resources, etc.

Air Quality

Guidance provided by federal and state Clean Air Acts, which establishes ambient standards for air pollutants to protect human health and welfare, and the prevention of significant deterioration of air quality.

Cultural Resources

Resource importance in accordance with the criteria for listing on the California Register of Historical Resources (CRHR), as set forth in CEQA Guidelines, Section 15064.5 and defined as follows:
· Association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
· association with lives of persons important in our past;
· embodiment of the distinctive characteristics of a type, period, region, or method of construction, or representative of the work of an important creative individual, or possessing high artistic values;
· has yielded, or may be likely to yield, information important in prehistory or history.

Impacts to "unique archaeological resources" are also considered under CEQA, as described under PRC 21083.2. Unique archaeological resources include archaeological artifacts, objects, or sites which meet one of the following criteria:
· Contains information needed to answer important scientific questions and there is a demonstrable public interest in that information.

· Has a special and particular quality, such as being the oldest of its type or the best available example of its type.
· Is directly associated with a scientifically recognized important prehistoric or historic event or person.

A historic property which is significant under the criteria of eligibility for the NRHP, as defined under 36 CFR 60.4, is:
· associated with important events in our history or prehistory;
· is associated with an important person or persons;
· represents the work of a master, or a high level of artistic achievement, or is exemplary of its type;
· or has the potential to yield data important to the study of history or prehistory.

Land Use

Impacts would be considered significant if the project includes land uses which are either:
· Inconsistent with adopted land use plans and policies of agencies with land use jurisdiction over the project area;
· Involve incompatible land uses which directly or indirectly affect the physical environment, or are;
· Incompatible with existing land use restrictions.

Traffic and Circulation

CEQA Guidelines state that a project will normally have a significant effect if it will "cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system.."
· Level of Service "C" is considered the threshold for acceptable average daily roadway operation on SR 88 in the vicinity of Kirkwood Resort.

Visual/Aesthetic Resources

Construction and operation activities may result in visual contrasts that affect:
· The quality of visual resources;
· Visual resources having rare or unique value;
· The view from or the visual setting of, designated or planned parks, wilderness, or natural areas, travel ways, or other visually sensitive land uses (including residential areas); and
· The view from or the visual setting of established, designated, or planned recreation, education, preservation, or scientific facility, use area activity and view point or vista.

Quality of the visual environment is based on Visual Quality Objectives/Visual Quality Levels (VQOs/VQLs) or the synthesis of scenic quality and visual sensitivity. The resulting impact significance factor involves the level of visual attention brought about by the project.

Noise

An impact would be significant if any of the following circumstances occurred due to project implementation or new development:
· Noise increased in the long term more than 6 decibels (dBA) over existing noise (refer to discussion in section 4.9.2 Methods); or
· Total noise levels increase in the long term enough to exceed the threshold of 65 dBA for residential areas, excluding single-family and duplex (L_{dn}/CNEL criteria for new development associated with the Proposed Project); and the threshold of 60 dBA for residential, single-family and duplex area (L_{dn}/CNEL criteria for new development associated with the Proposed Project).

Appendix G of the CEQA Guidelines states that a project will normally have a significant effect on the environment if it will "increase substantially the ambient noise levels for adjoining areas." Exceedance of an adopted noise standard would also be considered a significant impact under CEQA;

both Alpine and Amador County establish a maximum noise standard of 65 dBA L_{dn} at property lines for existing residential uses, and El Dorado County establishes a maximum noise standard of 60 dBA L_{dn} at property lines for existing residential uses.

Socioeconomics

Potentially relevant standards for the determination of significance include the following:

· Would the project conflict with population, employment, or housing policies or projections that exist within government agencies having jurisdiction over the project?

· Would the project directly or indirectly cause substantial growth or concentration in the population beyond current levels?

· Would the project directly or indirectly cause a substantial net loss in the number of jobs in the project area or cause a substantial loss in jobs or income due to changing job opportunities in the community?

· Does the project displace existing residences or otherwise create or exacerbate any housing shortages?

Hazardous Materials

CEQA Guidelines state that significance criteria for hazardous materials are based on the potential for materials or operations in the project area to pose a risk to either the environment or human health and safety. The criteria for determining each level of significance are described below:

· These consist of operations which have the potential for having a large impact on the environment and/or human health and safety. These operations could include the storage of fuels in Leaking Underground Storage Tanks (LUST), the improper storage of avalanche-control explosives, the exposure of workers or visitors to friable asbestos, the improper disposal of lubricants and/or solvents, etc.

· These consist of present or future operations which would have a significant impact on the environment and/or human health and safety and are not easily remediated. Examples would be the contamination of groundwater by LUSTs, the long-term leaking of PCB containing transformer oils into the soil, etc.

Recreation

The following factors were considered in evaluating the significance of effects to recreation:

· project-related changes that would alter or physically affect established, designated or planned recreation areas;

· project-related changes that would conflict with adopted policies or goals for recreation management;

· project-related changes that would affect access to recreation areas;

· project-related changes that would affect the quality of recreation experiences;

· project-related changes to currently undeveloped areas on NFS land.

Public Services

Potentially relevant standards for the determination of significance include the following:

· Police/Sheriff: Will the project require additional staff or equipment to maintain acceptable service ratios, response times, or other performance objectives?

· Fire: Will the project require additional staff or equipment to maintain an acceptable level of service (i.e., response time, equipment suitability)?

· Medical: Will the project require additional staff or equipment to maintain an acceptable level of service?

· Schools and Child Care: Will the project increase the population of school-age children in a public school district or child care services which are or will be operating without adequate staff, equipment, or facilities?

· Family Services: Will the project require additional staff to maintain an acceptable level of service?

· Parks and Recreation: Will the project increase use of existing park and recreational facilities, or require the creation of new park and recreational facilities, to comply with locally adopted park and recreational service standards?

Utilities and Infrastructure

Potentially relevant standards for the determination of significance include the following:

· Energy (Electricity and Propane): Will the project require expansions in existing electrical generating facilities or existing high-power transmission lines? Will the project require expansions in existing propane facilities?

· Water Supply: Will the project comply with water conservation and supply requirements imposed by state and local agencies? Will the project require expansions in existing water supply treatment facilities or trunk conveyance lines? Has the water purveyor determined that it has adequate treatment facilities, conveyance capacity, and water supplies to serve project demand? Will the water supply be drawn from a groundwater basin that is overdrawn in relation to demand and historical levels?

· Wastewater Treatment: Will the project comply with wastewater pretreatment standards enforced by federal, state, and local regulatory agencies? Will the project require expansions of the public wastewater treatment facilities or trunk conveyance lines? Has the wastewater treatment provider determined that it has adequate treatment and conveyance capacity to serve project demand?

· Solid Waste: Will the project comply with state and local requirements relating to source reduction, recycling, litter control, and solid waste handling? Is a landfill available with sufficient capacity to accommodate on a long-term basis (10 or more years) solid waste generated by the proposed project?

2.6 Significant Impacts and Mitigation

Table 2.5 summarizes the potential impacts and mitigation associated with implementation of the Proposed Project.

Table 2.5. Significant Impacts and Mitigation.

Significant Impact	Level of Significance Before Mitigation	Mitigation
		Geology, Soils, and Geologic Hazards
Soil disturbance and erosion.	Significant.	Mitigation Measure 4.1 (a). Construction will comply with the requirement the Kirkwood erosion control ordinance, which includes, but is not limite measures (b) through (h) below: Mitigation Measure 4.1 (b). Practice selective soil exposure by removing soil in areas of immediate development/construction; coordinate erosion sedimentation control with grading, development, and construction practices. Mitigation Measure 4.1 (c). Stockpile topsoil for use as a revegetative medi disturbed areas and restore sites with topsoil placed over subsoil fill; control ru from these stockpiled areas to minimize erosion and sedimentation. Mitigation Measure 4.1 (d). Utilize sediment basin and retention structures w other control measures are unacceptable. Mitigation Measure 4.1 (e). Preserve floodplains and riparian areas adjacer natural drainages and streams. Mitigation Measure 4.1 (f). Design runoff control to fit the hydrologic settin the area and in compliance with the Alpine County Subdivision, Parcel Map Site Improvement Standards. Mitigation Measure 4.1 (g). Preserve natural features (e.g., existing vegeta wetlands) through effective construction-site management. Mitigation Measure 4.1 (h). KMR will coordinate phasing with ENF and TC- in order to preclude having the amount of concurrent construction so great th torrential storm or other high-runoff event could cause significant erosion. In addition to the Kirkwood erosion control ordinance, other elements of ero control recommended for the project area include: Mitigation Measure 4.1 (i). Utilize construction roads only where and w necessary. Mitigation Measure 4.1 (j). Limit soil disturbance and vegetation removal to permanent disturbance locations and those areas necessary for acces

		construction zones. Mitigation Measure 4.1 (k). Construction roads and road beds will require w bars, mulching, and other erosion control techniques. Mitigation Measure 4.1 (l). KMPUD will include sedimentation monitoring component of water quality monitoring efforts, including tests for total suspe solids. Mitigation Measure 4.1 (m). Construction activities will be monitored to en compliance with soil erosion prevention practices and mitigation meas outlined above. *Mitigation Measure 4.1 (mm). Utilities (power, phone, water, sewer, cable) for projects will be placed in a common trench whenever feasible.*
Decreased soil productivity.	Significant.	Mitigation Measure 4.1 (n). Apply Mitigation Measures 4.1 (a) through 4.1 (k described above to maintain soil stability. Mitigation Measure 4.1 (o). Promptly revegetate all disturbed gro immediately following construction. This revegetation effort will be supplemen by the placement of erosion matting during seeding to preserve topsoil and pre erosion if an unforseen runoff event occurs. Temporarily disturbed areas wi reseeded to re-establish the vegetation type and density comparable to na vegetation surrounding the disturbed area. Mitigation Measure 4.1 (p). Mulching, hydromulching, landscape netting, st straw, or other protective materials will be used to maintain soil moisture. will enhance revegetation efforts. Mitigation Measure 4.1 (q). Fill placed in areas to be revegetated wil compacted to a bulk density and porosity similar to adjacent native soils.
Shrink/swell potential of soils.	Less than Significant.	Mitigation Measure 4.1 (r). If shrink/swell soils are discovered at prop building sites they should be avoided by relocating the proposed facility, o material should be removed and replaced with non-expansive soils.
Seismic hazards.	Significant.	These measures should be considered by appropriate *Building Depart* personnel prior to issuance of building permits. Mitigation Measure 4.1 (s). Plans and specifications for structures should integ engineering and design standards appropriate to UBC Seismic Zone II minimize structural effects. Mitigation Measure 4.1 (t). Specific building sites will be evaluated b geotechnical or soils engineer to determine the level of liquefaction hazard. factors to consider include: soil density, porosity, moisture content, water ta gradation, and depth. Mitigation Measure 4.1 (u). In areas of high liquefaction potential, enginee should include standard measures (e.g., increasing the density of foundation s employing larger foundations, and site drainage) to increase stability.
Rockfall and unstable slopes.	Significant.	These measures should be reviewed by appropriate county engineering perso prior to issuance of building permits.

		Mitigation Measure 4.1 (v). During excavation, remove loose sediments and l boulders by scaling to minimize the hazard.
		Mitigation Measure 4.1 (w). If appropriate, install temporary barricades an wire mesh fencing.
		Mitigation Measure 4.1 (x). A professional engineer or engineering geolo should certify that slopes associated with excavation are designed to en stability.
Ground settlement.	Significant.	These measures should be assessed by appropriate county engineering perso prior to building permit issuance.
		Mitigation Measure 4.1 (y). Alluvial soils at the site of specific structures sh be evaluated by a geotechnical or soils engineer to determine if the risks associ with ground settlement are significant.
		Mitigation Measure 4.1 (z). Where feasible, remove susceptible soils to elimi risk.
		Mitigation Measure 4.1 (aa). Incorporate accepted engineering control minimize effects on the structure, or avoid problematic sites.
		Mitigation Measure 4.1 (ab). Note water table elevations and identify ac springs at each site and adjust designs or preventative measures per acce engineering standards.
Avalanches.	Significant.	Mitigation Measure 4.1 (ac). In accordance with the Specific Plan, a residential development, or development that concentrates human activity (ti areas, parking lots, trail heads, etc.) in areas designated as high hazard (Figure Mears 1995a,b;1997). Limited road construction in these zones is acceptable
		Mitigation Measure 4.1 (ad). Construction of private buildings may be accept in zones of moderate hazard (Figure 4.3). However, reinforcement or protec for design avalanche loads is necessary. Incorporation of Mears' (1997) structural types of avalanche mitigation is recommended: (1) direct protec structures, (2) deflecting structures, (3) retarding mounds, and (4) catchment da
		Mitigation Measure 4.1 (ae). To minimize hazards, the current avala forecasting and control program carried out within the ski area boundarie Kirkwood should continue, *with annual evaluation of the program's effectiven*
		Mitigation Measure 4.1 (af). Properties located adjacent to the boundarie mapped avalanche hazard zones should display signs identifying the potentia this hazard.
		Water Resources
Increased surface runoff volumes and erosion.	Significant.	Mitigation Measure 4.2 (a). Implement grading measures to retard and re runoff, e.g., minimize slopes, construct detention basins, and design swale diffuse runoff and absorb excessive energy.
		Mitigation Measure 4.2 (b). Use vegetation, geotextiles, rock, gravel, and o surface treatments to retard and absorb runoff.

		Mitigation Measure 4.2 (c). Avoid creation of future flow barriers, obstruct and constrictions in streams and gullies. Mitigation Measure 4.2 (d). Implement Mitigation Measure 4.1 (a). Mitigation Measure 4.2 (dd). Implement grazing management practices outl in the grazing plan (see Appendix B), such as fencing livestock out of the ripa area of Kirkwood Creek.
Increased future water demands and resultant consumptive use.	Less than Significant.	Mitigation Measure 4.2 (e). Implement maximum water conservation xeriscape landscaping measures, such as limited yard watering and use of dro resistant native plants. Mitigation Measure 4.2 (f). Reclaim wastewater if necessary to help meet fu water supply demands. *Mitigation Measure 4.2 (g). To avoid sustained drawdown of the Kirkwood Va watertable, KMPUD will develop and implement a Water Stage Alert Sy establishing a sliding scale from voluntary to required water conserva measures based on their ongoing monitoring of aquifer levels, coupled with projections of water supply (based on precipitation data) and water demand. system would be triggered when aquifer levels fall to less than 40 feet above top of well pumps. Specific water conservation measures may include restrict on vehicle washing, landscape watering, and household consumption.* *Mitigation Measure 4.2 (h). To assist in minimizing impacts to instream flow Kirkwood Creek and downstream waterways, KMPUD will limit or cease pump from Well 2, which taps the shallow aquifer and is indirectly associated with creek, when the Water Stage Alert System is in effect.*
Reductions in groundwater surface elevations and supplies.	Less than Significant.	Implement mitigation measures 4.2 (e), (f) and (g).
Reduced infiltration rates and recharge of the Kirkwood Valley groundwater basin.	Less than Significant.	Mitigation Measure 4.2 (i). Minimize the extent of impervious surfaces disturbed soils to those that are absolutely necessary for implementation of Proposed Project. Mitigation Measure 4.2 (j). Avoid soil compaction in disturbed areas by lim use of heavy equipment, stockpiling and re-spreading of forest duff and tops and use of geotextiles. Mitigation Measure 4.2 (k). Install low-slope permeable swales, porous da such as hay bales, earthen benches, and infiltration basins to retard and cap runoff from impermeable surfaces.
Groundwater contamination from poor quality groundwater seepage.	Significant.	Mitigation Measure 4.2 (l). Use sealed well casings and other wellhead protec measures to preclude any movement of poor quality groundwater (and sur water) into pumped aquifers.
Leakage or spillage of untreated wastewater.	Significant.	Mitigation Measure 4.2 (m). Install sewage spill catch basins at vulner locations located outside the flood plain. Mitigation Measure 4.2 (n). Use accepted engineering design and construc features at flood-prone locations, particularly stream crossings. Mitigation Measure 4.2 (o). Install backup pump systems, auxiliary po

		sources, and system failure alarms.
Groundwater contamination from the routine discharge of treated wastewater.	Significant.	Mitigation Measure 4.2 (p). Avoid infiltration areas underlain by impermeab poorly permeable soils. Mitigation Measure 4.2 (q). Pressure transducers have been connected to existing absorption bed monitoring system in selected monitoring wells to mo the projected increases in groundwater surface elevations. KMPUD will avoidance actions such as more rapid rotation of the discharge to alternate and/or abandonment of individual beds that may cause problems, if monito results indicate potential surfacing or near-surfacing of effluent. Mitigation Measure 4.2 (r). Prevent excessive infiltration of sewage collection disposal systems by storm water. Mitigation Measure 4.2 (s). Police for and eradicate unauthorized discharg the sewer system. Mitigation Measure 4.2 (t). Expand the wastewater absorption beds and cons new ones in suitable areas. Mitigation Measure 4.2 (u). Utilize low flow water conserving plumbing fixt wherever possible.
Contamination from treated effluent inadvertently exceeding the intended and assimilatable waste loads discharged to surface and groundwaters.	Significant.	See Mitigation Measures 4.2 (p) through 4.2 (u).
Contamination from non-point source emissions in storm water runoff from impervious and disturbed areas.	Significant.	Mitigation Measure 4.2 (v). Conduct street sweeping twice-a-year and when b up of loose materials occurs on paved road ways. Mitigation Measure 4.2 (w). Develop drainage systems for parking lots w collect runoff from impermeable surfaces and channel it to settling basin through drainage filter strips, grassy swales, sand traps, or alterative sedi control features. Mitigation Measure 4.2 (x). Implement Mitigation Measure 4.3.3 (k). Mitigation Measure 4.2 (y). Implement Mitigation Measure 4.3.1 (e).
Water quality degradation from erosion and sedimentation resulting from increased flooding or increased surface runoff velocities.	Significant.	Mitigation Measure 4.2 (z). Implement Mitigation Measures 4.1 (a), 4.2 (a), 4.2 (b). Implement surface and channel erosion control measures such as placement, bank stabilization, geotextiles, sedimentation basins and traps, po barriers (e.g., hay bales) and earthen benches. Mitigation Measure 4.2 (aa). KMPUD will monitor for total suspended solid Kirkwood Creek, and ensure that construction activities are monitored so a implement necessary sediment prevention measures.
Contamination resulting from excessive treated effluent volumes.	Significant.	Mitigation Measure 4.2 (ab). Provide accommodations for wastewater storag hauling in case of emergency situations. Mitigation Measure 4.2 (ac). Add additional nitrate removal to the adva

		treatment processes. Mitigation Measure 4.2 (ad). Implement previously described non-point so and erosion control measures, including Mitigation Measures 4.2 (a) - (d), 4.2 - (z), and 4.2 (aa) - (ab).
Water quality degradation from surface drainage entering Kirkwood Lake.	Less than Significant.	None required.
		Biological Resources
Aquatic Resources		
Kirkwood Creek short-term sedimentation impacts.	Significant.	Mitigation Measure 4.3.1 (a). Implement Mitigation Measures 4.2 (a) through (d), 4.2 (w), 4.2 (x), 4.2 (z), and 4.2 (aa), as described in the Water Resou section. Mitigation Measure 4.3.1 (b). Allow no heavy construction equipment to ope within the Kirkwood Creek floodplain or within 100 feet of the Kirkwood C stream channel during periods when soils are saturated from rain or snowmelt Mitigation Measure 4.3.1 (c). Implement Mitigation Measures 4.2 (k) and 4.2 Sediment control structures will remain in place until vegetation has b established in disturbed areas.
Kirkwood Creek long-term sedimentation impacts.	Significant.	Mitigation Measure 4.3.1 (d). Implement Mitigation Measure 4.1 (a), 4.1 (l) (m), *4.1 (mm)*, and 4.1 (o) to prevent erosion and subsequent sedimentation Kirkwood Creek. Mitigation Measure 4.3.1 (e). Minimize salting and/or sanding of parking lo other impervious surfaces within 100 feet of the floodplain. Mitigation Measure 4.3.1 (f). Implement *the following* site-spe recommendations from the *Kirkwood Creek Floodplain Study* (EBCE 1996) p to the initiation of any proposed construction: *1) Build a diversion structure to operate with the existing drain and inle diversion of surface water between Lifts 10 and 11; 2) prevent flooding in the near Base Camp One condominiums by either clearing snow out of the sharp b in Kirkwood Creek, or constructing a low floodwall; 3) replace the two exis footbridges upstream of Kirkwood Meadows Drive, which currently restric flow of Kirkwood Creek; 4) prevent the infrequent overtopping of Kirkw Meadows Drive by enlarging the bridge opening or constructing a flood eastward along the east creek bank; some boulders could be removed from creek in this area as well; 5) any proposed structures in this area should be bu few feet above the floodplain elevation; 6) channel work such as bank protec (subject to permit requirements).* Mitigation Measure 4.3.1 (ff). Implement the grazing management (Appendix B).
Kirkwood Creek contamination impacts.	Significant.	Mitigation Measure 4.3.1 (g). Implement Mitigation Measures 4.2 (a), 4.2 (b) (e), and 4.2 (k) to reduce impacts associated with storm water runoff from par lots and other impervious surfaces.
Impacts to Kirkwood Lake fisheries.	Significant.	Mitigation Measure 4.3.1 (h). KMR will assist in educating Kirkwood resid

		and visitors about fishing regulations at Kirkwood Lake and, with the permis of the Forest Service, post such regulations at angler access points to the lake Mitigation Measure 4.3.1 (i). KMR will not create additional parking for purpose of facilitating access to Kirkwood Lake.
Impacts to Caples Creek.	Less than Significant.	None required.
Wildlife Resources		
Increased human presence.	Significant.	Mitigation Measure 4.3.2 (a). All dogs will be kept indoors or controlled leash. Mitigation Measure 4.3.2 (b). Expand CC& Rs to include regulations to go cat ownership, requiring owners to keep all cats indoors unless these pets are controlled on a leash. Mitigation Measure 4.3.2 (c). Require household garbage to be stored in wild proof containers prior to pick up. Mitigation Measure 4.3.2 (d). All pets will be fed inside, and pet food will no stored or provided to pets where wild animals could gain access. Mitigation Measure 4.3.2 (e). Implement restrictions to prohibit the feedin wildlife, except seed feeders for birds and nectar feeders for hummingbirds. Mitigation Measure 4.3.2 (f). Implement mitigation measures 4.3.3 (a) thro 4.3.3 (k) as described in the Wetlands Resources section (4.3.3) of this docu to avoid or minimize impacts to wetlands and streams. All projects with potential to impact waters of the U.S., including wetlands, will be reviewed by COE and the appropriate county and will be designed to avoid impacts an minimize impacts to the maximum extent possible.
Impacts to wildlife at Kirkwood *and Caples* Lakes.	Significant.	Mitigation Measure 4.3.2 (g). KMR will retain a qualified wildlife biologi survey the basin immediately surrounding Kirkwood and Caples Lakes in e summer *to determine the presence of special-status species identified in analysis (see Table 4.13) and establish baseline conditions*. After the *initial* su to establish baseline conditions, surveys will be performed every 3 years for year period (i.e., two additional surveys *or as determined to be needed by Forest Service*). The summary results will be submitted within 60 days of survey completion to the Amador Ranger District. If the wildlife population resources appear to be negatively affected, the Forest Service *will* dev management plans designed to mitigate the effects documented by the surv *These plans will include specific measures such as trail re-routing, interpr signing, protective fencing, area closures, and limits on user numbers or seas* *of use. They may also call for KMR involvement in the development implementation of an education program for Kirkwood visitors. The objecti the management plans will be to insure that the pertinent statutory protec extended to special-status species (see Table 4.11) are met.*
Impacts to threatened, endangered or sensitive species.	Less than Significant.	Mitigation Measure 4.3.2 (h). The project proponent will employ a quali biologist to conduct surveys for threatened, endangered, and sensitive wil species at Kirkwood prior to individual project construction. Surveys wil conducted within two breeding seasons prior to commencement of indivi

		project construction. These surveys will be completed during the approp season addressing species for which suitable habitat exists in the project area. geographic scope of the surveys should be limited to the area in which direc indirect impacts could occur. A report outlining results of the surveys wil submitted to the CDFG and to the respective county where construction is to place within one month of completion of the survey and prior to construc activities. If state listed species are found, a 2081 Permit will be obtained from CDFG. If federally listed threatened or endangered species are found, KMR enter into consultation with the USFWS to determine the appropriate cours action, including obtaining an Incidental Take Permit if necessary. Mitigation Measure 4.3.2 (i). The project proponent will implement mitiga measures 4.3.3 (a) through 4.3.3 (k), and 4.3.4 (d) to minimize impacts to wetl and riparian areas. Mitigation Measure 4.3.2 (j). Implement aquatic resource mitigation meas 4.3.1 (a) through 4.3.1 (e) to reduce short-term and long-term impacts to Kirkw Creek and associated aquatic wildlife habitat.
Wetland Resources		
Potential direct impact to waters of the U.S., including wetlands.	Significant.	Mitigation Measure 4.3.3 (a). The project proponent will negotiate and abid an acceptable Streambed Alteration Agreement (Fish and Game Code Sec 1603) with CDFG prior to construction of any improvements affecting steamb Mitigation Measure 4.3.3 (b). The project proponent will obtain approp permits from the COE prior to any placement of fill in wetlands. The appli will also comply with the terms and conditions specified in any permits obta from the COE. Mitigation Measure 4.3.3 (c). During construction of any utility infrastruc within wetlands, the construction contractor will place sidecast materials in up areas to minimize impacts as a result of temporary storage. These materials be used to backfill the trench as soon as possible. Mitigation Measure 4.3.3 (d). Implement Mitigation Measure 4.1 (c). Mitigation Measure 4.3.3 (e). In the vicinity of wetlands, the construc contractor will restrict construction equipment, vehicles, and the placement of stockpiles to upland sites except for implementation of COE-authorized crossi Mitigation Measure 4.3.3 (f). The project proponent will review prop development plans with the county of jurisdiction or the Forest Service, if in SUP area, and the COE to ensure that specific projects have been designed to a any impacts to wetlands or other waters of the U.S. to the maximum ex practicable. In cases where avoidance is not feasible, such as a road crossing linear wetland feature, then the impact should be minimized by making crossing as narrow as possible and crossing at a narrow point in the wetland. Mitigation Measure 4.3.3 (g). The project proponent will review proposed str crossings with the respective counties or the Forest Service, if in the SUP area, the COE and determine, based on the quality of the stream system and adja riparian habitat, which site would be appropriate for bridging. Mitigation Measure 4.3.3 (h). The project proponent will develop and implen

		a mitigation plan to replace any wetland losses due to the proposed developn The mitigation plans will be reviewed and approved by the COE and appropriate counties prior to implementation.
Potential indirect impact to waters of the U.S., particularly streams, from decreased water quality due to sedimentation associated with disturbance in upland.	Significant.	Mitigation Measure 4.3.3 (i). Implement Mitigation Measure 4.1 (a). Mitigation Measure 4.3.3 (j). If on private land**,** the county with jurisdiction require a minimum 35-foot buffer of undisturbed vegetation between wetlands, perennial or intermittent streams with riparian vegetation, and disturbed a (construction sites), or parking lots, or other impervious areas that produce ru If in the SUP area, minimum setback requirements outlined for ripa conservation areas in the *Sierra Nevada Forest Plan Amendment* will be requ These include setback requirements of 300 feet for perennial streams meadows, and 150 feet for seasonally flowing streams. Mitigation Measure 4.3.3 (k). KMR's landscape and revegetation guidel (KMR 1998) will be followed, and revised if necessary, to limit the us traditional manicured lawns in landscaping; to limit fertilizer use to d application to plants installed during revegetation efforts; and to limit the us herbicides, pesticides, and fungicides by individual property owners to d applications to control exotic species.
Potential for increased flooding as a result of impacts to wetlands and floodplains.	Less than Significant.	None required.
Vegetation Resources		
Direct and indirect impacts to the vegetation communities due to construction.	Significant.	Mitigation Measure 4.3.4 (a). KMR will follow the landscape and revegeta guidelines (KMR 1998), unless an item is specifically updated by requiremen the noxious weed control plan (Appendix B). Mitigation Measure 4.3.4 (b). KMR will implement the noxious weed co plan (see Appendix B) prior to construction of any elements approved in this The plan addresses weed issues of concern through measures such as requiring use of approved, native seed, weed-free hay, and construction practices such a cleaning of residual soil from off of construction equipment transported from o areas prior to use at Kirkwood. As under Mitigation Measure 4.3.4(a), KMR utilize current and approved seed mixes and revegetation techniques, outline the landscape and revegetation guidelines, except for specifically upd guidelines, as follows: · Strongly recommended use of native grasses only. This would change seed mix #1 in the landscape and revegetation guidelines by excluding the us *Dactylis glomerata* (Orchard grass). · As outlined under the Eldorado National Forest Seed, Mulch, and Ferti Prescriptions (Forest Service 2000), rice straw, (local) native grass straw, or needle mulch (if certified to be from a non-infected area) may be used in plac certified weed-free hay, pending development of the California certifica program.. · Use of quick-release, inorganic fertilizers should be avoided, as their tends to favor establishment of exotic weeds and grasses (Forest Service 200 Mitigation Measure 4.3.4 (c). KMR will retain the services of a Califo Registered Professional Forester to assess forest conditions and meet requirements for submitting timber harvesting plans.
Direct and indirect impacts to the threatened, endangered, and special-status plants due to construction.	Significant.	Mitigation Measure 4.3.4 (d). KMR will obtain the services of a qualified bot to conduct preconstruction surveys for special-status plant species if individ are known to potentially occur in the area of proposed disturbance. A re outlining results of the surveys will be submitted to the respective county w

		construction is to take place within one month of completion of the survey prior to construction activities. If sensitive species are found, construc envelopes should be redesigned (if feasible) to avoid the populations of sens plants. If federally listed threatened or endangered species are found on fe land, the project proponent will enter into consultation with the USFWS. Mitigation Measure 4.3.4 (e). Implement recommendations to minimiz eliminate impacts to special-status species, as cited in the botanical survey re (Jones and Stokes 2000), which include: using a helicopter lift to trans equipment and supplies, using stakes and flagging to carefully delineate restrict the construction area, and notifying construction crews of the presen the sensitive biological resource.
		Air Quality
Increase in carbon monoxide.	Less than Significant.	None required.
Increase in particulate matter emissions.	*Significant*.	Mitigation Measure 4.4 (a). The counties will develop and enact an ordinan reduce particulate emissions from wood burning within Kirkwood. The ordin should include the following elements: · Incentives to eliminate or replace *existing* woodburning devices tha not comply with the EPA Phase II Certification requirement. · A requirement that all new *residences previously approve the installation of* new woodburning devices *incorporate* EPA Pha Certified. · A requirement that, upon installation of a new EPA Phase II Cert woodburning device, at least one noncompliant woodburning devic eliminated within the Kirkwood area. · A prohibition on installation of new woodburning devices, including hearth-style fireplaces, which do not comply with EPA Phas Certification requirements, except that one noncompliant open he style fireplace will be allowed in the following locations: - a common lobby area located in a building containing more than four m family units, - a common lobby area located within lodges, hotels, motels, bed and brea accommodations, or a public recreation/meeting facility, - a bar/saloon or restaurant, - outdoors in the Village plaza area. *Mitigation Measure 4.4(aa). Prior to the addition of a second diesel generat the wastewater treatment plant, particulate matter source testing will be condu on the first generator to determine its emissions with the catalytic soot filt place. The results will be combined with estimates of emissions from the se generator and also with emissions produced by generators associated with the power plant expansion, to assess the potential cancer risk. Particulate m source-testing will be conducted on the second generator once it is insta Additional environmental controls, such as a catalytic soot scrubber on the se generator, will be installed as necessary to meet all current, applicable air qu standards. Any additional generators will need to meet the GBUA performance standard of (currently) a cancer risk less than or equal to ten in million.*
Increase in SO_x and NO_x.	Less than Significant.	Mitigation Measure 4.4 (b). MU will continue to operate the power genera plant with the SCR (Selective Catalytic Reduction) system in place as require the GBUAPCD.

Regional haze.	Significant.	Mitigation Measure 4.4 (c). To mitigate regional haze during the winter, E compliant woodburning fireplaces and stoves will be required in all new hou units as described in Mitigation Measure 4.4(a). Mitigation Measure 4.4 (d). During summer months, the application of suppressants will be required in areas where earth-moving activities are b conducted. *Mitigation Measure 4.4 (e). Streets will be swept by a vacuum sweeper du periods when road conditions are dry enough to allow the removal of anti- materials (i.e., sand). The streets must be swept from curb to curb, which incl the driving lanes, to maximize the control effectiveness.*
		Cultural Resources
Prehistoric resources.	Less than Significant.	Mitigation Measure 4.5 (a). Any area ultimately identified for pro development should be surveyed for prehistoric cultural resources by a quali archaeologist prior to ground-disturbing activity. Mitigation Measure 4.5 (b). If cultural resources are found, and if the resour determined to be significant under CEQA/CRHR criteria, or is a un archaeological resource, mitigation through data recovery or other approp measures should be devised and carried out by a qualified archaeologis consultation with all concerned parties. Mitigation Measure 4.5 (c). If Native American burial sites are found, spe mitigation measures would be determined in consultation with Native Amer most likely descendants, as identified by the NAHC. Options could inc leaving a burial in place if further disturbance can be avoided, or removal reburial with or without previous archaeological treatment. All such proced should be conducted within the context of CEQA Guidelines Section 15064.5 the California Public Resources Code Sections 5097.94, 5097.98 and 5097.99 Mitigation Measure 4.5 (d). In the event that construction personnel obs previously undiscovered subsurface prehistoric archaeological deposits (concentrations of bone, ash, charcoal, and/or artifacts) or human bones encountered in an area subject to development activity, work in the immed vicinity of the find should be halted and a professional archaeologist consulted in the case of human burials, the County Coroner and the appropriate Na American most likely descendants (identified by the NAHC). If the resourc determined to be historically significant under CEQA/CRHR criteria, mitiga data recovery or other measures should be devised and carried out by a qual archaeologist in consultation with all concerned parties.
Historic resources.	Significant.	Mitigation Measure 4.5 (e). Any area ultimately identified for potential pro development should be surveyed for historic cultural resources by a qual archaeologist prior to ground-disturbing activity. Mitigation Measure 4.5 (f). If historic cultural resources are found, and if resource is determined to be a historic resource or "unique archaeolog resource" under CEQA/CRHR criteria, mitigation through data recovery or o appropriate measures should be devised and carried out by a quali archaeologist in consultation with all concerned parties. All such proced should be conducted within the context of CEQA Guidelines, Section 15064.5

Mitigation Measure 4.5 (g). In the event that construction personnel obs previously undiscovered subsurface historic archaeological deposits (concentrations of historic materials such as ceramics, glass, or other his materials) in an area subject to development activity, work in the imme vicinity of the find should be halted and a professional archaeologist consulted such procedures should be conducted within the context of CEQA Guidel Section 15064.5.

Mitigation Measure 4.5 (h). Implementation of any element of the Draft Plan could affect the integrity of the Kirkwood Inn setting should be subject to re by Alpine and El Dorado counties. Any future additions should follow the s architectural style. Any future additions must also consider the view to and f the building, especially from the front or highway side. For structural reasons, new development and related heavy equipment should be distanced from Kirkwood Inn so as to not place additional stresses on the existing founda Review should include development of measures to mitigate indirect impac the Kirkwood Inn to a less-than-significant level. Specific mitigation measur be implemented by KMR will include some or all of the following:

- Include use of architecturally compatible materials and design develo with the input of a qualified historical architect, if the new construction affect visual setting of the Kirkwood Inn and it is determined that its setting contrib to its significance.
- Use of vegetative screening.
- Use of architecturally harmonious materials and sensitive placement of structures.
- Placement of an appropriate interpretive sign near the Kirkwood explaining the significance of the structure and its place in local and regi history.

Mitigation Measure 4.5 (i). If the Mace Camp in Kirkwood North canno removed from proposed development plans or from sale to private developers, the following protective measures will be undertaken by KMR or the pr proponent:
- The archaeological site and a 100-foot buffer area around the site wi excluded from sale to a private individual.
- No structures, other than those necessary to protect the integrity of the will be established within the 100-foot protected buffer area.
- With the cooperation of a qualified archaeologist and Eldorado Nati Forest to determine appropriate design and content, KMR will install a visibility interpretive sign at the site as an educational and protective measure
- KMR will monitor the site annually to assure the site is not degrade vandalism or over use. If degradation occurs, KMR will work with the El Do County Cultural Resources Commission and the Eldorado National Fores establish additional appropriate protective measures for the site.

Indirect impacts to sites on the Emigrant Summit Trail could be mitigate follows:

Mitigation Measure 4.5 (j). Educational literature will be developed by KM educate guests about the fragile and irreplaceable nature of cultural resources the penalties for violation of state and federal laws related to cultural resou This informational literature could be in the form of a pamphlet or other han that could be distributed at the same venues where other Kirkwood materials distributed.

Land Use

Effects on adjacent land.	Less than Significant.	None required.

Development North of SR 88.	Less than Significant.	None required.
Changing zoning designations to Ski-in/Ski-Out.	Less than Significant.	None required.
Effects of increased housing and development within Kirkwood.	Less than Significant.	None required.
		Traffic
Effects of increased traffic volumes on SR 88/Kirkwood Meadows Drive.	Significant.	Mitigation Measure 4.7 (a). A northbound to westbound left-turn acceleration on SR 88 should be created to accommodate left-turn movements. Kirkw Meadows Drive should be restriped and/or widened to accommodate three 10-f wide lanes (minimum), which would include one southbound lane and northbound lanes (one left-turn, one right-turn). Either restriping additional lanes or temporarily placing traffic cones during peak periods to form turn l would allow left-turn vehicle storage while allowing right turning vehicles to f Mitigation Measure 4.7 (b). Traffic control during peak periods, either thro signalization or manual control, at the SR 88/Kirkwood Meadows D intersection would improve the LOS rating to B at buildout (modeling resul Appendix A). KMR will conduct traffic counts and LOS modeling of intersection *during periods of peak visitation, which could include summer spe events,* every 3 years and provide the results to TC-TAC. The frequency of requirement will be modified by TC-TAC based on the rate of growth in tr experienced since the last evaluation and that expected in the near fu Signalization or manual control of the intersection will occur if traffic flows r Caltrans minimum requirements for signalization. Alternatively, KMR may pu other traffic control measures acceptable to Caltrans and all three counties would improve the LOS rating of the SR 88/Kirkwood Meadows D intersection to LOS B. Mitigation Measure 4.7 (c). Alpine County will implement a traffic im mitigation fee for future development within Kirkwood. The fee would be use mitigate traffic impacts on SR 88 both east and west of Kirkwood (in Am County) that are partially attributable to Alpine County development. The system would be based on a similar mitigation fee program already in place wi Amador County, which is applicable to development at Kirkwood within Am County.
Adequacy of parking.	Significant.	*Mitigation Measure 4.7 (d).* KMR will prepare an annual report that includ detailed analysis of day-visitor parking during peak periods such as the Christ holiday, Presidents Day weekend and other weekends during the ski season, *periods during the summer, and special events, when more than 4,000 day visitors are at the resort*. The study will compare day-visitor parking dem during these periods to day-visitor parking capacity at the resort. The results be reported to TC-TAC *in June of each year*. If the study shows that the num of day-visitor related vehicles parked within the resort exceeds the amoun parking spaces available for day visitors (approximately 2,500 spaces), TC-T will require KMR to implement a mitigation plan which will include one or m of the following actions: · Provide additional parking spaces in surface lots or parking structures. · Implement methods to provide greater efficiency in the use of exis parking lots. · Reduce parking demand through greater utilization of mass transit, incre vehicle occupancy, car/van pools or other programs that will result in redu parking demand during peak periods.

		· Restrict day-visitor use to a level that allows parking demand to accommodated in existing day-visitor parking areas. Implementation of the actions under this mitigation measure will result in adeq day-visitor parking capacity for the expected day-visitor demand at the resort manner that does not result in potentially significant adverse environmental ef that have not been identified and evaluated in this EIR.
Effects of Kirkwood North Development on Traffic.	Less than Significant.	Mitigation Measure 4.7 (e). Caltrans design requirements should be use develop the final intersection layout.
		Visual and Aesthetic Resources
Project visibility.	Significant.	Mitigation Measure 4.8 (a). At high-visibility locations, such as upper elevat of Ski-In/Ski-Out South, new trees will be grouped and planted strategicall help break up or screen out the visibility of the proposed development. Additi refinements to location will be defined through design review and analysi specific proposals. Mitigation Measure 4.8 (b). Proposed development in forested areas wil established with curvilinear, undulating boundaries wherever possible. Mitigation Measure 4.8 (c). During construction, clearing of land for facilitie activities will emphasize curvilinear boundaries instead of straight lines in na appearing landscapes. Mitigation Measure 4.8 (d). Grading will be done in a manner which minim erosion, conforms to the natural topography, and minimizes cuts and fills. Mitigation Measure 4.8 (e). Clearing of trees and vegetation for the project be limited to the minimum area required. Mitigation Measure 4.8 (f). Soil excavated during construction and not used be backfilled evenly into the cleared area, and will be graded to conform with terrain and the adjacent landscape. Mitigation Measure 4.8 (g). Site-specific efforts will be made, such as remo stumps or smoothing soil, to ensure a temporary impact where clearing is requ in sensitive or scenic areas. Mitigation Measure 4.8 (h). Permanent vegetative cover will be establishe disturbed areas. Replanting poor or difficult sites will be done if initial efforts to ensure the establishment and continued growth of plant material to pre erosion and sedimentation. Qualified personnel will perform all reseeding revegetation efforts. Mitigation Measure 4.8 (i). Native or indigenous plant materials will be sele on the basis of site-specific climatic conditions, soil characteristics, soil mois regime, and topography, and further selected based on their ability to blend existing vegetation. Mitigation Measure 4.8 (j). The seedbed will be modified to provide an optin environment for seed germination, seedling growth, and survival, as specifie the Kirkwood erosion control ordinance (see Mitigation Measures 4.1 (b)- (h)) KRMOA Design Guidelines. Mitigation Measure 4.8 (k). Landscape design which repeats or blends with surrounding existing landscape character will be applied in highly visibl sensitive areas to enhance the appearance of project building installation. Mitigation Measure 4.8 (l). Feathering the edges of the highway ROW in ce

		areas will be utilized to repeat vegetation patterns of existing open space edge Mitigation Measure 4.8 (m). Natural woody vegetation within 100 to 200 fe SR 88 in Kirkwood North will be evaluated carefully before removal in ord preserve a visual buffer for this area. Selective removal or pruning of trees in a with sensitive scenic values (e.g., SR 88 recreation areas and residences) wi done in consultation with the Caltrans landscape architect or county-appr visual resource specialist prior to any tree removal in these areas. Mitigation Measure 4.8 (n). Trees and other plants for landscaping will be sele based on their ability to blend with existing vegetation. Rip-Rap stabiliza material will be a non-contrasting color. Mitigation Measure 4.8 (o). Mulch or scatter tree slash debris on cut and fill a to mask bare soil and maintain a more appropriate texture to areas back f travelways. Mitigation Measure 4.8 (p). Control planting times to maximize succes revegetation. Mitigation Measure 4.8 (q). Use natural-looking planting patterns on cu slopes. Mitigation Measure 4.8 (r). Implement Mitigation Measure 4.1(c). Mitigation Measure 4.8 (s). Implement Mitigation Measures 4.1 (m) and 4.1 (Mitigation Measure 4.8 (t). Design to take advantage of natural screens vegetation, landforms). Mitigation Measure 4.8 (u). Seed cuts and fills with native grass species that not have substantial winter or other seasonal color contrasts. Mitigation Measure 4.8 (v). Visual prominence of development within visu sensitive areas, as viewed from SR 88, will continue to comply with requirem for building colors, construction materials, and architectural design administered by the Forest Service and TC-TAC, and outlined in KRMOA CC& and Design Guidelines. Particular attention should be given to any new Kirkw North development, especially regarding the architectural style and color sche Mitigation Measure 4.8 (w). Structures will be constructed of materials that b with the landscape character. Lift components will meet FSM 2380 (Forest Ser Manual) policy for color and reflectivity, which is 4.5 on the Munsell neutral v color scale. Building designs (on NFS lands), including color and material, be submitted to the Forest Service for approval prior to construction. Mitigation Measure 4.8 (x). The appearance of human-made openings simulate existing natural openings in the forest such as those which occur in project area. Mitigation Measure 4.8 (y). In accordance with FSM 2380, appropriate sitin buildings will be incorporated, as will the use of low-impact materials and co on NFS lands.
Light and glare.	Significant.	Mitigation Measure 4.8 (z). For working and public gathering areas, lighting le will be 3.5 foot-candles average horizontal, with a minimum illumination of average, a maximum of three times the average. Mitigation Measure 4.8 (aa). Fixtures will be required to minimize fugitive l into existing residential areas, including East Meadow, KMA subdivision, other residential locations susceptible to light and glare, by using asymmet

		distribution, light shields, and vegetation. Mitigation Measure 4.8 (ab). A lighting plan for all new development wil required, as outlined in the KRMOA Design Guidelines, that will be reviewe the counties when specific project level plans are submitted for review.
		Noise
Traffic Noise.	Less than Significant.	None required.
Construction noise and structures.	Significant.	Mitigation Measure 4.9 (a). Construction activities which generate or proc noise that can be heard beyond the boundaries of a project site will be limite the hours of 7 a.m. to 7 p.m. Exceptions are allowed for emergency repairs. *Mitigation Measure 4.9 (aa). Loudspeaker use will continue to be allowe special events related to ski area operation. Their operation will be limite between the hours of 7 a.m. and 7 p.m.*
Snowmaking activities.	Less than Significant.	Mitigation Measure 4.9 (b). KMR will implement the Snowmaking N Management Program, which was adopted when the snowmaking project approved. This incorporates several features, including restrictions on the typ nozzle, shielding of nozzles, and acceptable time of operation.
		Socioeconomics
Population and Employment.	Less than Significant.	Effects analyzed under CEQA must be related to a physical change in environment. Economic and social effects are not considered environme effects under CEQA, and need only be considered in an EIR if they would lea an environmental effect. The reader is referred to the Noise, Traffic Circulation, and Public Services sections of this chapter for an assessmen impacts and mitigation measures related to population and employment increa
Housing.	Significant.	Mitigation Measure 4.10 (a). Counties will develop and enact an ordin requiring employee housing to be provided at Kirkwood. The ordinance will minimum, include the following elements: · A requirement that at least 50 percent of the number of average peak-se employees be provided with employee housing concurrent with fu development of the resort. · A method of ensuring that the amount of required employee housing continue to be provided in the future. · Consideration of possible allowance for a fee to be paid in lieu of construc employee housing. Consideration of possible credit toward the employee housing requiremen exchange for KMR providing transportation for employees residing outside o Kirkwood area. Consideration of possible credit toward the employee housing requirement housing units located outside of the Kirkwood area which are reserved by K for use by employees within the Kirkwood area.
		Hazardous Materials
Fuel Storage and Use.	Significant.	Mitigation Measure 4.11 (a). Underground storage tanks or other hazar material storage will not be sited within the Caltrans right-of-way. Mitigation Measure 4.11 (b). The Kirkwood Maintenance Shop and MU maintain spill prevention plans for all hazardous materials. These plans wi reviewed and updated annually, as appropriate, and filed with the approp county. Mitigation Measure 4.11 (c). All existing and proposed fuel tanks wil

		maintained, operated and tested in accordance with local, state and fe regulations. Mitigation Measure 4.11 (d). Hazardous materials cleanup and containr supplies will be carried in any vehicle that transports fuel for refueling construc equipment. Mitigation Measure 4.11 (e). Hazardous materials cleanup and containr supplies will be present at any permanent location where refueling is done. Mitigation Measure 4.11 (f). KMR, MU, and KMPUD will train all vel operators who will be participating in refueling activities in spill prevention ar the use of cleanup materials. Mitigation Measure 4.11 (g). No motor fuel refueling will be conducted wi 100 feet of Kirkwood Creek or any of its perennial tributaries, or within 50 fe any occupied housing unit. Mitigation Measure 4.11 (h). In the event that a hazardous material spill reportable quantity occurs, the responsible party will immediately notify Department of Environmental Health of the affected county or counties, the CI and any other agencies as required under regulations applicable at the time o spill. If the spill occurs on NFS land, Kirkwood will also notify the Am Ranger District. Mitigation Measure 4.11 (i). KMR and its agents and subcontractors will ad to the reporting standards outlined in California Hazardous Materials Spill/Rel Notification Guidance (Lercari 1999) established by the Governor's Offic Emergency Services. Mitigation Measure 4.11 (j). KMR, MU, and KMPUD will comply with Titl for submission of business plans, inventory statements, explosive storage, and prevention control countermeasure plans, as may be required. Mitigation Measure 4.11 (k). Future development in portions of Alpine or Am County where soil or groundwater contamination by petroleum products has b identified will at a minimum require approval from the applicable County He Department and the CVRWQCB.
Explosives Storage.	Less than Significant.	None required.
		Recreation
Effects of increased construction and traffic on recreation.	Less than Significant.	None required.
Effects of increased population on use of surrounding public lands.	Significant.	Mitigation Measure 4.12 (a). Implement Mitigation Measures 4.3.1 (i) and 4 (j) as described in the Aquatic Resources section. Mitigation Measure 4.12 (b) KMR willconduct surveys to identify on/off recreation use patterns of residents and guests and report results to TC-TAC the Forest Service. Such surveys will be conducted every *4* years or as dee necessary by TC-TAC and the Forest Service. *Results will be reported to t agencies within 60 days. This information will increase TC-TAC and Fo Service knowledge of recreational use patterns in the Kirkwood area contribute to development of responsive management plans for heavily impa recreational sites and facilities.*
Effects on Kirkwood Lake, including fishing.	Significant.	Mitigation Measure 4.12 (c). Implement Mitigation Measures 4.3.1 (h) and 4 (i), as described in the Aquatic Resources section. *In addition, KMR will work*

		the Forest Service to develop and implement an instructional/interpretive prog to inform Kirkwood visitors about sensitive resource issues at Kirkwood Lake
		Public Services
Police/Sheriff Protection.	Significant.	Mitigation Measure 4.13 (a). KMR will monitor the level of police protec services required as development proceeds and the resident population increa Alpine and Amador counties will add deputies as dictated by community need
Fire Protection.	Significant.	Mitigation Measure 4.13 (b). Construct all facilities to adhere to the UBC. Mitigation Measure 4.13 (c). KMR should continue to implement, *maintain, revise as needed,* the Kirkwood Village Fire and Safety Plan and demonstrate the development complies with the plan. Mitigation Measure 4.13 (d). KMR will increase infrastructure and phy accommodations in the service district to support the level of fire protec required for the proposed development. Mitigation Measure 4.13 (e). KMR will monitor the level of firefighting serv required as development proceeds and the resident population increases. KMI will add firefighters as dictated by community needs.
Medical Services.	Significant.	Mitigation Measure 4.13 (f). KMR will continue to maintain medical facil during the ski season consistent with the requirements of the U.S. Forest Ser special use permit issued for the ski area. Mitigation Measure 4.13 (g). KMR will monitor the level of medical serv required as development proceeds and the resident population increases. I increase in year-round population warrants, KMR will add medical service meet community needs.
School and Child Care.	Significant.	Mitigation Measure 4.13 (h). KMR will continue providing funding suppo educational facilities for elementary school children (Grades K-6) at Kirkw (e.g., continue financial support for rented facilities). This requirement wil reviewed every 5 years and a determination made by Alpine County as to whe the requirement should be continued, modified or eliminated.
Family Services.	Less than Significant.	None Required.
Parks and Recreation.	Less than Significant.	None Required.
Snow Removal.	Less than Significant.	None Required.
Telecommunications.	Less than Significant.	None Required.
		Utilities and Infrastructure
Energy.	Significant.	Mitigation Measure 4.14 (a). MU will expand the existing electrical facilit construct a new facility to meet projected electrical demands as identifie section 4.14.4.1. As electrical requirements increase and the existing fac reaches capacity, expanded or new facilities must be developed. At the tir tentative development map is submitted, MU must provide the respective co with the current capacity of the electrical generation facility, the current elect demand of the Kirkwood area, and the projected electrical requirements of development. If the projected electrical need would not be met by the exis facility, improvements will also be provided and the schedule for completion be identified. Expanded or new facilities must be in operation prior to elect demands of the new development.
Water Supply.	Less than Significant.	Mitigation Measure 4.14 (b). KMPUD will connect a new well to the water su system if the maximum daily demand exceeds the available supplies with largest well out of service, such that emergency storage reserves would be depl in 7 days if demands continued at the maximum rate.

		Mitigation Measure 4.14 (c). KMPUD will monitor water supply output and in additional wells prior to increased water supply demands of new developr parcels. At the time a tentative development map is submitted, KMPUD provide the respective county with the current water supply, the current w consumption of the Kirkwood area, and the projected water requirements of development. If the projected water requirements will not be met by the existing supply, as defined in Mitigation Measure 4.14 (b), KMI will identify the number and location of proposed wells to be installed and schedule for completion. Additional wells must be in operation prior to w demands of the new development. Mitigation Measure 4.14 (d). Plan and implement new development to ensure use of best available technologies for water conservation, including, but not lim to, water conserving toilets, showerheads, faucets, and irrigation systems.
Wastewater Treatment.	Significant.	Mitigation Measure 4.14 (e). Monitor wastewater treatment operations upgrade as appropriate. Expanded or new facilities must be in operation prio wastewater demands of the new development. Mitigation Measure 4.14 (*f*). At the time a tentative development map is submi KMPUD will provide the respective county with the current capacity of wastewater treatment facility and the current wastewater output of the Kirkw area. KMPUD will also provide the projected wastewater requirements of development. Mitigation Measure 4.14 (*g*). Implement Mitigation Measure 4.14 (d).
Solid Waste.	Less than Significant.	None required.

2.7 Summary of Environmental Impacts of the Proposed Project

Developing Kirkwood into a year-round destination resort will result in environmental impacts, both adverse and beneficial. This analysis found that the majority of adverse impacts would be reduced to a less-than-significant level with appropriate mitigation, while some would be less than significant prior to mitigation, and a few would be significant and unavoidable. Many of the projected impacts would stem from the nature of the expansion – the progression from a small, winter recreation resort to a major four-season destination resort. Other impacts would be temporary, related to construction of the proposed facilities and infrastructure. If the objectives of the Proposed Project were met, longer-term impacts associated with developing a fundamentally changed community would occur.

Impacts to natural resources such as soils and geology, water, wildlife, vegetation, wetlands, and air quality have been considered. Other areas of concern related more to human use and perceptions have also been addressed, including cultural artifacts and sites, land use, traffic and parking, visuals and aesthetics, noise, socioeconomics, hazardous materials, recreation, public services, and utilities and infrastructure. Careful planning, including adherence to the regulatory guidelines of the counties and other regulatory and land management agencies involved would prevent many of the projected impacts from reaching a significant level. Impacts initially found to be less than significant before mitigation are outlined in section 2.7.1. Potentially significant impacts reduced to less-than-significant levels are summarized in section 2.7.2, and impacts found to be significant following mitigation are addressed in section 2.7.3. Significant cumulative effects are noted in section 2.7.4.

2.7.1 Impacts Found to Be Less Than Significant Before Mitigation

While the majority of impacts identified could be mitigated to less-than-significant levels, some impacts were identified as initially having a less-than-significant impact. Following are brief descriptions of those resources for which impacts have been determined to be less than significant before mitigation.

- In terms of geologic and soil impacts, the potential for encountering shrink/swell soils is thought to be so low as to pose an insignificant risk to building integrity.

- For water resources, the potential for reductions in groundwater surface elevations, infiltration rates, and water supplies would not be significant. No construction related impacts would occur in the Kirkwood Lake watershed.

- While the wildlife species present in the immediate area may change, overall biodiversity of the region is likely to remain constant. Endangered, threatened, or sensitive wildlife species are unlikely to be affected. Impacts to the fisheries of Caples Lake and Caples Creek would be less than significant.

- No impacts would occur to any federally listed threatened or endangered plant species.

- No air quality thresholds of significance would be exceeded for levels of CO, SO_x, or NO_x.

- No significant impacts would occur to prehistoric or ethnographic cultural resources.

- The Proposed Project would be consistent with existing land uses.

- Increases in noise impacts related to traffic, ambient sources, and snowmaking would be less than significant. Snowmaking noise is allowed by the counties due to its temporary nature and acceptability as part of a ski resort. The analysis also considered the combined impact from all potential noise sources at Kirkwood to be less than significant.

- Impacts associated with the storage and use of avalanche explosives would be less than significant.

- Impacts to recreation at Kirkwood would be beneficial.

- Public services and utilities would not be significantly impacted, including police/sheriff services, fire protection, medical services, schools and child care, family services, parks and recreation, snow removal, telecommunications, water supply, and solid waste handling and removal.

2.7.2 Impacts Mitigated to a Less-Than-Significant Level

Impacts in this category are defined as those that would constitute substantial adverse changes to existing environmental conditions but could be reduced to less-than-significant levels through mitigation. As previously indicated, almost all impacts associated with the Proposed Project can be mitigated to less-than-significant levels.

- In terms of soils, geology, and geologic hazards, some erosion of soils exposed during construction is likely to occur. Soils may be eroded and displaced by winds entraining exposed soil, or by rain or runoff-induced erosion. Other impacts associated with area soils and geology include hazards such as rock slides, avalanches, and ground settlement beneath structures sited on unstable soils. Conversion to impervious surfaces, through the construction of buildings, parking lots, and roads would also cause a general decline in soil productivity at Kirkwood.

- Impacts to water resources include the potential for degradation of ground and surface water quality. Construction activities and increased impervious surface area would increase runoff and erosion potential, leading to non-point source pollution and sedimentation impacts. Poorly managed grazing practices could also result in impacts. Sedimentation and water quality degradation could also impact wetlands and the aquatic resources of the area, leading to a decline in fish stocks and the general health of the stream ecosystems. Effects of increases in impervious and disturbed areas on surface runoff velocities, flows, and flooding, and their contribution to erosion could be significant.

- Impacts to the wildlife associated with habitat loss and construction disturbance would occur. Indirect impacts to wildlife would result from the increase in year-round occupancy of Kirkwood, and from tripling the potential maximum summer human population. Increased exploitation of the fishery resource at Kirkwood Lake and other popular fishing areas could lead to a stock decline. Short- and long-term sedimentation impacts to Kirkwood and Caples Creeks could also degrade habitat for fish and aquatic invertebrates. Potential impacts to wetlands and vegetation would also impact wildlife habitat.

- Impacts to vegetation would occur associated with vegetative clearing for siting of structures and development of trails and ski runs. Wetlands could be directly impacted by poor siting of structures

or roadways, or indirectly through receiving erosion and contaminated runoff from nearby disturbed or impervious areas. Potential direct impacts to special status plant species could occur.

- The potential for increased levels of suspended particulate matter in the air and a decrease in regional air quality could occur due to increases in woodstove use and levels of construction dust. *PM_{10} standards would be exceeded if KMPUD installed a second generator.*

- Potential impacts to historic cultural resources, specifically the Mace Camp, could occur. MMDP projects proposed in the Emigrant Valley could indirectly impact the Emigrant Trail. Previously undocumented archaeological sites could be disturbed during construction.

- The SR 88/Kirkwood Meadows Drive intersection would operate at Level F for northbound traffic during peak hours on peak days. This condition would typically only occur during peak hours of peak-use days. Increased visitation by day visitors would substantially increase demand for parking at Kirkwood, particularly if the desired increase in the ratio of destination to day visitors was not achieved.

- The expansion of development at Kirkwood would likely to lead to a decline in the visual and aesthetic qualities of the natural environment. Impacts are likely to be most discernable around the SR 88 corridor, a visually sensitive area because of its state and Forest Service scenic designations and the natural state of surrounding NFS land. The MMDP projects located in Emigrant Valley would result in a significant visual impact in this area, especially as viewed from the historic Emigrant Trail.

- In terms of project visibility, the Kirkwood North single-family residential development would be inconsistent with the characteristic development along SR 88, and MMDP projects Emigrant Valley would be inconsistent with the Management Area 11 stipulations. Many proposed elements would contribute to light and glare.

- Noise associated with additional snowmaking activities could affect current or planned residential areas, but this impact is considered temporary and expected for ski resort operation and is therefore allowed by the counties. Construction noise could be substantial.

- Impacts to the socioeconomic setting would include the need to house a percentage of the ski resort and related businesses' employees at Kirkwood, and to provide emergency housing provisions.

- Potential contamination from fuel leaks and spills could occur.

- In terms of recreation, increased numbers of people recreating at Kirkwood would be a beneficial impact in general, but minor, adverse impacts to individuals desiring a more tranquil, undeveloped recreational experience would occur. Construction disturbance would also temporarily impact the recreational experience at Kirkwood.

- Projected resident and visitor population growth would exceed Kirkwood's current ability to meet energy and wastewater treatment demands.

2.7.3 Significant and Unavoidable Environmental Impacts

Significant and unavoidable adverse impacts are those which constitute a substantial detrimental change to existing environmental conditions that could not be fully mitigated by implementing all feasible mitigation measures or by selecting an alternative to the Proposed Project. Because the Proposed Project and its alternatives all involve a substantial increase in Kirkwood's population and year-round activities, all alternatives would have similar ramifications regarding significant and unavoidable environmental impacts.

- Developing Kirkwood as a year-round resort would significantly impact certain wildlife populations. It is likely that the proposed level of development would prevent the Kirkwood area from being used by species sensitive to human presence and activity in the future. Most such species have already left the area.

- Year 2020 average annual daily traffic and peak-month service levels on state and local roads is expected to deteriorate from Level C to Level D even without the Proposed Project, resulting in a significant impact. This change in LOS can be exclusively attributed to the development at Kirkwood for traffic traveling west of Kirkwood Meadows Drive on SR 88. The impact of increasing traffic volumes on SR 88 service levels would likely remain significant.

- The project visibility impact of multi-family and commercial development in the SR 88 corridor at Kirkwood North would remain significant, as would development on the higher slopes of Ski-In/Ski-Out South. Existing and proposed facilities in the Management Area 4 portion of Emigrant Valley if the ENF Forest Plan is not amended to change the VQO. Significant impacts would remain as a result of lighting at Ski-In/Ski-Out South, Kirkwood North, and the Caples Crest Restaurant.

- The impact of growing numbers of Kirkwood residents and visitors using popular recreational sites and facilities on adjacent NFS land, particularly those such as Kirkwood Lake that are within walking distance of Kirkwood. The would constitute a significant adverse impact, as most such nearby sites and facilities are already operating at or near capacity. This impact is likely to be limited to summer months.

2.7.4 CUMULATIVE ACTIONS

An EIR must identify ways in which a proposed project may have a cumulative environmental effect when considered in the context of other actions affecting the environment. Cumulative actions considered in this analysis are described in Chapter 3. Cumulative impacts of these actions and the Proposed Project are discussed at the conclusion of each discipline-specific analysis in Chapter 4. Because the Proposed Project and alternatives would be similar in regard to the physical disturbance they would entail and the population they would ultimately support, cumulative impacts would be similar for all alternatives.

Cumulative actions are those past, present, and reasonably foreseeable actions with which the Proposed Project could act in an additive fashion to degrade environmental resources. As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the cumulative actions have the potential to interact with the Proposed Project to generate cumulative land use and recreation effects, primarily through increased use of lands adjacent to Kirkwood. Growth and development in South Tahoe and other surrounding communities, and the increase in tourism and dispersed recreation in the surrounding area further increase the recreational use of these lands. Up to a point, increases in recreational use would be compatible with such land use classifications. However, some popular recreation sites and facilities in the area are currently used at or near capacity. Impacts from the increased level of recreational use could in turn drive significant changes in land use management or even land use classifications, particularly on the ENF. Popular recreational areas that would likely receive increased visitation include Kirkwood Lake, Caples Lake, Caples Creek, Silver Lake, South Lake Tahoe, Hope Valley, Lake Margaret, and Woods Lake. There is also the possibility that recreational use of the upper Truckee watershed, "Meiss Country," and the Mokelumne Wilderness could increase.

Both of the cited cumulative actions could also combine with the Proposed Project to generate cumulative traffic effects in terms of increased vehicles on SR 88. Both growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area would add traffic to the highway. As discussed above, the traffic modeling completed for this analysis incorporated traffic increases not associated with the Proposed Project as a baseline for predicting the impacts of the Proposed Project. In other words, the cumulative effects were built into the analysis of the direct and indirect effects of the project. This projected cumulative growth in traffic on SR 88 would constitute a significant, unavoidable, adverse impact.

These cumulative impacts on land use, recreation, and traffic are the only three significant, cumulative effects identified in this analysis.

CHAPTER 3: DESCRIPTION OF THE PROJECT

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

3.1 Introduction

This chapter describes key aspects of the Kirkwood Specific Plan (Draft Plan), the Mountain Master Development Plan (MMDP), and the wastewater treatment plant (WWTP) upgrade, which together constitute the Proposed Project addressed in this EIR. The function of this EIR in addressing each of these three elements of the Proposed Project is discussed in Chapter 1 (section 1.2). The following sections of this chapter identify the project location, outline the objectives of each of the three project elements, then detail the distinguishing features of each element.

Private land development at Kirkwood is currently guided by the 1988 Master Plan (KAI 1988). The proposed Draft Plan updates and modifies the 1988 Master Plan to respond to market demands and current county development policies. Once finalized and adopted by the three counties, the Draft Plan will meet pertinent state requirements and become Kirkwood's Specific Plan. The Specific Plan will document plans, policies, and regulations which will guide development of Kirkwood's privately owned land, primarily within the base area, through buildout.

Proposed development of ski area facilities and infrastructure on National Forest System (NFS) land and some portions of private land at Kirkwood has been outlined in the proposed MMDP. Management of the existing on-mountain facilities is controlled by the resort's original 1971 Mountain Master Plan and numerous, subsequent revisions made on a case-by-case basis. As a result, there is currently no consolidated plan for on-mountain development. The MMDP is intended to fulfill that need. Decisions concerning development possibilities on federal land are the responsibility of Forest Service decision-makers and subject to further review prior to agency approval (see section 3.5.2 below). The draft MMDP has been incorporated into the Proposed Project. It is available for review at the Eldorado National Forest , Amador Ranger District office, the Alpine County planning department, the Kirkwood planning office, and the Alpine County library.

The proposed WWTP upgrade is designed to meet projected wastewater treatment needs at Kirkwood. The *Wastewater Facilities Plan* (Kennedy/Jenks 1998) evaluated wastewater treatment and disposal alternatives in Kirkwood Meadows. Detailed engineering plans to implement the best apparent alternative, with some technological improvements, were subsequently prepared by ECO:LOGIC. Those final plans, outlined in the *Wastewater Facilities Plan Update* (ECO:LOGIC 2001c), have been incorporated into the Proposed Project.

3.2 Project Location

Kirkwood is located about 35 miles southwest of Lake Tahoe at the intersection of Alpine, Amador, and El Dorado Counties. Access is via SR 88, an east-west artery that provides access to Jackson to the west, Meyers and South Lake Tahoe to the north, Gardnerville and Carson City to the northeast, and Markleeville to the east (Figure 3.1). The nearest airport is at South Tahoe, about 35 miles from Kirkwood. This airport does not currently offer scheduled commercial service. The two nearest airports offering commercial service are in Reno, 76 miles away, and Sacramento, 112 miles away.

Kirkwood includes both private and public lands (Figure 3.2). The ski lifts and ski terrain are primarily on Eldorado National Forest lands, with operations authorized under a special use permit issued by the Forest Service in 1971. This permit was recently renewed for a new, 40-year term, with the next renewal due in 2039. Currently, approximately 69 percent (506 acres) of the total private land at Kirkwood is owned, in fee simple, by Kirkwood Mountain Resort (KMR), with the remaining 31 percent (226 acres) owned by other persons or entities.

3.3 Project Objectives

The Proposed Project outlined in this Recirculated Revised EIR reflects changes made to the Draft Plan, the WWTP upgrade, and the proposed MMDP since publication of the last FEIR. These changes are summarized below in the Project Elements sections.

3.3.1 Draft Plan Objectives

The Draft Plan component of the Proposed Project is intended to facilitate development of a year-round destination resort community while protecting the natural environment and Kirkwood's unique mountain setting. KMR provided the following project objectives for the proposal involving their privately owned land (KMR 2001a):

- Create a year-round destination mountain resort community with a diversity of residential, commercial, recreational, and cultural activities.
- Balance Kirkwood community development with the skiing capacity of the mountain, and achieve this balance while protecting the environmental and visual quality of the area.
- Develop a full-service resort with lodging, restaurants, shops, and related services to accommodate the summer and winter visitor, while paying particular attention to preservation of the natural beauty and mountain atmosphere that make Kirkwood unique.
- Develop Kirkwood as a community, emphasizing the quality of the visitor and resident experience by the types and designs of buildings, the types of services offered, and the protection of open space.
- Concentrate development at Kirkwood in and near the Mountain Village and Timber Creek Village where residential, commercial, and recreational uses are closely intermixed to promote a strong pedestrian-oriented community.

- Enhance recreational experience opportunities for the skier, snowboarder, mountain biker, and hiker by maintaining and improving mountain support facilities.

Figure 3.1. Regional Location Map.

Back of Figure 3.1.

Figure 3.2. Land Ownership.

Back of Figure 3.2.

Specific needs addressed by the Draft Plan include:

- Increasing and maintaining the financial stability of the resort by promoting year-round resort use. KMR proposes to meet this need by: establishing a destination resort community accommodating year-round residents, part-year residents, and short-term visitors; providing year-round recreational opportunities for residents, visitors, and employees; attracting meetings and conferences; and sponsoring cultural events.

- Maintaining general competitiveness in the marketplace. Retaining or increasing market share in the ski industry requires resorts to transition from single-season recreation (alpine skiing) to multiple, four-season, recreational pursuits.

- Expanding recreational opportunities beyond skiing to accommodate other user groups. KMR proposes to meet this need by providing: a multi-purpose recreation/community center to provide indoor and nighttime recreation, opportunities for rock climbing and lift-accessed mountain bike riding, a ropes course and rock climbing wall, space for volleyball and basketball, and trail system improvements, as described below.

- Improving the existing trail system, which currently restricts trail-dependant activities such as hiking, biking, and horseback riding. An expanded trail system would accommodate increased summer use, provide better trail access, and minimize trail congestion, erosion, and unauthorized trail-blazing.

- Providing a range of housing opportunities and associated infrastructure for residents, visitors, and employees as year-round use of the resort increases. KMR's plans to meet this need include: (1) buildout of an estimated 1,503 residential units of varying types and sizes, with higher-density development concentrated around the village centers, Mountain Village and Timber Creek areas of the resort, and (2) introducing a population-based approach to assigning unit density to a given residential development. This is intended to provide developers additional flexibility in adjusting to trends in market demand for a variety of unit sizes and types.

- Providing affordable housing as well as community and recreational activities for employees. Kirkwood is geographically isolated from population centers that provide off-site housing opportunities and social amenities. It is expected that at buildout there would be 1,000 KMR employees (150 year-round and 850 seasonal), 100 non-KMR employees, 10 Caples Lake resort employees, and 25 Caltrans employees connected with the Kirkwood community. The goal of the Draft Plan is to provide local housing for up to 50 percent of these individuals.

- Preserving the aesthetic and ecological values of the natural environment surrounding Kirkwood. Part of KMR's strategy for meeting this need includes concentrating residential density and focusing commercial activities in and near the village centers of the resort. This would limit traffic and foster a pedestrian-oriented community. Specific restrictions defined in the Draft Plan and in Kirkwood Resort Master Owners Association covenants, conditions, and restrictions (CC&Rs) (Cadwalader & Watters 1997) further guide development and recommend additional protection measures.

3.3.2 MOUNTAIN MASTER DEVELOPMENT PLAN OBJECTIVES

The primary goal of the MMDP is to provide long-term development planning for facilities improvements on NFS lands and KMR's private lands utilized for alpine recreation. The MMDP is intended to guide site-specific development over the next 7 to 10 years of on-mountain projects related to skiing and four-season recreational infrastructure (KMR 2001a). Specific design objectives outlined in the MMDP include (SE Group 2001):

- Review past inventories of the study area's environmental resources/constraints (e.g., wetlands, avalanche hazards) to ensure a comprehensive planning process.
- Employ state-of-the-art design, planning, and technology in order to provide a quality resort experience.
- Improve the resort's overall utilization, specifically during the summer and "shoulder" seasons, with modernization of the resort's recreational facilities.
- Integrate the unique qualities of the environs, especially as they relate to the expectations associated with the "Kirkwood experience."
- Design a portion of KMR's facilities specifically with families and children in mind, while continuing to position the resort principally as the Sierra's premiere destination for advanced intermediate and expert skiers and snowboarders.
- Enhance Kirkwood's destination status by offering a variety of four-season activities, which contribute to the attractiveness of the resort, and which are unique to Kirkwood's high elevation setting.
- Provide creative design solutions that ensure comfortable walking/sliding distances between parking facilities, base area buildings, and lower lift terminals.
- Ensure adequate parking and shuttle service to accommodate KMR's peak-day capacity.
- Upgrade and expand guest services by rehabilitating KMR's base area facilities and developing complementary, up-mountain facilities.
- Enhance KMR's out-of-base lift capacity to help facilitate skier/snowboarder circulation during the busy morning and mid-day access periods.
- Upgrade and expand the resort's lift network to improve skier/snowboarder circulation and better serve the resort's collection of terrain.
- Add lift service to areas of Kirkwood, which are presently "hike-to" only, (e.g., Red Cliffs, Thimble Peak, and Covered Wagon Peak).
- Shorten lift lines while maintaining trail densities - persons per acre ratios - that are in accordance with mountain resort industry standards for western North America.

- Develop a greater variety of terrain, to the degree possible, tailored to Kirkwood's skier and snowboarder marketplace breakdown, with a particular emphasis on enhancing opportunities for lower skier ability levels.

- Provide a snowmaking system that ensures a consistent, high quality snow surface, over a more diverse collection of terrain.

- Enhance public access to NFS lands and design proposed guest facilities in accordance with the American with Disabilities Act of 1990.

- Minimize the environmental impacts of future activities through the use of design, construction, and maintenance techniques that are sensitive to Kirkwood's physical and biological resources.

- Perform all work in conformance with Forest Service standards for mountain master plans, in full compliance with all federal, state, and local regulations related to the resort planning process.

Specific needs addressed by the MMDP include:

- Providing a clear direction for on-mountain development over the next 7 to 10 years. The ability to comprehensively assess changes in visitor preferences will allow for a balance between resort capacities and user demand. Careful planning will also avoid piecemeal development.

- Re-evaluating previously approved projects and, if possible, minimizing disturbance, especially to identified sensitive resources (e.g., wetlands, avalanche-prone areas, culturally significant sites, critical viewsheds, potentially important wildlife habitat).

- Providing quality recreational experiences to users of NFS lands and remaining economically competitive in the business of providing these recreational services. To remain consistent with Forest Service policy, these year-round recreational opportunities must be provided in an environmentally sustainable manner. Recreational opportunities must also be accessible to visitors of all abilities.

- Providing all levels of terrain difficulty and moving skiers/boarders on the mountain efficiently. Increasing the lift capacity will bring it into balance with available terrain.

- Providing adequate safety services such as ski patrol and avalanche control. Providing lift access to areas currently used by skiers but not served by lifts would increase ski patrol access. Construction of ski patrol duty stations would improve the level of service. Allowing snowcat storage atop the Wagon Wheel lift would facilitate access to avalanche-prone areas.

- Accommodating non-skiing and year-round guests. Development of snowplay activity areas, expanding the trail system, and increasing food service capacity will diversify the resort and alleviate restaurant overcrowding.

3.3.3 WASTEWATER TREATMENT PLANT UPGRADE OBJECTIVES

The WWTP upgrade project is designed to meet projected increases in demand for wastewater treatment at Kirkwood through buildout. Specific objectives include:

- Treat wastewater from all Kirkwood areas at a local treatment plant that meets all applicable standards and avoids adverse impacts to public health and safety.

- Update current wastewater treatment facilities with technological advances in order to increase capacity and efficiency.

Specific needs addressed by the wastewater treatment plant upgrade include:

- Meeting demands placed on wastewater treatment facilities by the projected future population, including both overnight and day visitors. Current capacity of the WWTP at Kirkwood is inadequate to meet future wastewater demands projected to accompany growth and development of the Kirkwood community. As resort visitation increases, Kirkwood Meadows Public Utilities District (KMPUD) must accommodate the associated increase in demand on public utilities. Increasing capacity to 190,000 gallons per day (gpd), the projected peak monthly flow, would ensure that treatment facilities will meet treatment demand.

- Incorporating current technology in wastewater treatment techniques. Technological advances that optimize efficiency, while also reducing environmental impacts, are always preferred. Incorporation of these technological upgrades concurrently with the necessary facility expansion will decrease construction disturbance in the long term.

3.4 Project Elements

This section summarizes the major elements of each of the Proposed Project's three components, providing an overview to precede the detailed descriptions of each component that follow in section 3.5. To introduce this summary, particularly for readers familiar with the evolution of this EIR, it is important to note that each of the three project components has been revised on the basis of concerns raised through the environmental review process to date.

To illustrate the plans included for various purposes in this analysis, figures depicting existing conditions (Figure 3.3), land use under the 1988 Master Plan (Figure 3.4), and the Proposed Project (Figure 3.5) follow.

3.4.1 DRAFT PLAN PROJECT ELEMENTS

As noted, because the Draft Plan builds upon the 1988 Master Plan, the two documents have many similarities. In more detailed terms, the Draft Plan retains the following elements of past plans:

- Retention of Kirkwood Meadow as permanent open space.

- Single-family residential development on the east and west sides of the meadow (in the central portion of Kirkwood, south of SR 88).

- A Highway Center north of SR 88, to include commercial uses.

- A small village center at Timber Creek on the west side of Kirkwood, with a parking area, commercial uses, and multi-family development.

- Service facilities east of Timber Creek to include a maintenance facility, school site, microwave receiving station, parking, and wastewater treatment plant.

- A main Mountain Village center of commercial and residential uses at the south end of the resort (including parking, commercial uses, and multi-family development) (See Figure 3.6).

The Draft Plan has revised some of these elements and provided detail on others to produce the following, more focused approaches:

- New Ski-In/Ski-Out residential and recreational development in the vicinity of the Timber Creek Village Center on the west side of Kirkwood, with some associated multi-family and single-family development. (Figure 3.7a and 3.7b).

- Reduced land use densities north of Kirkwood at SR 88 (Kirkwood North) and limits to commercial uses to a concentrated area adjacent to the highway (Figure 3.8). The remaining private lands would be developed for single-family residential units.

- A main mixed-use Mountain Village Center at the south end of Kirkwood Meadow that would include ground-floor commercial uses clustered around a central plaza and upper-story condominiums. Outdoor seating areas would be provided in the plaza and deck areas.

- Skiing/boarding maintained as the major winter recreational activity, while the range of summer recreation options expands with the promotion of hiking, biking, running, tennis, equestrian activities and other outdoor summer sports within the Kirkwood Valley and permit area.

- Facilities to host conference, trade and cultural events.

- Increased amount of allowable commercial space in Kirkwood to ensure that adequate retail and office space can be constructed to provide necessary community support services.

Specific changes to the Draft Plan assessed in this Recirculated Revised EIR include:

- The elimination of the proposed golf course.

- The elimination of the proposed parking lot behind the cross-country center north of Highway 88 at Kirkwood North.

- The elimination of the proposal to use Caples Lake as a supplemental culinary water source.

The addition of a separate zoning category for recreational open space in which recreational facilities are allowed.

3.4.2 MMDP PROJECT ELEMENTS

- Upgrade, shorten, or relocate seven chairlifts and construct five new lifts, thus increasing Kirkwood's Comfortable Carrying Capacity (CCC) from 6,200 to 9,300 guests.
- Add 56 acres of snowmaking coverage for a total of approximately 192 acres of covered terrain.
- Construct the new Caples Crest Restaurant, including basic food service and dining, restrooms, a ski patrol facility, and a cultural interpretive center and star-gazing observatory.
- Increase food service seating by 1,339 new seats through the expansions of Kirkwood Mountain and Timber Creek Villages, and the construction of Caples Crest Restaurant.
- Upgrade and expand existing ski trails for a total of approximately 782 acres of developed trails.

Previously proposed projects that have been eliminated from the current proposed MMDP include:

- No development of Martin Point.
- No alteration to Surface Tow 12, originating from the Timber Creek Village area.
- Less additional snowmaking coverage.
- Less total acres of terrain expansion.

Figure 3.9 depicts the proposed MMDP projects.

3.4.3 WWTP UPGRADE PROJECT ELEMENTS

The following design improvements were made in the *Wastewater Facilities Plan Update* (ECO:LOGIC 2001c):

- Treat wastewater biologically through the use of a membrane bioreactor process (MBR). This will require replacing existing blowers with larger capacity blowers.
- Increase the size of aeration basins from 50,000 to 100,000 gallons, and the anoxic basins from 26,000 to 50,000 gallons. These improvements will result in the need for additional pumps and blowers. Also, the increased size of the anoxic basins will require that four new basins be constructed on the northern side of the main treatment building. A new 25 x 25-foot structure adjacent to the main building will accommodate the new basins.
- Install dual train system, with two or more of each basin type (see above). This allows the treatment plant to remain in service if individual basins require maintenance.

- Install dual contained bulk storage tanks and feed systems for alum, sodium hypochlorite, and caustic soda.

- Construct two new absorption beds in the Chair 7 parking area and three additional beds in the vehicle maintenance shop area.

- Install a second diesel-powered 320 kw generator. Together with existing 320 kw generator, this will meet additional power needs for treatment plant operation. This new generator and fuel tank will be located on the west side of the building.

The following improvements have already been made to the wastewater treatment facility, resulting in its current 100,000 gpd capacity:

- The old influent screen was replaced with a perforated basket screen with turbo washer (1.2 mgd capacity) in 1999.

- A new diesel-powered 320 kw generator was installed in 2000. The old generator remains in place as a back-up, but a second 320 kw generator will be required.

- A catalytic soot scrubber was installed on the new generator and will also function on the proposed second generator as a control on particulate emissions according to Air Resources Board recommendations (ARB 2000a, 2000b; ALG 2001).

- The submersible raw sewage pumps were replaced with larger, 5 horsepower (HP) chopper pumps in 2000.

- The gravity bag filter dewatering system was replaced with a larger capacity centrifuge.

In the event of delays to the proposed major upgrades, the District is also considering the following interim improvements. These improvements would increase capacity to 120,000 gpd. As a second phase of these improvements, additional measures could include improving the two existing emergency storage tanks, which would increase capacity to 140,000 gpd.

- Convert the existing aerobic digester into an additional aeration basin, increasing capacity from 50,000 to 75,000 gallons.

- Purchase and install a 25 HP blower.

- Replace air diffusers in the existing digester with additional and higher capacity diffusers.

- Provide additional return activated sludge (RAS) pumping capacity so that all RAS is returned to anoxic basins.

- Provide mechanical mixers in the anoxic basins.

- Provide the necessary piping and electrical facilities to accommodate the foregoing facilities.

- Insulate existing emergency storage tanks and provide then with air diffusers and additional air

supply.

· Repairing and insulating two existing storage tanks could increase capacity to 140,000 gpd.

Previously proposed projects for the treatment of effluent that have been eliminated from the currently proposed WWTP upgrades include:

· The option to directly discharge treated effluent to Kirkwood Creek.

· The option to construct effluent absorption beds in the East Meadows area or *in or near Kirkwood Meadow*.

Figure 3.10 depicts areas of wetlands and streams in relation to the WWTP and the existing and proposed absorption beds (Figure 3.11).

Figure 3.3. Existing Subareas.

Back of Figure 3.3.

Figure 3.4. 1988 Master Development Plan.

Back of Figure 3.4.

Figure 3.5. Draft Plan Subareas and Land Use Classifications.

Back of Figure 3.5.

Figure 3.6. Kirkwood Village Conceptual Plan.

Back of Figure 3.6.

Figure 3.7a. Ski-In/Ski-Out North Conceptual Plan.

Back of Figure 3.7a.

Figure 3.7b. Ski-In/Ski-Out South Conceptual Plan.

Back of Figure 3.7b.

Figure 3.8. Kirkwood North Conceptual Plan.

Back of Figure 3.8.

Figure 3.9. Mountain Master Development Plan.

Back of Figure 3.9.

Figure 3.10. Wetlands and Streams.

Back of Figure 3.10.

Figure 3.11. Absorption Bed Sites.

Back of Figure 3.11.

3.5 Detailed Project Description

3.5.1 Draft Plan Description

3.5.1.1 Population Projections

The Draft Plan would limit Kirkwood's peak, overnight population to 6,558 persons, the same limit imposed by the 1988 Master Plan. However, rather than establishing caps on the numbers of units of various types to enforce this population limit as the 1988 Master Plan does, the Draft Plan incorporates a population-based approach. That is, a persons-per-unit factor is established for each of the various types and sizes of units, so developers can alter the mix of unit types in response to changing market demands while maintaining a given development's approved population.

To arrive at the persons-per-unit factors that link unit counts to overnight population and allow the flexibility to adjust unit types, a resort research firm was contracted to review data from Kirkwood and other resorts in the western U.S., establish pertinent assumptions, and develop a valid set of persons-per-unit factors (RRC Associates 2001). Table 3.1 shows the findings of the RRC analysis. It was based on a proposed mix of 1,503 units, consisting of 418 single-family type and 1,085 multi-family type. The same total number of units is proposed in the Draft Plan but consists of a slightly different unit mix, 425 single-family type and 1,078 multi-family type. This *change, made after completion of the RRC report,* results in a total maximum overnight population of 6,528, a population that is slightly less than the 6,558 limit. The persons-per-unit factors used in this analysis are *not affected by this minor change in the unit mix*. Persons-per-unit values, *calculated using the population at 95 percent occupancy*, are 5.47 people per single-family unit and 3.9 people per multi-family unit. These values are used to calculate the population at buildout. The RRC analysis assumes *95 percent unit* occupancy, which rarely occurs at ski resorts, making this analysis quite conservative. The persons-per-unit factors suggested by this analysis are presented in the last column of Table 3.1.

Table 3.1. Peak overnight population analysis.

Unit Type	Number of Units	Avg. no. of Bed-rooms	Avg. Beds/ Room	Avg. Pillows/Bed	Peak Day Occupancy Rate	Population *at 95 % Occupancy*	Persons/Unit
Single family	418	3.2	1.0	1.8	95%	2,287	5.47
Studio	112	1	1.2	1.8	95%	230	2.1
1BR condo	395	1	1.2	1.8	95%	811	2.1
2BR condo	372	2	1.2	1.8	95%	1,527	4.1
3BR condo	155	3	1.2	1.8	95%	954	6.2
4BR condo	48	4	1.2	1.8	95%	394	8.2
Service	3	1	1.2	1.8	95%	6	2
Total units	1,503						

From RRC Associates 2001.

In addition to peak overnight population, two terms are often used to describe and regulate population at a

resort. The most encompassing term is persons at one time (PAOT), which is used in setting a total population cap for all persons at a resort, regardless of whether or not they are participating in recreational activities (i.e., skiing or boarding). The maximum PAOT at Kirkwood was negotiated with the Forest Service in the early 1970s and published in *Kirkwood Winter Sports Development, Eldorado National Forest Environmental Impact Statement* (Forest Service 1973). A distinction is made between winter PAOT to accommodate the resort's busiest season, and summer PAOT applicable to the off season. The maximum winter PAOT described in the Draft Plan remains unchanged from earlier plans and totals 11,800. While the Forest Service has yet to specify a summer PAOT for public lands, the Draft Plan proposes to set the summer PAOT limit at 6,558, with a special event limit of 9,800, which is allowed only for the duration of the event. Special event permit(s) from the appropriate county would be required for many events. The 6,558- person cap described above applies to long-term and short-term overnight residents but does not include day visitors.

The second and more narrowly defined term is skiers at one time (SAOT). SAOT is used to limit the number of recreationists utilizing the ski facilities. The 1973 EIS authorized a total of 8,400 SAOT. This figure is for the NFS lands, not KMR's private lands. KMR has historically defined the overall SAOT limit, including skiers on private and public lands, as 10,800. Both the Draft Plan and the MMDP maintain these established limits.

KMR recorded the highest seasonal usage of ski facilities during the 1989/90 ski season, when 352,487 skiers visited the resort. A new all-time peak day number of downhill skiers occurred on Saturday, March 9, 2002, when an estimated 8,350 skiers visited Kirkwood, but this season's skier numbers are not used in this analysis (the old record, used in this analysis, occurred on January 23, 1988, when 7,775 downhill skiers visited Kirkwood). Average annual skier visitation for the past 10 years equals 282,443, with an average peak day of 6,777. Cross-country facility use has declined, averaging 7,094 skiers over the past 10 seasons (Morrow 2001b, 2001c). Skier visitation at Kirkwood is closely linked to snowpack, and in years of low early season snowfall, total skier visitation is only 50 to 60 percent of levels reached in high snowfall years (Simpson 1995d).

The last population category discussed in the Draft Plan is employees. At buildout the Draft Plan projects 1,000 KMR employees, approximately 850 of which are seasonal, and 135 non-KMR employees.

3.5.1.2KMR's Zoning Plan

The proposed land uses and associated zone acreages at Kirkwood include a few changes, but remain similar to existing uses. The community comprises a mixture of residential, commercial, public services and utilities, and open space and recreational uses. A graphic representation of the proposed zoning classifications is presented in Figure 3.5. A summary of acreage within each zoning classification is included in Table 3.2, and proposed unit counts for residential classifications are provided in Table 3.3. Allowable land uses in each zoning classification are summarized in Table 3.4. The following zoning categories have been used to develop Kirkwood's Draft Plan:

SR	Single-Family/Duplex Residential Zone
MF	Multi-Family Residential Zone
MF&C	Multi-Family and Commercial Zone
S/P	Service/Parking Zone
OS	Open Space/Recreation Zone
OS/R	Open Space/Recreation Zone-Facilities Allowed
M	Meadow

Table 3.2. Proposed land uses and acreage associated with Draft Plan zoning.

Land Use Designation	Land Use Acreage
Single-Family/Duplex Residential	201.9
Multi-Family Residential	25.3
Multi-Family Residential and Commercial	50.1
Open Space/Recreation[1]	201.6
Open Space/Recreation-Facilities Allowed	3.8
Meadow[2]	129.0
Service/Parking	48.0
Local Roads and State Route 88 and ROW[3]	72.0
TOTAL	731.7

[1]Includes private land ski terrain and undeveloped open space available for general recreation activities.
[2]Includes Kirkwood Meadow.
[3]At buildout, new internal roads may differ from the acreage shown in this table. These roads would be defined at the time of proposed new subdivisions and are not shown in the Draft Plan land use map. This land use is not intended to be a zoning designation, but is included for completeness.

Table 3.3. Projected residential unit counts.

Zoning Designation	Projected Units
Single-Family/Duplex Residential	425
Multi-Family Residential and Multi-Family Residential & Commercial	1,078
TOTAL	**1,503**

Table 3.4. Zoning designations and allowable land uses.

Symbol	Zoning Designation	Allowable Land Uses
SR	Single-Family/Duplex Residential	· Single-family dwellings. · Duplexes (when designated on final subdivision map). · Home occupation[1]. · Caretaker units (attached). · Ski lifts, cross-country ski trails, and other recreational trails.
MF	Multi-Family Residential	· Condominiums. · Townhomes. · Apartments. · Employee housing. · Tri-plexes and larger complexes. · Appropriately located effluent absorption beds.

MF&C	Multi-Family Residential and Commercial	· Residential: Apartments, Townhomes, Condominiums, Tri-plexes and larger complexes, Employee housing. · Offices and related uses: Administrative, clerical, real estate, professional, Financial institutions, Medical, dental, and related human services, Postal/telegraph service offices. · General Commercial Uses: Food and beverage sales, Restaurant/cocktail lounges/night clubs, Sale of dry goods, Catering establishments, Bakeries, Delicatessens, Hardware/sporting goods/equipment sales/rentals/ repairs, Drug store/pharmacies, Clothing sales, Liquor stores, Ski schools, Ski rentals, Barber or salon shops, Libraries/civic facilities, Conference facilities, Day-care facilities, Photo/art studios, Bowling alleys, Electronic game centers, Theater/movie houses, Laundries, Gas stations/auto repair/rental (limited to Kirkwood North), Motels/hotels, Bed & Breakfasts. · Other: Ski mountain operations, Appropriately located effluent absorption beds, Outdoor/indoor recreation facilities, School/educational facilities.
S/P	Service and Parking	· Sheriff substation. · Fire station (with employee housing). · Day care. · Parks and recreation facilities. · Sewer/water treatment and water production and distribution facilities. · School [2]. · Snowmaking facilities. · Road and slope (grooming) maintenance equipment and facilities (ski mountain operations). · Telephone/communication facilities. · Power generation/conveyance facilities. · Construction-related facilities.

		· Waste transit/storage. · Library. · Propane/natural gas facilities. · Cable television facilities. · Transportation facilities. · Surface parking lots. · Parking garages. · Appropriately located effluent absorption beds.
OS	Open Space/Recreation	· Recreational trails. · Trailhead markers. · Outdoor recreational activities that do not lead to the significant degradation of the environment. · Ski mountain operations.
OS/R	Open Space/ Recreation-Facilities Allowed	· Outdoor recreational facilities (e.g., tennis courts, playing fields, trailheads, playgrounds).
M	Meadow	· No development of permanent above-ground structures, excluding utility enclosures, such as well pump enclosures, and creek crossings (bridges). · Temporary structures on skids for winter activities. · Maintenance of existing utility facilities. · Maintenance of winter uses (trail grooming). · Trailhead markers.

[1]Typical "home occupations" are allowed. Should the occupation be a true home-based business such as a dentist's office, and not simply a telecommuter, then approval must be obtained from the appropriate county.
[2]Six-acre site *(Amador Co. APN# 026-270-018-000)* deeded by KMR to *Amador* County Unified School District for school use only. *It is restricted from all other uses except for parks and recreation.* This does not preclude the use of the existing school located in Sun Meadows 4.

3.5.1.2.1 Single-Family/Duplex Residential (SR)

This zoning classification is found throughout Kirkwood. It applies to areas that are currently developed or subdivided for SR, areas that are approved for SR development, and areas slated for SR development under the Draft Plan. Each SR lot will have a specified building envelope based on topography, geophysical considerations (e.g., rockfall and snow avalanche), biological considerations (e.g., tree location and health, wetlands, and riparian areas), road access, and subdivision theme. These envelopes will avoid or minimize environmental degradation and unnecessary ground disturbance.

Caretaker units are encouraged in SR areas as a means of providing both affordable housing to Kirkwood employees and/or year-round security for the homeowner. Caretaker units, where permitted by Kirkwood's CC&Rs, qualify as employee housing. Design criteria of caretaker units state that the main dwelling must be owner-occupied and larger than the caretaker unit. The caretaker unit must attach to the main unit by a structural feature spanning no more than 30 feet, be designed in a manner consistent with the architecture of the main dwelling, and comply to all ordinances and building codes of a single-family unit. Impact and assessment fees are levied as appropriate. This employee housing program encourages the legitimization of second units (caretaker units) without county or KMPUD-imposed penalties, provided they are used as employee housing units and meet all applicable Uniform Building Code (UBC) standards.

The maximum density associated with SR zoning is 24 persons per acre. This corresponds to the 1988 Master Plan density allocation of six persons per single-family home, with an average lot size of 0.25 acre.

Duplex lots support a higher density of 48 persons per acre. Caretaker units fall within this category. An average associated population for SR areas (single-family and duplex) is 36 persons per acre. Kirkwood Meadows West, East Meadows, Juniper Ridge, Kirkwood North, and parts of Ski-In/Ski-Out development are subareas of Kirkwood zoned SR.

3.5.1.2.2 Multi-Family Residential (MF)

This zoning classification is currently found mainly on the western side of the valley and includes existing condominium developments such as The Meadows, Edelweiss, Thimblewood, and Base Camp. MF zoning allows for development of multi-family dwelling units, including town homes, condominiums, and apartments. Employee housing complexes can also be located within, but are not restricted to, this designation.

The minimum density associated with this land use category is 20 persons per acre. The maximum density allowed within the MF zone is 200 persons per acre. The goal is to provide for maximum flexibility in design, site planning, and product mixture to meet current market trends at the time of development.

3.5.1.2.3 Multi-Family Residential and Commercial (MF&C)

This zoning classification applies to three Kirkwood areas. The first and largest area is the Village Center, at the southern end of Kirkwood, where the Lodge at Kirkwood and Mountain Club are located and several major MF&C structures are proposed. The second, smaller village center is at Timber Creek, where KMR will develop a beginning and intermediate ski ability area, with commercial and residential activity centered around the bases of Chairlifts 7 and 9. The Mighty Mountain Children's Center will be included in the commercial activities in this area. The third area is Kirkwood North. A small, highway-oriented commercial center will be developed along SR 88 with the potential for expanded cross-country skiing and bed-and-breakfast facilities.

The MF&C designation allows for a mixture of uses. Land suitable for building is limited and construction costs are high at Kirkwood. Site constraints, building code requirements, and the severe winter environment all contribute to increased construction costs. KMR feels that mixed-use development is the most economical way of developing the desired residential and commercial base at Kirkwood. By combining residential and commercial uses, two distinct needs of this community may be met with less disturbance of vacant land than if these land uses were segregated. Further, mixed-use classifications embrace and encourage a pedestrian environment. Density in this zone is the same as for MF, with a minimum of 20 persons per acre and a maximum of 200 persons per acre.

The total amount of commercial space at Kirkwood under build-out conditions is projected to be 194,300 square feet. With 76,664 square feet of commercial space existing, under the Draft Plan approximately 71,000 square feet of this will remain, and an additional 123,300 square feet of new commercial development is proposed. At buildout, about 62 percent of the commercial space will be located at the Mountain Village, 17 percent at Timber Creek, 16 percent at Kirkwood North, and 5 percent at Caples Crest Restaurant.

3.5.1.2.4 Service/Parking (S/P)

Service and parking areas can be found throughout the valley. These uses are combined in the Draft Plan in order to maintain maximum flexibility in future utility and infrastructure expansion and parking development. Typical uses include parking in the form of either surface lots or parking garages, a school facility, wastewater treatment, effluent absorption beds, potable water sources and distribution facilities, power generation facilities, gas/propane storage and distribution facilities, and snow storage. Amador

County assessors parcel #026-270-018-000 is set aside for a school facility. This parcel is restricted from all uses except parks and recreational facilities if the parcel reverts at any time to KMR ownership. Development of these facilities is subject to appropriate county review prior to any permit issuance for facility construction or expansion. Future development will likely maintain the existing pattern of intermixing infrastructure facilities with major surface parking lots.

3.5.1.2.5 Open Space/Recreation (OS)

Winter uses in these areas include Nordic, alpine, and cross-country skiing; snowshoeing; and other forms of snowplay. During the summer months, hiking and mountain biking are permitted. Other possibilities include grass skiing, hot air ballooning, horseback riding, fly fishing, nature hikes and lectures, and guided tours. Any proposed development will require review on a site-by-site basis by TC-TAC and other appropriate county, state and federal agencies.

3.5.1.2.6 Open Space/Recreation–Facilities Allowed (OS/R)

This new zoning classification allows for the addition of outdoor recreational facilities that involve some site alteration, but should also take advantage of existing natural resources and features of scenic value. OS/R areas will increase the year-round recreational opportunities in the Kirkwood community while maintaining the natural quality of the environment. Potential facilities allowed within this zone include playgrounds, playing fields, trailheads, and tennis courts.

3.5.1.2.7 Meadow (M)

No permanent above-ground structures can be developed in this zone, except those necessary to support trails and utilities provided that such facilities do not cause degradation of the meadow. These above-ground structures include well pump enclosures and bridges to allow for non-motorized access across Kirkwood Meadow and Kirkwood Creek. Any disturbance resulting from installation of utilities or foot bridges would be revegetated immediately after construction. To accommodate the safety of patrons and avoid unauthorized trail blazing, KMR and KMPUD may construct bridges across Kirkwood Creek at appropriate locations. It is expected that these bridges, with supporting signage, would help keep hikers, bikers, and horseback riders on designated trails. During the winter months, these bridges would also offer a greater degree of safety to cross-county skiers.

Primary meadow uses would be limited to cross-country skiing, horseback riding, and grazing. These uses would be curtailed if they appeared to cause damage to the meadow ecology. KMR has requested the inclusion of specific grazing management practices to minimize meadow impacts. Studies commissioned by KMPUD and KMR (Culp/Wesner/Culp 1984; Watershed Systems 1996) have indicated that the meadow is the primary area where viable sources of subterranean water may be tapped.

Under the proposed grazing plan, horses and other livestock animals are rotated between corrals north of Highway 88, grazing areas off-site near Gardnerville, and 50 acres of Kirkwood Meadow. Depending on the seasonality of precipitation, the normal horse grazing season occurs between June 15 and October 31. No more than 25 horses would utilize the northern end of Kirkwood Meadow at one time, with 15 to 20 horses being a more likely stocking estimate. For these, the meadow is used for resting periods. The maximum number of grazing animals must remain below 12, with 6 to 10 being more common. Creek access will be eliminated and enforcement is proposed through the use of electric fences during the grazing season. Water troughs will be provided as an alternative to using the creek as a water source. The grazing management plan is included in Appendix B.

3.5.1.2.8 Local Roads, State Route 88, and Caltrans Right-of-Way

This category of land use is not intended to be a zoning designation but is included for completeness. Known and existing roads have been classified, and the total area dedicated to roadways calculated. As new projects are designed and constructed, the acreage associated with roads and rights-of-way will increase. Single-family subdivisions are anticipated to generate the greatest increase in roads, whereas the multi-family areas would likely contribute minimally to the overall road acreage in Kirkwood.

3.5.1.3 Kirkwood Subareas and Proposed Buildings

For planning purposes, the Draft Plan divides the private lands targeted for development at Kirkwood into ten subareas (Figure 3.5). The subareas provide a convenient mechanism for dividing the project into discrete units and addressing project goals in terms of these discrete pods. Underlying the subareas are the various zoning classifications ascribed to the project area. Note that a single subarea may contain more than one type of zoning. It is the zoning designation which determines both the type and the density of development permitted.

3.5.1.3.1 Mountain Village- East and West

The Mountain Village is on the west and east side of Kirkwood Creek, in the existing Village area at the head of Kirkwood Meadow. The Draft Plan zones the Mountain Village as MF&C, OS/R , and S/P. The intent is to focus commercial development in this area and to intermix residential and commercial uses to create a strong pedestrian-oriented community. The entire Village Center (east and west) contains a mix of residential units that include condominiums for individual owners, interval ownership units (whereby more than one owner shares the ownership of a unit to promote year-round use of the resort), and hotel/lodge units. Ground-floor commercial units will be created within the condominium buildings, centered around open-air plazas that serve as public gathering places.

This area is partially developed and includes The Meadows condominium complex, Sun Meadows I, II, III, IV, the Cornice Café, The Lodge at Kirkwood, the Mountain Club, Meadowstone Lodge, Lost Cabin condominiums, Snowcrest condominiums, Edelweiss condominiums, and Thimblewood condominiums. These condominiums are served by both underground and above-ground parking.

The Village Center includes the existing Red Cliffs Lodge, Red Cliffs employee housing complex, existing Snowkirk parking lot, the Mountain Utilities power plant, the Towers condominiums, and other property for service, commercial, and residential development.

Also included in this subarea are the four public tennis courts and an existing playground located between Snowkirk parking lot and East Meadows Drive. The community recreational facility is under construction across from the Snowkirk parking lot.

Figure 3.6 illustrates a conceptual plan for the Village Center.

3.5.1.3.2 Timber Creek Day Skier and Parking/Services Area

The Timber Creek Day Skier and Parking/Services Area comprises the area surrounding Loop Road, and the area across Kirkwood Meadows Drive, including the existing Timber Creek Lodge. This area is currently occupied by surface parking lots, the KMPUD wastewater treatment plant and offices, the Kirkwood Volunteer Fire Department firehouse, the KMR vehicle maintenance shop, fuel storage, storage for snow-removal equipment, fire-fighting equipment, and a bulk storage propane tank. A portion of this area includes a 6-acre site deeded to Alpine County Unified School District for the future construction of a school. The Draft Plan zones this area to include S/P and MF&C. Future uses will likely include expanded wastewater treatment facilities, a new school, and expanded parking. Refer to Figure 3.7 for a conceptual

illustration of the expanded parking lot and facilities in this area.

Immediately north of the KMR vehicle maintenance shop is Renwick and the youth hostel employee housing areas. Designated as MF in the Draft Plan, this area is anticipated to have expanded employee housing and possibly other residential development.

This subarea also includes existing commercial uses such as the Timber Creek Lodge (restaurant, bar, ticket sales, retail uses), Chair 9 surface parking area, and the Mighty Mountain Children's Ski Center. A new mixed-use (MF&C) area would be incorporated into the Timber Creek Day Skier Center. This complex is anticipated to have the same flavor as the Village Center but the size and scope would be much reduced.

3.5.1.3.3 Ski-In/Ski-Out North and South

Zoning in the Ski-In/Ski-Out North and South areas has been reclassified from the 1988 Master Plan. The land on either side of the existing Timber Creek Lodge has been zoned for a mixture of residential and recreational uses. This subarea footprint is larger than under the 1988 Master Plan, extending SR development into areas not slated for development under the previous plan.

SR and MF home sites will be accessed year-round by new roads. Skier bridges are planned over these new roads to allow for easy ski-lift access by residents. Placement will depend on the final design. Lots will be designed to border ski trails in and among tree clusters that define the trails. Some of the land included in this area is currently ski trails and will remain as such.

Multi-purpose trails will be maintained and incorporated into the subdivision design. These trails will access all lots, encouraging their use for local travel as ski trails (winter) and bike/foot paths (summer). These trails are not intended to accommodate large numbers of people. Due to their location and design, they will probably be used primarily by subdivision residents. In addition to the existing recreational opportunities in this area, the plan could accommodate other activities. Refer to Figure 3.7 for a conceptual illustration of the proposed Timber Creek Day Skier Center, Ski-In/Ski-Out South, Ski-In/Ski-Out North, and the Timber Creek day skier parking lot.

3.5.1.3.4 Kirkwood Meadow West

Kirkwood Meadows West includes the Kirkwood Meadows Association (KMA), which has been subdivided for SR development. This subdivision is the original single-family/duplex development at Kirkwood, subdivided in the early 1970s. This area also includes Amador Unit Numbers 2 & 3. A small area in the northwest corner of Kirkwood Meadows West is proposed for SR zoning but, if developed, would require an additional access from SR 88. The potential access route would follow an existing route which KMR occasionally utilizes to service utilities in the S/P area adjacent to the SR zone (Peters 1999a). Caltrans would make any final decision on allowable access from SR 88.

3.5.1.3.5 Kirkwood North

Kirkwood North is the subarea encompassing all KMR-owned lands north of SR 88. Existing development in this area is limited to a gas station, the Kirkwood Inn, and the cross-country ski center. A riding stable and the remnants of an old motel facility are also located in this area.

The 1988 Master Plan zoned high- and medium-density condominium development as well as commercial development for this area. Under that plan, 122 condominiums were expected at buildout, along with an undefined amount of commercial space. The Draft Plan retains the MF&C zoning designation, but proposes to reduce this population number by 55 percent. Much of the remaining population will be accommodated

in the SR zone off the highway, which includes 18 single-family/duplex residences in its design. Large tracts of OS are designated in the northwest corner of KMR's property.

There will be approximately 32,000 square feet of commercial space at Kirkwood North at buildout, including the existing cross-country center, the service station, and the Kirkwood Inn. Existing commercial space totals 6,200 square feet. An additional 25,800 square feet of new space is proposed. MF&C uses are proposed to border SR 88, including a bed-and-breakfast facility, and other commercial uses that will meet the needs of passing motorists without requiring that they drive into Kirkwood. The existing cross-country ski trails will be protected by easements. Figure 3.8 provides a conceptual illustration of this area.

3.5.1.3.6 East Meadows

East Meadows, located east of the Kirkwood Meadow, includes the existing East Meadows I, II, and III SR subdivisions. The East Meadows subarea includes SR and OS zones under the Draft Plan.

3.5.1.3.7 Juniper Ridge

The Juniper Ridge subdivision, located at the southeast end of the East Meadows subarea, includes existing subdivisions along Glove Rock Road and Cornice Court. Ten single-family and nine duplex lots exist. This area maintains SR and OS zoning under the Draft Plan.

3.5.1.3.8 Kirkwood Meadow

Kirkwood Meadow is the subarea that divides Kirkwood into east and west zones. The meadow is protected from any residential or commercial use. Infrastructure development, such as water wells and utility corridors, is allowed. The meadow is also protected by the Scenic Agreement signed by the Forest Service and KMR Associates, Inc., as a result of the EIR (Roberts 1973) and the EIS (Forest Service 1973) completed for Kirkwood development in 1973. To maintain this protected status, the Draft Plan designates the area's zoning as Meadow (M).

3.5.1.3.9 Phasing

The Draft Plan indicates the following phasing for future development of subareas:

- Mountain Village- west side
- Ski-In/Ski-Out South
- Timber Creek Village/Service areas
- Ski-In/Ski-Out North
- Mountain Village- east side
- Kirkwood North

Development of infrastructure will occur in advance of or concurrent with the demand for community services upgrades. This strategy allows development to occur as thresholds are approached and precludes the development of unnecessary infrastructure. While the preferred phasing sets an idealized course for construction, market demand and housing needs will ultimately determine the timing of development projects.

3.5.1.4Buildout Assumptions

A number of assumptions underlie the analysis of growth-related impacts at Kirkwood, and many of these assumptions are linked to the rate at which buildings would be constructed. This rate in turn is related to population growth, and both influence the timing for the implementation of public services. The rate of growth at Kirkwood will be highly dependent on the national and state economy. Projections are essentially

based on the current economic climate, and a downturn or recession would be expected to slow growth rates. The Socioeconomics, Public Services, and Utilities and Infrastructure sections of Chapter 4 explain many of these assumptions in greater detail.

All of the private and commercial development associated with the Proposed Project is expected to be in place by 2020, except for some single-family residences. Single-family residences have historically been built at the rate of six per year at Kirkwood. If this rate held, all single-family residences would not be completed until 2045. As a result, overnight population capacity in 2020 would be 5,669 persons, and ultimate build-out population (6,528) would not be attained until 2045.

3.5.1.5Review and Approval of Specific Development Proposals

Any new private development proposed at Kirkwood must be scrutinized by a number of reviewing bodies, depending on the location and type of development proposed. In general, single-family and duplex residential development must undergo design review, while multi-family commercial development requires a use permit procedure as well as design review. All development must be approved by KMPUD, to ensure adequate water and sewer capacity, and by Mountain Utilities (MU), to ensure adequate gas and electric generation capacity. Depending on the location of the project, building permits are required from Alpine County, Amador County, or El Dorado County. TC-TAC review is required for any use or development requiring a use permit, subdivision map approval, or variance from any of the counties, and single-family and duplex development on visually sensitive lots. Additional approvals from outside agencies such as the California Department of Fish and Game, Regional Water Quality Control Board (RWQCB) or local Air Pollution Control District may also be required depending on the type of project and site conditions. Ultimately, it is the developer's responsibility to ensure all applicable permits and approvals are obtained. Table 3.7 in section 3.7 provides a summary of potentially required approvals and actions.

All single-family subdivisions and condominium homeowners' associations (HOA) have their own rules regarding new or modified development within their sphere of influence. These rules are set forth in legal agreements known as landowners' CC&Rs. Within each HOA's area, approval is required from the appropriate reviewing body as well as from the appropriate county building and/or planning department prior to the issuance of a building permit. TC-TAC reviews the building materials and colors for visually sensitive lots in single-family duplex residential zones.

Design guidelines are established to create and preserve an attractive, enjoyable community. The Draft Plan's design guidelines (KMR 2001a) are a template for the various architectural control and design review boards to follow, and are intended to establish and preserve harmonious design and protect the value of property within the community.

Due to the existence of various individual HOAs at Kirkwood, as well as the Kirkwood Resort Master Owners' Association, there is no single reviewing entity charged with the authority for architectural review for the entire community. Design review authority is derived from the various CC&Rs in force at Kirkwood. Therefore, design review of different projects by reviewing entities is dependent upon which HOA the project is subject to. This private review process does not preclude the requirement of review by any other reviewing agency or body.

3.5.1.6Supporting Public Services

Kirkwood benefits from a variety of public services typical of any small community, including water and wastewater facilities, propane and electrical service, solid waste and recycling services, fire and police

protection, emergency medical services, telecommunication service, parks and recreation, school and child care facilities, library services, snow removal, and avalanche control within ski area boundaries. Buildout at Kirkwood would require an attendant increase in public services provided to the community. The degree to which these and other services would need to expand is discussed in greater detail below. Specific development projects involving wastewater treatment are addressed in the WWTP upgrade section below. Details on the existing community service infrastructure are provided in the Public Services, and Utilities and Infrastructure sections of this EIR, as well as in the Draft Plan.

3.5.1.6.1 KMPUD's Community Services

KMR has deeded land to KMPUD for developing or improving public services. The 5.74-acre site is adjacent to Loop Road and encompasses the existing KMPUD wastewater treatment plant and community services building, which houses the fire department (equipment and office space), a sheriff's substation, KMPUD administrative offices, and a room for community events and meetings.

KMPUD's responsibilities include solid waste and recycling services (in cooperation with HOAs), fire protection (in cooperation with the Kirkwood Volunteer Fire Department), operation of the water supply, sewer, and wastewater treatment systems, and snow removal (in cooperation with Kirkwood Resort Master Owners' Association).

3.5.1.6.2 Electrical Service

Electrical power is produced on-site by Mountain Utilities (MU) (formerly Kirkwood Gas & Electric). MU is a wholly owned subsidiary of KMR. Electrical power generation is regulated by the California Public Utilities Commission. The long-range electrical power needs of Kirkwood require either the expansion of the on-site generating facilities or the transmission of electricity from an outside energy source. Recent load calculations indicate a plant size of 11 megawatts will be needed at buildout to handle anticipated growth (see the energy discussion in Chapter 4, Utilities and Infrastructure). KMR has chosen to pursue expansion of the existing diesel plant as the most economically viable alternative, and the alternative most likely to meet short-term expansion needs (Eichar 1999b). Other concepts under review include various supplementation by fuel cells, wind power, and microturbine generators and co-generators. However, successful application of any of these concepts is limited by current technology and cost. The use of fuel cells is being actively researched, but their efficiency using propane as a fuel source and/or operating at higher altitudes is still under review. Further details on the electrical generation alternatives considered but dismissed are included in the Utilities and Infrastructure section of Chapter 4 of this EIR.

The KMR-preferred alternative uses the existing diesel plant and expands it with additional diesel generators. This would require expanding the existing plant building by about 3,300 square feet. Three new diesel engines, two transformers, a larger Selective Catalytic Reduction System (SCR), and additional diesel tanks would also be required.

KMPUD generates its own electrical power, as detailed below in the description of the WWTP upgrade.

3.5.1.6.3 Solid Waste and Recycling Services

According to the Draft plan, the solid waste management program involves the hauling of solid waste from Kirkwood by private waste hauling companies, providing pick-up and storage space for solid waste, and establishing recycling deposit locations for the community of Kirkwood. Since 1997, KMPUD has had a solid waste program that contracts with the majority of the homeowner associations at Kirkwood.

3.5.1.6.4 Fire Protection Services

Buildings will continue to be constructed in compliance with the Uniform Building Code and KMPUD Ordinance No. 93-1. This ordinance includes building and landscape standards for constructing fire-resistant structures. *Other fire protection building requirements, such as the incorporation of sprinkler systems and heat sensitive devices, are outlined in the KMPUD Fire Service Master Plan (ABC 1997), which is incorporated in this document by reference. It is available for review at the Kirkwood Planning Office, Kirkwood, CA, and as part of the project record at the Alpine County Planning Office, Markleeville, CA.*

Due to the limited ability for fire trucks to access structures in the Mountain Village, KMR also maintains a Village Fire and *Life* Safety Plan. *Its goals are* to ensure the safety of the guests and staff from fire while protecting property. Fire protection services will continue to be provided by Kirkwood Volunteer Fire Department (VFD), with backup provided by Amador Fire Protection District (FPD), Markleeville VFD, Woodfords VFD, and Lake Valley FPD.

3.5.1.6.5 Police Protection Services

Alpine and Amador Counties provide law enforcement services at Kirkwood, depending on the county involved in the particular incident. KMPUD recently constructed a community services facility, which includes space for a sheriff's sub-station. Police protection for any incident along Highway 88 is the responsibility of the California Highway Patrol.

3.5.1.6.6 Medical Services

Medical services are provided on-site at a facility operated by Barton Memorial Hospital, which is located approximately 38 miles northeast of Kirkwood. These services are adequate for the current needs of residents and visitors of Kirkwood. As residential and ski area development proceeds, the level of medical services required will need to be evaluated. The biggest issue surrounding expanded medical services to the community of Kirkwood is funding for personnel and capitol improvements for a facility. Funding for future community medical services would likely be supported by local taxes. The existing medical facility and services are provided and subsidized by KMR as a requirement of the ski area special use permit and are not intended to meet community medical needs.

3.5.1.6.7 Telecommunication Services

Telephone service at Kirkwood is provided by Volcano Telephone Company of Pioneer, California through a fiber optic line, which reached Kirkwood during the summer of 1998. The fiber optic telephone connection also provides cable TV service (Eichar 1999b). Distribution lines are buried in road rights-of-way and other easements as necessary.

Cellular telephone service is also available in Kirkwood Valley. Coverage may become more consistent and expand to areas along Highway 88 with the anticipated installation of an additional antenna, located at the top of Chairlift 2.

3.5.1.6.8 Snow Removal and Avalanche Control

The Kirkwood Resort Master Owners' Association has been given the responsibility for snow removal along Kirkwood Meadow Drive and the Village Center areas. The master association also contracts snow removal services for the other HOAs at Kirkwood. KMPUD is investigating the possibility of providing snow removal services in the private streets and parking bays in Kirkwood. Should an individual HOA choose not to contract with the master association, it would be up to that individual association to privately

contract with another entity providing snow removal services. At present, no funding for snow removal at Kirkwood is provided by Alpine, Amador, or El Dorado County. The *KMR Master Snow Removal Plan* is included in the Draft Plan. This plan outlines specific procedures to be followed for snow removal, as well as outlines snow storage standards for developed areas.

Avalanche control activities are undertaken to maintain the safety of skiers and residents alike. The use of military weapons (a 75mm recoilless rifle) is carried out by KMR under the jurisdiction of the Forest Service. Other control methods, including the use of hand charges, are carried out at the sole discretion of KMR. KMR recently completed an avalanche/rockfall hazards analysis to identify potential hazard areas in locations subject to future development (Mears 1995a, 1997). No high-use activities or residences would be sited within identified avalanche hazard areas.

3.5.1.6.9 Easements

KMR's planning includes the preservation of adequate easements for the installation, upgrade, and maintenance of utilities. Existing easements within the private lands of Kirkwood are primarily for water, wastewater, and power lines. Easements are also recorded for recreation and storm drainages. These easements are maintained under the Draft Plan.

Non-exclusive snow removal/storage easements are necessary for the equitable and timely removal of snow from streets and parking areas for the residents and visitors of Kirkwood. At present, some formal easements for snow storage exist. However, due to the large amount of available storage area currently owned by KMR, many areas used for snow storage are not identified as formal easements. Over time, as more land is transferred to other owners, formal recording of such easements will become necessary. The size and distribution of snow storage easements is a case-by-case issue. The size is dependent upon the design of the subdivision, the topography of the land, and the design of the road. The Draft Plan highlights the need to insure adequate easements as development proceeds. It also includes the detailed snow removal plan.

3.5.1.7Circulation and Parking

The community of Kirkwood is serviced by one major residential collector street, Kirkwood Meadows Drive, with numerous residential side streets. Kirkwood Meadows Drive intersects SR 88, a two-lane state highway at the entrance to the resort.

Proposed zoning and development are based on the objective of minimizing vehicle use. Once visitors and residents have arrived at Kirkwood, multiple attractions will be available within easy walking distance of residential units, thus minimizing reliance on automobiles. In addition, the in-valley shuttle system will transport visitors from one end of Kirkwood to the other. The Draft Plan also includes proposals for multi-purpose paths throughout Kirkwood, to be used primarily during summer months.

3.5.1.7.1 Public Transit

Due to its isolation from other urbanized areas and its relatively small size, Kirkwood does not lend itself to the use of significant public transit except for a local in-valley shuttle service and an employee shuttle system. The in-valley shuttle service operates only during winter because of the current lack of demand during the summer. As summer occupancy of the resort increases, this in-valley shuttle system will be operated during the summer season. The employee shuttle is maintained throughout the year. However, the number of shuttles serving the South Lake Tahoe and Minden/Gardnerville areas during the summer months is limited due to the reduced number of summer employees at Kirkwood. KMR intends to keep pace with the anticipated increase in commuter employees as the resort continues to grow.

A privately-owned business currently buses patrons from South Lake Tahoe hotels to Kirkwood during the ski season. This system is subsidized by KMR and requires reservations and a small fee from guests. This enterprise will be encouraged by KMR in the future.

3.5.1.7.2 Parking Plan and Parking Standards

The Draft Plan's intent is to provide adequate parking to serve both residents' and visitors' needs while protecting the rural quality of Kirkwood and avoiding unnecessary expanses of paved parking areas. Parking spaces required for non-residential uses are provided by concentrating surface parking in restricted locations to promote a pedestrian-oriented community. The *Kirkwood Master Parking Plan* is included in the Draft Plan. This plan addresses minimum parking requirements for residential and commercial development, as well as parking available for day visitors.

The requirements for residential and commercial development include covered and uncovered spaces. Uncovered parking spaces may be accommodated in any one of the existing and future expanded surface parking lots. In the case of the Village Center, 1.5 parking spaces are required for each unit, of which one space is to be covered. *If needed and available,* uncovered parking space may be provided in the other nearby resort parking *areas* and would be designated as restricted/permit only parking. Parking requirement details are included in section 4.7, Traffic and Circulation.

Eighty percent of the covered parking spaces will be regular, single-loaded (non-tandem) spaces. Ten percent of this 80 percent could be compact, if dictated by construction/structural constraints. The remaining 20 percent of the parking spaces may be tandem (double loaded, valet style), and half of these spaces could be compact, if dictated by construction/structural constraints.

Under build-out conditions, approximately 2,500 parking spaces would be available on a daily basis for visitors at Kirkwood (Table 3.5).

Table 3.5. Non-resident buildout parking spaces at Kirkwood Mountain Resort.

Location	Number of spaces
Red Cliffs and Village (Also includes Snowkirk, Whiskey Towers, condominium, and tennis court parking.)	1,027
Kirkwood Meadows Drive (North of Red Cliffs and Village area.)	544
Chair 7 lots (Timber Creek)	784
Chair 9 lots (This area part of Chair 7 at buildout.)	40
Kirkwood North cross-country lot	100
Total	**2,495**

3.5.1.8 Parks and Recreation

3.5.1.8.1 Parks and Recreation Facilities

There are 2,300 skiable acres of NFS and private land, as well as approximately 50 miles (80 kilometers) of groomed cross-country trails. Within the private landholdings at Kirkwood, there are 172 acres of

undeveloped open space and 132.1 acres of meadow. During the summer months, this land is open to day hikers, mountain bikers, horseback riders, anglers, photographers, and sightseers. Numerous hiking and riding trails are located on private land and NFS land in the Kirkwood vicinity, as discussed below.

3.5.1.8.2 Equestrian Activities

Horseback riding is available through Kirkwood's stables in the summer months. The stables are currently located on the north side of SR 88, with trails located throughout Kirkwood. In the winter months, horse-drawn sleighs are available for rides through the Kirkwood Meadow, using groomed trails. Horseback riding is expected to continue at Kirkwood. Equestrian trails and stable locations will be managed as provided and controlled by the Forest Service and county regulations.

3.5.1.8.3 Tennis Courts

A total of four public tennis courts are currently available during the summer months, located adjacent to a small playground at the entrance to East Meadows. They are open to Kirkwood residents and guests. Two additional tennis courts are located in the East Meadows subdivision for the exclusive use of East Meadows HOA members. As residential development continues, the provision for additional courts and other recreational amenities will be encouraged.

3.5.1.8.4 Multi-purpose Trail Network

A number of multi-purpose trails exist within and around the community of Kirkwood, on NFS land and private land, for use during summer months. Some of these trails connect with service roads used to access ski lifts for maintenance during summer months. In addition to trails, pedestrian and bicycle use occurs along many of the local roads.

Figure 3.9 depicts the existing and proposed trail network in Kirkwood Valley. Construction of new trails is likely to coincide with ski trail and ski lift expansion, and possibly with private land development.

Trail construction will occur so as to avoid or minimize erosion and guard against plant and riparian habitat degradation. If use conflicts arise, trail use will be coordinated and/or restricted to certain types and/or combinations of use.

One partially completed trail, the Meadow Trail Nature Walk, parallels the eastern perimeter of the meadow. To protect the sensitive meadow ecology and to minimize unauthorized trail-blazing, a complete trail encircling the meadow and providing a single, designated crossing is proposed. Utility easements will be used where possible to create this looped trail system. All proposed trail construction will be consistent with the open space and recreational land use policies of the Draft Plan.

3.5.1.9Reasonably Foreseeable Future Phases

3.5.1.9.1 Library

At some point in the future, Kirkwood may develop a permanent library facility. This could be done in conjunction with the school, as has been done in the community of Bear Valley, or as part of a community center.

3.5.1.9.2 School

New school facilities may be built, depending largely upon demand and funding, to meet the need for

established local school facilities and to accommodate an increased number of students in kindergarten through sixth grade at buildout (from the current 12 to an estimated 43). Only a small percentage of the maximum build-out population of 6,558 would be year-round residents. As a result, the number of school children is expected to remain small in comparison to the maximum population allowed at Kirkwood. It is doubtful that a new school would provide education beyond the sixth grade due to low numbers of students projected for grades 7 through 12 (36 students) and students' preferences for greater educational and social opportunities at schools in larger communities.

The Alpine County Unified School District (ACUSD) has been deeded a 6-acre pod at the edge of Kirkwood Meadow near Loop Road. Should demand dictate, and funding become available, this location would house a new school facility. However, this site needs to be evaluated and certified by the State of California for its suitability before ACUSD could construct a school facility.

The continued use of the existing school space in Sun Meadows IV is dependent upon approval of 100 percent of the homeowners in the HOA of the Sun Meadows III and IV condominiums. Without this approval the school would need to be relocated to another leased space, or children would need to be bused to the Diamond Valley School in Markleeville, about 30 miles east of Kirkwood. In the event of severe winter weather conditions, Carson Pass may be closed, leaving children unable to get to school or home. Busing is not the ACUSD-preferred system, especially for children from kindergarten through the sixth grade.

3.5.2 Mountain Master Development Plan Description

While certain components of the proposed MMDP, including lifts and trails, fall on both public and private lands, the majority of KMR's skiing operation occurs on NFS land through an authorized special use permit (SUP) issued by the Eldorado National Forest. The resort's original SUP, which includes 2,129 acres of NFS land, was renewed for a standard 40-year term by the Forest Service in December 1999. As a requirement of their SUP, KMR must maintain a master plan outlining their plans for operating and developing the resort over a 7-to-10-year planning horizon. This plan must first be accepted by the Forest Service. The proposed MMDP constitutes that plan.

The geographic and functional relationship between the Draft Plan and the MMDP led to inclusion of the MMDP in this EIR's definition of the Proposed Project, allowing full analysis and disclosure of all direct, indirect, and cumulative environmental impacts in their complete context. This EIR will be used by the counties to decide whether to permit the private land portions of the MMDP. The MMDP primarily involves federal lands managed by the USDA-Forest Service and will require that agency's approval before it can be implemented. Therefore, although the proposed MMDP is included in this analysis, county decisions regarding the Draft Plan and the MMDP will not control Forest Service decisions regarding the proposed MMDP. Such decisions will be based on a subsequent impact assessment conducted by the Forest Service in accordance with the National Environmental Policy Act of 1969 (NEPA). This analysis will address all MMDP elements proposed on NFS lands. It is possible that through the NEPA process, alternatives to KMR's proposed on-mountain improvements may be developed and approved in lieu of the elements described below.

KMR submitted a previous MMDP proposal to the Forest Service in 1999, and the Forest Service initiated an environmental analysis and public scoping on July 26 of that year. In consideration of several factors, including uncertainty about the timing of county decisions regarding the Draft Plan and public comments

regarding the relationship between the MMDP and the Draft Plan, KMR agreed in 2001 to withdraw the 1999 MMDP proposal. KMR revised and resubmitted the MMDP in 2001. The Forest Service will conduct NEPA review of the 2001 MMDP.

The following summary of the MMDP elements is intended to illustrate the broad scope of KMR's MMDP proposal rather than provide an exhaustive and detailed description of the infrastructure that is intended to be built in the next 7 to 10 years. Greater detail is available in the MMDP itself, which is incorporated herein by reference. It is available for review at the Kirkwood Land Planning Office.

3.5.2.1 Capacities

As proposed in the MMDP, the resort's upgraded and expanded alpine skiing and snowboarding facilities will accommodate approximately 9,300 guests, up from a current capacity of 6,500. In addition to skiing/snowboarding capacity, the MMDP includes development of snowplay, ice skating, and village activities.

The snowplay area will provide lift-served winter tubing. Capacity will be determined by the number of tubes available, projected to be 100.

An ice skating rink, planned for constructed at the Village Center, will comfortably accommodate 100 skaters.

A proportion of any winter resort's visitors are not participating in outdoor recreational pursuits at any given time. Many of these are shopping, dining, or taking advantage of various indoor forms of recreation. The MMDP projects that 1,000 visitors will be accommodated by these pursuits in the Village Center and Timber Creek Day Skier Center.

Cumulatively, these capacities total 10,500. Factoring in 300 cross-country skiers (partial capacity of the resort's cross-country facilities, limited due to operational independence and distance from the resort base area) brings the total capacity to 10,800. This is 1,000 less than the approved winter PAOT limit of 11,800, allowing development to accommodate an additional 1,000 visitors in some type of activity in the future.

3.5.2.2Chairlifts

A total of seven chairlifts are proposed to either be upgraded with new equipment, shortened to accommodate village construction, or relocated to facilitate improved mountain circulation. Upgraded or modified lifts include the Hole 'n Wall Express originating in the Timber Creek Village area; Solitude, Wagon Wheel, and The Reut originating in Kirkwood Mountain Village; and Flying Carpet, Iron Horse, and Sunrise Express in the eastern portion of the SUP area.

To complement KMR's existing lift network, KMR proposes five new lift installations, including Caples Crest Express, Look Out Vista, Thimble Peak, Covered Wagon, and Red Cliffs. As a result of lift upgrades and proposed lift installations, Kirkwood's alpine Comfortable Carrying Capacity (CCC) would be expected to increase from 6,200 guests to 9,300 guests. CCC is defined as the optimum level of utilization (the number of skiers a resort can accommodate at any given time) which guarantees a pleasant recreational experience and preserves the quality of the environment (SE Group 2001).

3.5.2.3 Snowmaking Expansion

The *Kirkwood Water Rights and Snowmaking Project EIR/EA* (Simpson 1995d) analyzed and authorized approximately 140 acres of snowmaking coverage. The first phase of the previously approved snowmaking project, in 1996, included a supply line from Caples Lake and distribution lines to the pump house and approximately 56 acres of covered terrain. The MMDP proposes approximately 56 acres of snowmaking coverage in addition to what was already approved for a total of roughly 192 acres of covered terrain (SE Group 2001). *The existing snowmaking water conveyance infrastructure is sufficient to support the proposed increase in snowmaking coverage.*

3.5.2.4 Infrastructure Expansion

Located at the top of the Flying Carpet chairlift, the Caples Crest Restaurant is proposed to provide seating and dining space, an upgraded ski patrol facility, space to operate a cultural/historical interpretive center (in cooperation with the Forest Service) and a star-gazing observatory. Total two-story square footage of the Caples Crest Restaurant is proposed to be between 14,000 and 20,000 square feet. Ski patrol facilities are proposed at the top terminals of the Covered Wagon, Thimble Peak, and Red Cliffs lifts. The ski patrol station at the top terminal of the Wagon Wheel lift would be modified and expanded to accommodate snowcat storage. An expansion to the Chair 10 duty station is proposed to support the additional patrol service provided by the on-mountain snowcat storage. Overnight stays may be necessary by patrollers in order to clear the upper terminal and help with avalanche control.

The increase in energy capacity related to the MMDP is included in the analysis of impacts related to the Draft Plan. Based on proposed improvements to the base area, as well as proposed on-mountain improvements, the Mountain Utilities powerhouse does not have sufficient capacity to power additional lift systems and up-mountain facilities. A generating plant with a capacity of 11 megawatts will be needed to accommodate KMR's desired, full buildout scenario, including on-mountain power demands (see Draft Plan discussion of electrical power generation above).

3.5.2.5 Terrain Upgrades and Expansion

Kirkwood's proposed terrain upgrade and expansion program is designed to increase utilization of the existing SUP area (e.g., areas like Thunder Saddle that are not easily accessed by lifts). In addition, the widening and reshaping of existing trails helps the resort accommodate the anticipated increases in the volume of skiers and snowboarders, improving circulation especially during busy ingress and egress periods. The acreage of developed trails will increase from approximately 568 acres to approximately 781 acres, with 13.1 acres of vegetative clearing (SE Group 2001). Much of the proposed skiing terrain expansions are naturally devoid of trees, and thus require no tree removal.

3.5.2.6 Multiple-use Trails

Users of the multiple-use trail network at Kirkwood include hikers, backpackers, mountain bikers, horseback riders, and pack animal enthusiasts. Improvements to this trail network have already been approved by the Amador District Ranger (SE Group 2001).

At full buildout, the mountain biking terrain distribution will be: 3.0 miles of beginner trails, 8.1 miles of intermediate/advanced intermediate trails, and 5.0 miles of expert trails. Mountain bike transport is currently provided via the Snowkirk and Flying Carpet chairlifts. At full buildout, this transport system will also include the use of the proposed Caples Crest Express lift and the existing Cornice Express. Lift-served mountain biking will be limited to weekends and holidays, mid-June through Labor Day weekend.

3.5.3 WASTEWATER TREATMENT PLANT UPGRADE DESCRIPTION

The wastewater treatment plant at Kirkwood is owned and operated by the KMPUD. The District encompasses land within Alpine, Amador, and El Dorado Counties and, in addition to wastewater treatment services, also provides water supply, fire protection, and mosquito abatement, and manages solid waste collection and cable television.

The KMPUD wastewater treatment plant treats wastewater from the surrounding community and ski resort. Additional wastewater generated by new development is expected to trigger expansion of the treatment facilities. Flow to the treatment plant is expected to exceed the discharge limit in the year 2006.

Plans to expand and upgrade the wastewater treatment facilities at Kirkwood are described in the *Wastewater Facilities Plan Update* (2001c), prepared by ECO:LOGIC Engineering. These plans evolved from the *Wastewater Facilities Plan* (Kennedy/Jenks 1998), which initially developed the alternatives for wastewater facilities expansion, compared these alternatives based on a monetary and non-monetary cost factor basis, and determined the best apparent alternative. In 2001, ECO:LOGIC produced the *Wastewater Facilities Plan Update*, which improved upon the best apparent alternative identified in the *Wastewater Facilities Plan* by incorporating the use of improved membrane bioreactor process (MBR) technology, enlarged aeration basins, a dual train system, new blowers needed to accommodate the MBR process, and dual contained bulk storage tanks and feed systems. All of the proposed improvements would be located inside the existing wastewater treatment buildings except for four new basins that would be housed in a new block building approximately 25 feet square. The new structure will be attached to the northwestern side of the main building and hidden by a growing screen of trees, which has already been planted. Also, the roof height will not exceed that of the existing structure. A 7.5 foot diameter by 24 foot long horizontal clean in place tank will be located on the north side of the building, and a 320-kilowatt diesel generator with fuel tank would be located on the west side of the building. Inside the existing treatment buildings, essentially all of the existing equalization basin would be partitioned into four separate basins, and the existing aeration basin/clarifier would be converted to equalization. This would eliminate the need for a new clarifier and filters. The effluent produced is also of high quality. Five new absorption beds for effluent disposal are also proposed, to be located in the Chair 7 parking area and the vehicle maintenance shop area.

The upgrade plans will result in a plant with a maximum monthly flow capacity of 190,000 gpd. This is the projected flow occurring under ultimate build-out conditions proposed under the Draft Plan. Currently, maximum monthly flows are estimated at 90,000 gpd. The treatment facility can currently handle 100,000 gpd. With previously approved upgrades, the existing capacity can be increased to 120,000 gpd. These upgrades are described below under Recent and Interim Improvements.

Advances in technology occur on a daily basis. As detailed plans are developed prior to construction, it is reasonable to assume that the latest, most efficient, technology would be used. The impacts disclosed in this analysis are based upon the latest technology available at this time. However, future advances in technology may suggest the use of other specific methods, equipment, or upgrades to optimize efficiency and possibly reduce costs. As technology changes, it is assumed that changes in the proposed development would be made as long as the new technology resulted in environmental impacts equal to or less than the technology analyzed in this EIR.

3.5.3.1Discharge Requirements

The following effluent limits for the wastewater facility (Table 3.6), reported in Kennedy/Jenks (1998) are provided in Order No. 94-108:

Table 3.6. Current effluent discharge limits for the KMPUD wastewater treatment plant.

Constituent	30-Day Average	Daily Maximum
BOD_5, mg/L	10	30
Settleable Solids, mL/L	0.2	0.5
Total Coliform Organisms, MPN/100 mL	2.2	23
Total Nitrogen (as N), mg/L		
May 1-Oct. 31	15	
Nov. 1- April 30	25	
Total Phosphorus (as P), mg/L	3.0	
Flow, gpd	150,000	

The maximum permitted flow to the absorption beds is 150,000 gpd. The design capacity of the wastewater treatment plant is 190,000 gpd. A Report of Waste Discharge must be submitted to the Regional Water Quality Control Board (RWQCB) prior to the flow exceeding 150,000 gpd on a 30-day average basis.

3.5.3.2Recent and Interim Improvements

The following improvements have already been made to the wastewater treatment facility, resulting in its current 100,000 gpd capacity:

- The old influent screen was replaced with a perforated basket screen with turbo washer (1.2 mgd capacity) in 1999.
- A new diesel-powered 320 kw generator was installed in 2000. The old generator remains in place as a back-up, but a second 320 kw generator will be required.
- A catalytic soot scrubber was installed on the new generator and will also function on the proposed second generator as a control on particulate emissions according to Air Resources Board (ARB) recommendations (ARB 2000a, 2000b; ALG 2001).
- The submersible raw sewage pumps were replaced with larger, 5 HP chopper pumps in 2000.
- The gravity bag filter dewatering system was replaced with a larger capacity centrifuge.

In the event of delays to the proposed major upgrades, the District is also considering the following interim improvements, which would increase treatment capacity from 100,000 to 120,000 gpd. A second phase of these improvements could increase peak capacity to 140,000 gpd. This increased capacity is within the already permitted 150,000 gpd CVRWQCB order.

- Convert the existing aerobic digester into an additional aeration basin, increasing capacity from 50,000 to 75,000 gallons.

- Purchase and install a 25 HP blower.
- Replace air diffusers in the existing digester with additional and higher capacity diffusers.
- Provide additional return activated sludge (RAS) pumping capacity so that all RAS is returned to anoxic basins.
- Provide mechanical mixers in the anoxic basins.
- Provide the necessary piping and electrical facilities to accommodate the foregoing facilities.
- As the second phase, Repair existing storage tanks to allow for a total peak-capacity increase of 140,000 gpd.

3.5.3.3 Effluent Disposal

The best process for effluent disposal at Kirkwood continues to be absorption beds. New effluent absorption beds would need to be developed to accommodate the increased effluent volumes through buildout. The proposed and existing locations for the absorption beds are illustrated in Figure 3.11.

Disposal facilities have been upgraded since the *1998 Wastewater Facilities Plan*. Two absorption beds in the Chair 9 parking area have replaced the eight located on the Chair 7 ski run. Use of four beds in the Chair 7 parking area remains unchanged.

The District is proposing two additional absorption beds in the Chair 7 parking area and three additional beds are planned for the vehicle maintenance shop area. In May 2001, the hydrogeologic characterization investigation of the existing and proposed absorption beds found that these beds would together have adequate capacity to dispose of the 190,000 gpd projected maximum monthly flow at buildout without causing groundwater levels to reach land surface (Kleinfelder 2001). This issue is discussed further in the Water Resources section of Chapter 4.

3.5.3.4 Geotechnical Investigations

The following studies were performed in order to test site suitability for wastewater disposal facilities. All studies found soils of silty sands or silty sands and gravels, which are well-suited for absorption bed placement.

The first investigation, Pacific Geotechnical (1976), evaluated the areas now known as Chair 7 parking and land disposal site. No groundwater was encountered in any of the 10-foot-deep test pits, dug in June. A second report, by Kleinfelder (1998) evaluated the vehicle maintenance shop area. Groundwater was not encountered in any of the test pits, dug to a maximum depth of 10 feet. Another Kleinfelder report (2000 *in* Kennedy/Jenks 1998) evaluated the Chair 7 parking area. No groundwater was encountered in test pits, dug to 11 feet, in August. The most recent report, *Hydrogeologic Characterization of Absorption Bed Area*, was produced by Kleinfelder (2001).

The Final Report, Kirkwood Basin Geohydrology Study for El Dorado Irrigation District, (Culp/Wesner/Culp 1984) concluded that chemical constituents of wastewater origin would not reach high concentrations at any point in the Kirkwood Basin groundwater due to the seasonal flushing by snowmelt.

3.5.3.5 Wastewater Sludge Disposal

The peak volume of sludge to be treated per day would likely double at ultimate buildout. Therefore, the future solids handling system should be capable of dewatering this peak capacity of 1 to 2 percent sludge. Hauling costs are high at Kirkwood; therefore, the more the sludge can be dewatered, the less the treatment plant would pay in hauling costs. Sludge is taken to the Forward Landfill near Stockton, CA. At buildout, an estimated 31,000,000 gallons of wastewater would be treated annually, resulting in 83,000 pounds of dry solids being produced. This is equivalent to 8,000 cubic feet per year of dewatered sludge at a concentration of 15 percent solids. This will require an estimated 40 loads of sludge to be hauled annually, or, during the ski season, six loads per month.

3.5.3.6 Water Supply and Demand

Details on existing potable water sources at Kirkwood are given in the Draft Plan and in a technical memorandum from Fred Fahlen dated 5/18/01 (ECO:LOGIC 2001a). Current average annual domestic water demand at Kirkwood is approximately 56,700 gpd.

For water planning purposes it is estimated that 1,757 equivalent dwelling units would be connected to the water system under build-out conditions. This number combines water use associated with the 1,503 residential units and water demand associated with commercial use. With present patterns of use, maximum daily demands at buildout will be 390,000 gpd based on 1,757 equivalent dwelling units, or 222 gpd per unit. Average annual demands are predicted to be 170,000 gpd.

Four main groundwater wells and one emergency-supply well supply domestic water to Kirkwood. Combined, wells 2, 3, 4,and 5 produce 340 gpm over the short term, and 190 gpm over the long term. Two water storage tanks provide 950,000 gallons of storage capacity. Existing water supply sources at Kirkwood are sufficient to meet demand at buildout (see further discussion in section 4.2 Water Resources).

3.6 Cumulative Actions

An EIR must identify how a proposed project would interact with other actions to generate cumulative environmental effects. Cumulative actions are defined as those past, present, and reasonably foreseeable future actions undertaken by the Lead Agency or any other entity that, in combination with a particular proposed project, could result in increased or compounded impacts on the environment. Cumulative effects are defined as the incremental effects of a proposed project when it is viewed collectively with other, cumulative actions. Significant cumulative effects can result from combining impacts that are individually less than significant.

Because of Kirkwood's isolated location, there are not many cumulative actions to consider in this analysis. Kirkwood is far removed from other communities and generally surrounded by undeveloped public land. Little development is taking place or planned on the limited private land in the surrounding area, and virtually all planned development at Kirkwood is included in the Proposed Project. Because of these limitations, only the following six actions were identified as potential cumulative actions, and only the last two were actually carried into the cumulative impact analysis for the reasons outlined under the following heading.

- Development at Kirkwood to date.
- Implementation of the Forest Service's Sierra Nevada Conservation Framework.
- Construction of an electrical transmission line to Kirkwood.
- FERC Project 184.

- Growth and development in South Tahoe and other surrounding communities.
- Increasing dispersed recreation in the surrounding area.

In previous draft of this EIR, the MMDP was the major cumulative action considered. As discussed in Chapter 1 and in the introduction to this chapter, the MMDP has become part of the Proposed Project, so all effects associated with the it are addressed as direct and indirect rather than cumulative impacts.

The cumulative impacts of the Proposed Project and the two cumulative actions carried into this analysis (i.e., development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area) are discussed under each resource discipline in Chapter 4. Because the Proposed Project and alternatives would be similar in regard to the physical disturbance they would entail and the population they would ultimately support, cumulative impacts would be similar for all alternatives. Therefore cumulative impacts are not discussed in Chapter 5.

3.6.1 Actions Not Carried into Cumulative Impact Analysis

3.6.1.1 Kirkwood Development to Date

The activity that has impacted the environment in the Kirkwood area most is development of Kirkwood itself. The original ski area development plan for Kirkwood was approved in 1968. The State of California opened SR 88 for winter travel in 1971, and Kirkwood ski resort opened for skiing in 1972 with four chairlifts, a surface lift, a day lodge, an employee housing building, and a vehicle maintenance shop. Development of on-site power generation and wastewater treatment facilities was necessary due to Kirkwood's remote location.

Ski resort development continued through the 1980s with numerous terrain expansions, five additional lifts, another lodge, and more employee housing. Town infrastructure, such as a post office, and commercial development, such as a general store, were in place by 1984, along with a tenth lift that accessed advanced and expert terrain. Subsequent development included additions such as conference facilities and a restaurant. Year-round and seasonal residential development and guest accommodations increased as interest in the community grew.

Kirkwood exists today as a regional day and destination resort comprising 11 lifts, about 2,500 acres of terrain, a comfortable capacity of 6,200 skiers, two day lodges with restaurants, bars, retail shops, equipment rental, and other related guest services. The community includes housing and infrastructure to support a resident population of about 2,500.

The fact that development at Kirkwood to date has affected the area's environment more than any other action qualify it as a major cumulative action. However, development to date also serves other, more important functions in this EIR, such as establishing the baseline against which most direct and indirect impacts of the Proposed Project are assessed. The Environmental Setting sections under each resource discipline heading in Chapter 4 describe the end points of past development. In that way, they document environmental effects to date as well as setting the stage for assessing the impacts of the Proposed Project. Since a project's cumulative impacts are generally analyzed in less detail than its direct and indirect effects, this approach focuses more attention on past development.

For these reasons, past development at Kirkwood is not considered a cumulative action and is not carried into the cumulative impact analyses discussed in Chapter 4.

3.6.1.2 Sierra Nevada Conservation Framework

Development of the *Sierra Nevada Framework for Conservation and Collaboration* was the first step in a region-wide, federal effort to improve overall management direction for stewardship of National Forests in the Sierra Nevada and Modoc Plateau. The *Sierra Nevada Forest Plan Amendment* (SNFPA) was adopted in January 2001 and led to changes in 11 Forest Plans, including the plan for the Eldorado National Forest. The SNFPA addresses management concerns involving old forest ecosystems; aquatic, riparian, and wetland ecosystems; fire and fuels management; noxious weeds; and lower west slope hardwood forests.

As discussed in this EIR, implementation of the Proposed Project would directly, indirectly, and cumulatively impact the NFS land surrounding Kirkwood. Management objectives and guidelines stipulated in the SNFPA would affect the way in which NFS resources are managed and are therefore relevant to discussions of impacts and mitigation. However, in this analysis is more appropriately used as a criterion for screening mitigation measures for consistency with the existing regulatory structure. SNFPA management objectives and guidelines that relate to resources discussed in Chapter 4 are addressed in the applicable sections. For example, guidelines for noxious weed management developed in the SNFPA are discussed in Vegetation Resources, section 4.3.4.

The Eldorado National Forest Land and Resource Management Plan and the SNFPA are available for review at the Eldorado National Forest office, Placerville, the Amador Ranger District, Pioneer, and the Alpine County planning office, Markleeville.

3.6.1.3Kirkwood Transmission Line

Construction of an electrical transmission line to Kirkwood was evaluated in 1996 (*Kirkwood Transmission Line Feasibility Study*, July 10, 1996). Although considered as a potential option for providing power to the resort, the power line option was abandoned due to excessive costs and significant physical and environmental constraints. Therefore, this option is no longer a reasonably foreseeable action and is not considered as a cumulative action in this analysis. Should this option be considered in the future, a separate environmental analysis, most likely a combined EIR/EIS, would be required.

3.6.1.4FERC Project 184

This EIR does not analyze the Federal Energy Regulatory Commission (FERC) Project 184 as a cumulative action because FERC Project 184 will not produce related or cumulative impacts (CEQA Guidelines, Section 15130 [b][1][A]). FERC Project 184 is the El Dorado Hydroelectric Project involving four headwater reservoirs, including Caples Lake. El Dorado Irrigation District (EID) is seeking licensing and permitting to acquire, repair, and operate hydroelectric plants, and acquire 17,000 acre-feet per year of new consumptive water rights. *Lake levels would continue to be maintained primarily for power and consumptive uses, which take precedence over recreational use. However, recreational use would be maintained at Caples Lake from May through August, when summer visitation at Kirkwood is expected to increase.* The DEIR does not identify EID operational considerations that could affect recreational use of Caples and Silver lakes, *as any potential conflicts between EID project objectives and recreation at the lake regarding fluctuating water levels would occur in September and October.* EID's proposal includes a lake-level operational commitment intended to result in conditions substantially similar to PG&E historical operations at Caples Lake. Impacts associated with the *FERC Project 184* would not be expected to change the situation at Caples Lake *from the current, baseline condition assessed in this EIR,* and this project is not considered a cumulative action. Direct and indirect impacts of the Proposed Project on Caples Lake are disclosed in this EIR, but this project is not considered a cumulative action.

3.6.2 Actions Carried Into Cumulative Impact Analysis

3.6.2.1Growth and Development at South Tahoe and Other Surrounding Communities

Growth and development in communities surrounding Kirkwood, and particularly at South Tahoe, is a cumulative action relevant to this analysis. Population growth and tourist visitation trends at South Tahoe could interact cumulatively with the Proposed Project in several ways. South Tahoe is a likely source of labor and place of residence for Kirkwood employees, so increasing employment opportunities and associated demand for housing, public services, and utilities demand could be exacerbated by development at Kirkwood. In addition, many Kirkwood visitors travel to and from the South Tahoe area, approximately 35 minutes away, and other areas to the north and east. The Proposed Project could incrementally increase traffic on area highways (i.e., SR 88, SR 89, and US 50) which are already experiencing increases associated with growth and development in the South Tahoe area

El Dorado County, which includes the California portion of South Tahoe, had an estimated 1999 population of 161,358, up 1.8 percent from 1998. The estimated population of South Tahoe in 1999 was 23,000. Over the next 25 years, El Dorado County is expected to grow by 75 percent. This growth rate is nearly twice that of the rest of the state. Much of the growth is expected to occur away from Kirkwood on the western slope of the county. Placer County, which borders El Dorado County to the north, had a population of about 240,000 in 1999 and is expected to grow at a similar rate to El Dorado County. Douglas County, Nevada borders El Dorado County and Alpine County to the northeast and has a rapidly growing population of 37,480. It includes the Nevada portion of South Tahoe as well as Gardnervill/Minden, another source of labor and employee housing for Kirkwood.

Spanning the California-Nevada state line at South Tahoe, the 4,000-acre Heavenly Ski Resort is undergoing expansion. In 1997 final approvals for a redevelopment master plan were granted. The initial phase was completed in December 2000. A high-speed gondola now links over 5,000 lodging rooms to the mountain. Phase two is currently under construction and scheduled for completion in the Fall of 2002. When completed, two hotels with a total of 793 rooms and suites, 125,000 square feet of commercial space, an outdoor skating rink, and a multiplex cinema will be in service. Future plans include a 91,000 square feet convention center and an additional 540 room hotel. As shown in Figure 3.1, several ski resorts exist in the Tahoe region.

The Proposed Project area lies primarily in Alpine and Amador Counties, with a smaller portion in El Dorado County. The 1999 population in Alpine County was estimated as 1,161, a 3 percent decrease from the previous year. Amador County had an estimated population of 34,153 in 1999, up about 2 percent from 1998. The smaller, more static populations residing in these counties could make them more susceptible to the effects, positive or negative, of development at Kirkwood. The towns of Woodfords and Markleeville are relatively close to Kirkwood and provide some labor and housing and service opportunities. Amador County communities are generally further away, and the potential impacts to them are associated with increased numbers of skiers and other Kirkwood visitors passing through.

3.6.2.2 Overall Increase in Dispersed Recreation in the Kirkwood Area

The national forests and wilderness areas of the central Sierras are a major attraction to recreationist of all sorts due to their scenic beauty, the range of recreational opportunities they afford, and their accessibility to the public. As the popularity of dispersed recreation increases, the region around Kirkwood draws more visitors from the population centers of California and, increasingly, Nevada. Since the Proposed Project is intended to increase Kirkwood's resident and visitor populations, and these residents and visitors are likely to seek out similar recreational opportunities in the region, this background growth in dispersed recreation constitutes a cumulative action to be addressed in this analysis.

To date, the potential for cumulative impacts on dispersed recreation have been limited by seasonality. Kirkwood visitation has been strongly concentrated in winter, while dispersed recreation not related to Kirkwood has been primarily a summer activity. While this seasonal distinction remains and will likely continue to characterize the situation, two forces will drive increased cumulative impacts. First and foremost is the Proposed Project's emphasis on making Kirkwood a true four-season resort. Second is the increase in dispersed winter recreation in the region. These factors are discussed further in Chapter 4 under Cumulative Effects for specific, relevant resource disciplines.

Popular summer recreational activities and venues include sightseeing from the region's highways and roads, camping at Forest Service and private campgrounds, fishing in Caples Lake, Silver Lake, and Kirkwood Lake as well as in the areas streams and rivers (e.g., Caples Creek and the West Fork of the Carson River), and hiking in locales such as the Mokelumne Wilderness, Emigrant Trail, Meiss Country, and Caples Creek roadless area. Use of many of these locations is currently near or at capacity (see section 4.12, Recreation).

Winter recreation in the region is concentrated at Kirkwood, but dispersed activities such as cross-country skiing (outside Kirkwood's Nordic Center facilities), backcountry touring, snowmobiling, snow play, and ice fishing also occur in the area.

The Proposed Project is not expected to change historic levels of recreational activity at Kirkwood and in the surrounding region during the shoulder seasons of spring and fall. As a result, the potential for cumulative impacts *during these shoulder seasons* is not discussed further in this analysis.

3.7 Relationship to County General Plans

Private lands of Kirkwood fall within the jurisdiction of Alpine, Amador, and El Dorado Counties, and all three counties will be responsible for adopting the Specific Plan. The Specific Plan must be consistent with the General Plans of each county in order to be adopted by the respective county. Once adopted, it will replace the 1988 Master Plan as the guiding document for the development of Kirkwood. The relationship to county General Plans is discussed in more detail in section 1.8.

3.7.1 ALPINE COUNTY GENERAL PLAN

The Alpine County General Plan applies to land uses in the eastern and southern portions of Kirkwood, and designates Kirkwood as a Planned Development area. This designation allows "any residential, commercial, institutional, and recreational use or combination of uses arranged and/or designed to result in an integrated and organized development deemed acceptable by the county."

SR 88 is shown in the Alpine County General Plan as a Scenic Highway. Alpine County has a number of policies designed to protect the SR 88 viewshed and requires county oversight of design plans.

3.7.2 AMADOR COUNTY GENERAL PLAN

The Amador County General Plan, which applies to land uses at the western edge of Kirkwood, designates Kirkwood as a Special Planning area. This classification applies to approved or proposed planned developments under carefully prepared or supervised plans. The Amador County General Plan states that "complex land development projects are acceptable, provided there are findings of conformity and subject to use permit or other appropriate controls."

The SP designation in Amador County's General Plan limits population density and building intensity to 18 families per acre for developments within the county. The General Plan also includes text related to the Scenic Highway status of SR 88 and development in proximity to this highway. These regulations essentially control development in the highway corridor by requiring review and comment by TC-TAC and Amador County.

3.7.3 EL DORADO COUNTY GENERAL PLAN

In February of 1999, the Sacramento Superior Court "effectively [threw] out El Dorado County's guiding land-use [General Plan]" (Hecht 1999). Typically, when a General Plan is invalid, the county cannot process any land use entitlements (including Specific Plans) until the deficiencies with the General Plan are remedied. According to Jim Moose, the county's attorney for the General Plan lawsuit, El Dorado County will not be processing any Specific Plans until they have revised their General Plan pursuant to the lawsuit. Therefore, the portion of the Kirkwood Specific Plan located in El Dorado County cannot be adopted by El Dorado County until the county remedies its General Plan (Mitchell 1999).

3.8 Permits and Approvals Required

Table 3.7 identifies the potentially required permits, approvals, and actions for the implementation of the Draft Plan.

Table 3.7. Potentially required permits, approvals, and actions for the implementation of the Draft Plan.

Agency	Approval/Action	Timing
FEDERAL AGENCIES		
U.S. Army Corps of Engineers	Clean Water Act Section 404 - discharge dredged and/or fill material into wetlands or other waters of the U.S.	Condition of approval of development permit.
U.S. Fish and Wildlife Service	Incidental take permit/habitat conservation plan if significant impacts are projected for endangered or threatened species.	Prior to any grading or building permit.
U.S. Environmental Protection Agency	Prevention of Significant Deterioration (PSD) Permit.	Expansion of Mountain Utilities facilities.
	Review of 404 permits.	Following review by the Army Corps

		of Engineers.
STATE AGENCIES		
Caltrans, District 10	Encroachment permit.	Condition of approval of development permit.
	Improvements to SR 88 and interchanges.	Condition of approval of development permit.
Department of Real Estate	Public reports.	Prior to closing of escrow on residential units.
Integrated Waste Management Board	Solid waste transfer facilities.	If constructed, concurrent with building permit.
State Water Resources Control Board, Division of Water Rights	Permit to appropriate entity.	Prior to obtaining water rights.
Central Valley Regional Water Quality Control Board	NPDES/Storm water permit.	Condition of approval of development permit.
	Waste (effluent) discharge requirements.	Condition of approval of development permit.
	Water quality certification.	Wastewater treatment plant expansion; 404 permit.
Health Services, Office of Drinking Water	Approval of domestic water supply; surface water treatment.	Expansion of domestic water supply.
California Department of Fish and Game	Compliance with California State Endangered Species Act, if any listed species are identified within the project area.	Compliance prior to building permit.
	Streambed alteration agreement (1603 permit).	Condition of approval for projects impacting water courses.
Great Basin Unified Air Pollution Control District	Authority to construct and permit to operate.	Final subdivision map approval.
		On-site temporary industrial use, i.e., concrete batch plant.
		Expansion of Mountain Utilities power plant.
		Expansion of parking facilities.
		Addition of second KMPUD generator.
Public Utilities Commission	Expansion of Mountain Utilities service boundary.	Prior to expansion.
California Department of Forestry and Fire Protection	Timber harvest plans.	Prior to harvest activities.
	Conversions and exemptions.	Prior to harvest activities.
LOCAL AGENCIES		
Alpine County Planning Dept.	Zoning consistency.	Development application.
	Use permits.	
	Land subdivisions.	

	Variances.	
	Special event permits.	Event application.
Alpine County Building Dept.	Building permits.	Building permit application.
Alpine County Public Works/County Surveyor/County Engineer	Final map approval.	Final map application.
	Improvement plan approval.	Improvement plan application.
	Easement abandonment and dedication.	Easement quit-claim/grant deed.
Amador County Planning Dept.	Zoning consistency.	Development application.
	Use permits.	
	Land subdivisions.	
	Variances.	
	Special event permits.	Event application.
Amador County Building Dept.	Building permits.	Building permit application.
Amador County Public Works/County Surveyor/County Engineer	Final map approval.	Final map submittal.
	Improvement plan approval.	Improvement plan application.
	Easement abandonment and dedication.	Easement quit-claim/grant deed.
El Dorado County Planning Dept./ County Surveyor	Zoning consistency.	Development application.
	Use permits.	
	Land subdivision.	
	Variances.	
	Special event permits.	Event application.
	Final map approval.	Final map application.
El Dorado County Building Dept.	Building permits.	Building permit application.
El Dorado County Dept. of Transportation	Approval of grading plans.	Grading permit application.
Tri-County Technical Advisory Committee	Review of commercial, multi-family and mixed use projects, proposed subdivision maps, variances, and other discretionary projects.	Prior to county approval (including building permit).
	Review of any special event.	
	Design review of SR homes designated as visually sensitive from SR 88.	
KIRKWOOD REVIEWING ENTITIES		
Appropriate HOA review	Empowered by the specific CC&Rs, design review and conformance with applicable CC&R sections.	Prior to TC-TAC review.
Kirkwood Meadow Public Utility District (KMPUD)	Will-serve letter for available sewer and water capacity.	Prior to building permit.
Mountain Utilities (MU)	Will-serve letter for available propane and electric capacity.	

Kirkwood Volunteer Fire Department	Design review for safety and serviceability.

CHAPTER 4: ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

The environmental analysis section of this EIR discusses the environmental setting, impacts, and mitigation measures for each of the following topics:

- Geology, Soils, and Geologic Hazards
- Water Resources
- Biological Resources
- Air Quality
- Cultural Resources
- Land Use
- Traffic and Circulation
- Visual and Aesthetic Resources
- Noise
- Socioeconomics
- Hazardous Materials
- Recreation
- Public Services
- Utilities and Infrastructure

Each section begins with an outline of the issues raised during scoping and agency review relative to each discipline. The issues identified for each resource area help focus the analysis on particular areas of concern. Following the issues section is a description of the methods employed to identify and assess the potential impacts resulting from implementation of any proposed actions. This section is followed by a description of the assumptions underlying the resource analysis, and an outline of the impact significance criteria established for each resource analysis. Significance criteria are established both by CEQA guidance, which identifies resource-specific thresholds; federal, state, and local statutes; and by resource specialists, who identify thresholds which, if crossed, would lead to resource degradation. The pertinent regulatory setting is then described, outlining the relevant federal, state, and local statutes regulating each resource area. A listing of pertinent studies and information sources that aided resource analysis is then provided to guide the interested reviewer to the published data sources underlying the analysis. Finally, the environmental setting for each discipline is described, followed by the disclosure of potential environmental impacts associated with the Proposed Project, the impacts' level of significance prior to mitigation, and potential mitigation measures for ameliorating the associated impacts. The level of significance after mitigation is then assessed, followed by a discussion of any unavoidable adverse impacts and potential cumulative impacts.

The discussion of impacts in Chapter 4 is limited to KMR's Proposed Project, as described in Chapter 3. Alternatives to the Proposed Project have been identified, and, along with associated potential impacts, are described in detail in Chapter 5.

4.1 GEOLOGY, SOILS, AND GEOLOGIC HAZARDS

This section presents a description of the geology, soils, and potential geologic hazards of the project area, followed by an analysis of the possible impacts to the geologic and soil resources either from existing hazards or those caused or enhanced by the Proposed Project. The geologic description is not limited to the Kirkwood area, since large-scale geologic processes have heavily influenced the physiographic setting and topography. The magnitude of regional seismic activity is pertinent to an analysis of geologic hazards.

4.1.1 ISSUES

The following issues were identified through public and agency scoping and resource specialist review:

- Geologic Resources- Concerns that the project could result in the loss of, or lost access to, precious or industrial minerals resources.
- The potential loss of, or damage to, unique geological features of local, statewide, or national significance.
- Soil Resources- The potential for substantial soil erosion or loss of topsoil.
- Concern that erosion of soils, and disturbance by compaction or removal of vegetation, could reduce long-term stability and productivity of soils.
- The potential for expansive soils to be present in the project area, resulting in ground settling or movement.
- Seismic Hazards- The potential and magnitude for seismic activity to occur, and the immediate effects of such events (for example, ground rupture, ground shaking, liquefaction, landslides) and secondary effects (such as personal injury, or structural failure or damage).
- Rockfall and Landslides- The potential for rockfall, landslides, unstable or failing slopes, or other sudden mass earth movements to occur, either as a result of Proposed Project activities or seismically-induced ground shaking, and the possible threats to human health or structures.
- Static Hazards- Concerns include ground subsidence or differential settlement of soils or alluvial sediments.
- Avalanches- The potential for avalanches to occur and their locations, and possible threats to human health or structures.

4.1.2 METHODS

The scope of geologic and soils analysis for the Proposed Project is based on local conditions, but these resources are also heavily influenced by regional processes. For example, concerns expressed about the effect of ground shaking should be evaluated by considering seismic activity that may originate far from the project area. For this reason, the description of geologic hazards includes an overview of seismic

activity in California, with a focus on the local conditions that will be affected by the resulting ground shaking.

The description of the current conditions is based on existing information from a variety of sources, including:

- Regional and local geologic studies and soils surveys, including maps and descriptions.
- Geologic, geotechnical, and soils data collected specifically for the Proposed Project or previous development activities in the Kirkwood Basin.
- Aerial photographs of the project area and surrounding environs.
- Federal, state, and local regulations or planning documents that constrain development activities, or otherwise impose conditions on how such activities take place.
- Communications with local officials and resources specialists from U.S. Geological Survey, California Division of Mines and Geology, U.S. Forest Service, and private consultants familiar with the project and project area.

4.1.2.1 Assumptions

This analysis of potential impacts to geologic and soils resources is based largely on existing information. Due to the landscape scale associated with these resources, processes occurring at both the local and regional scale must be considered. The analysis presented here provides substantial information to assess potential impacts associated with the Proposed Project, which could occur anywhere within the KMR boundaries and Kirkwood's SUP area.

4.1.2.2 Significance Criteria

The analysis of effects to geological resources and soils, and concerns associated with geologic hazards, has two primary considerations. First, local ordinances such as those governing construction practices, and other relevant criteria such as objectives found in the *Eldorado National Forest* (ENF) *Land and Resource Management Plan* (Forest Plan) (Forest Service 1988), and amendments to the plan contained in the *Sierra Nevada Forest Plan Amendment* (SNFPA) (Forest Service 2001) were used to determine the standards of significance. In addition, specific consideration was given to such factors as the nature of the incidence and the existing state of the resource. Geologic hazards were analyzed as a function of the likelihood of an event occurring, as well as the magnitude of the event and its consequences. Significance of impacts to soils were determined by weighing the type of impact, its magnitude, extent, and duration, and the likelihood of mitigation success, all factored within the context of the existing soils resource base in the project area.

Once significant impacts were identified, mitigation measures were developed to reduce or minimize the magnitude of the effect. Mitigation measures are often successful at reducing impacts to a level below significance. For example, erosion control techniques and best management practices can minimize soil displacement into surface water and sedimentation. However, geological hazards may represent a significant potential impact even after mitigation because of the magnitude of effects resulting from an event.

4.1.2.3 Regulatory Setting

Local ordinances are one element of the regulatory setting. For example, The Kirkwood erosion control

ordinance contains specifications for minimizing and controlling erosion during construction activities associated with the Draft Plan (see Mitigation Measures 4.1 (b)- (h)). One main resource management guideline outlined in the Forest Plan is the prevention of mass earth movements and losses in soil productivity. The Forest Plan calls for integration of "soil resource information into land and resource management activities…to optimize…goods and services without impairment of the productivity of the land." A secondary objective from the Forest Plan is to "improve the inherent productivity of the soil, or return degraded soils to the productivity consistent with resource objectives" (Forest Service 1988). These provisions apply to surrounding NFS land and also provide sound criteria for development within the KMR property area. The level of enforceability of various guiding documents depends on land ownership, but nonetheless represents management objectives or environmental practices which are relevant to design and implementation of all components of the Proposed Project. Other relevant documentation used for the significance criteria and mitigation development are designated in the specific impact analysis in section 4.1.4.

Several forest practices and monitoring requirements specific to geology, soils, and water quality are outlined in the Forest Plan (Forest Service 1988). The document is included in this Recirculated Revised EIR by reference. It is available for review at the Eldorado National Forest office, Placerville, CA, the Amador Ranger District, Pioneer, CA, and the Alpine County planning office, Markleeville, CA.

4.1.2.4Existing Studies and Information

Important studies used for this analysis include:

- *Alpine County General Plan* (Alpine County 1982).
- *Amador County General Plan: Seismic and Safety Element* (Amador County 1973).
- Geologic Reconnaissance of the Silver Lake 15-Minute Quadrangle (Bedrossian 1979).
- *Mines and Mineral Resources of Alpine County, California* (Clark 1977).
- *Final Report, Kirkwood Basin Geohydrology Study for El Dorado Irrigation District* (Culp/Wesner/Culp 1984).
- *Kirkwood Ski-In/Ski-Out Expansion Areas, Geologic Planning Study* (GRD 1997).
- *Fault-rupture Hazard Zones in California,* Alquist-Priolo Earthquake Fault Zoning Act With Index to Earthquake Fault Zones Maps (Hart and Bryant 1997).
- *Geology of the Sierra Nevada* (Hill 1975).
- Fault Activity Map of California and Adjacent Areas With Locations and Ages of Recent Volcanic Eruptions (Jennings 1994).
- *Kirkwood Specific Plan* (KMR 2001a).
- Preliminary Soil Data, Sewage Facilities, Kirkwood Meadow Project, Alpine and Amador Counties, California (Kleinfelder 1971).
- Preliminary Soil Data, Proposed Aggregate Base Sources, Kirkwood Meadow Project, Alpine and Amador Counties, California (Kleinfelder 1972a).

· Preliminary Foundation Investigation, Proposed Maintenance Area, Kirkwood Meadow Project, Amador County, California (Kleinfelder 1972b).

· Preliminary Foundation Investigation, Proposed Village Structures, Kirkwood Meadow Project, Amador and Alpine Counties, California (Kleinfelder 1972c).

· Preliminary Foundation Investigation, Proposed Condominium Structures, Kirkwood Meadow Project, Amador and Alpine Counties, California (Kleinfelder 1973a).

· Final Foundation Recommendations, Proposed Condominium Structures, Kirkwood Meadow Project, Alpine County, California (Kleinfelder 1973b).

· Final Foundation Recommendations, Proposed Condominium Structures, Kirkwood Meadow Project, Alpine County, California (Kleinfelder 1973c).

· Preliminary Soils Investigation, Proposed Kirkwood Meadow, Alpine Unit No. One Subdivision, Kirkwood Meadow Project, Alpine County, California (Kleinfelder 1973d).

· *Geotechnical Investigation for the East Meadows Subdivision, Kirkwood, California* (Kleinfelder 1990).

· *Geotechnical Investigation Report, Proposed Phase I Village Center, Kirkwood Lodge* (Kleinfelder 1995).

· *Mineral Resource Potential of the Mokelumne Wilderness and Contiguous Roadless Areas, Central Sierra Nevada, California* (McKee et al. 1981).

· Geologic Map of the Mokelumne Wilderness and Contiguous Rare II Further Planning Area, Central Sierra Nevada, California (McKee and Howe 1981).

· *Design-magnitude Avalanche Mapping and Hazard Analysis, Kirkwood Resort, California* (Mears 1995a).

· *Avalanche Mitigation Concepts, East Meadow 3* (Mears 1995b).

· *Design-magnitude Avalanche Mapping and Mitigation Analysis, Kirkwood Resort, California – An Updated Study* (Mears 1997).

· *Report of Preliminary Geotechnical Investigation, Kirkwood Expansion, Kirkwood, California* (Nolte and Associates, Inc. 1996a).

· *Geotechnical Investigation Report, Children's Center, Kirkwood, California* (Nolte and Associates, Inc. 1996b).

· *Geotechnical Investigation Report, Quartershare, Kirkwood, California* (Nolte and Associates, Inc. 1996c).

· *Geotechnical Investigation Report, Snowboard Shop, Kirkwood, California* (Nolte and Associates,

Inc., 1996d).

- *Report of Geotechnical Findings, Proposed General Store Site, Kirkwood, California* (Nolte and Associates, Inc. 1996e).
- *Report of Preliminary I, Trust Parcel Project Area, Kirkwood, California* (Nolte and Associates, Inc. 1996f).
- Probabilistic Seismic Hazard Map for California (10% probability of exceedance in 50 years) Peak Horizontal Ground Acceleration, Uniform Firm-rock Site Condition (Petersen et al. 1996).
- *Final Environmental Impact Report: Kirkwood Meadow Ski Resort* (Roberts 1973).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d).
- *Eldorado National Forest Land and Resource Management Plan, Pacific Southwest Region* (Forest Service 1988).
- *Soil Survey of the Eldorado National Forest* (USDA/NRCS 1985).
- *Keys to Soil Taxonomy* (USDA/NRCS 1996).
- Caples Lake Quadrangle, California, 7.5 Minute Series, Topographic Map, 1973, revised 1992 (USGS 1992).
- Geologic Map of the Sacramento Quadrangle, California (Wagner et al. 1981).

4.1.3 Environmental Setting

4.1.3.1 Geology

This section presents a summary of geology, mineral resources, and significant geologic features found both in the surrounding region and within the local area of Kirkwood.

4.1.3.1.1 Regional Geologic Setting

Kirkwood is located along the eastern side of California in the Sierra Nevada Geomorphic Province. The Sierra Nevada Mountains extend north to south for 400 miles and are 50 to 80 miles wide. The west side of the mountains is characterized by a gentle slope dissected by numerous valleys, while the eastern side has a much steeper slope of about 25 degrees (Hill 1975). The morphology (or shape) of the range is created by an uplifted, westward-tilting block that is bounded by a fault on the eastern side. Kirkwood is situated on the western side of the central portion of the Sierras.

In general, the range is composed of a huge mass of granite, a type of igneous rock created beneath the Earth's surface, that was uplifted and eroded in the early Tertiary and subsequently covered with volcanic rocks in the mid- to late-Tertiary (Table 4.1). Forces affecting the structure of the earth (in this area referred to as Basin and Range tectonic forces) started to shape the area around the late Tertiary, and resulted in extension (pulling apart), faulting, and uplift of the range. These forces continue today. The higher

elevations of the Sierra Nevada were subjected to glacial activities during the Quaternary (Hill 1975).

The structural setting of the Sierra Nevada is controlled by active forces that have resulted in the following structures: north-south oriented extensional faults (so called "normal" faults), east-west oriented extensional faults, and tilted fault blocks. The Sierra Nevada is one of these westward-tilted fault blocks that is bounded on the east side by a large normal fault. Movement along faults results in uplift of the fault block. The interior of the block also includes smaller normal faults along which earthquake activity is actively occurring.

4.1.3.1.2 Physiography

Kirkwood and the surrounding basin are located on the Caples Lake 7.5 minute quadrangle, shown in Figure 4.1 (USGS 1992). Elevations in the area range from 7,700 feet in the valley to 9,800 feet in the surrounding mountains. Topography in the bottom of the valley, where Kirkwood Meadow is located, is flat with a gradual dip to the north. The glacially derived valley is surrounded by steep walls on all sides but the north end and contains the meandering Kirkwood Creek. Prominent peaks surrounding the valley are Thimble Peak to the south, Martin Point to the west, and the Red Cliffs ridge to the east. Topography to the north of the valley includes small knolls of low relief.

Glacial processes shaped landforms in the area. The valley itself is U-shaped with steep walls surrounded by sharp-edged peaks that were carved by a glacier moving northward through the valley. The glacier scoured volcanic materials of the slopes and valley floor, carried these materials within the glacier, and deposited the rock on the sides and end of the glacier as lateral and terminal moraines. A small glacial lake, known as a tarn, was created in the valley as the glacier receded. The resultant shape and form of the valley, including its steep walls and valley-fill sediments, have important implications when considering potential environmental effects of development (see section 4.1.4).

4.1.3.1.3 Geology of the Project Area

The geology in the vicinity of Kirkwood has been mapped on a regional scale (Wagner et al. 1981, McKee and Howe 1981, Clark 1977, Bedrossian 1979) and a local scale (Culp/Wesner/Culp 1984, Simpson 1995d, Nolte and Associates 1996a). Surface exposures of the rock types found in the project area, subsurface geology, and the structural setting are discussed below. A geologic map of the Kirkwood area is presented in Figure 4.1. Table 4.1 shows the various rock types mapped in the vicinity of Kirkwood.

4.1.3.1.4 Surface Exposure

The slopes and palisades surrounding Kirkwood (Figure 4.1) are rocks of the Mehrten Formation (Pvp), composed of pyroclastic andesitic mudflows containing breccia (a type of volcanic rock that includes broken pieces of other rock swept up in the cooling magma). The fragments of broken andesite range in size from a few millimeters to greater than 1 meter (Simpson 1995d). The unit also contains interspersed beds of two other volcanic rock types called tuff and lapili, both of which were reshaped and flattened during cooling in a process termed "welding."

The valley bottom contains one band of rhyolite (Tvs) near the south end of the valley, and a few outcrops of granitic rocks (Bedrossian 1979, Simpson 1995d). Granodiorite (Kgr) is exposed on one wall, and diorite (Kgd) is exposed north of the valley across SR 88. Both of these are igneous rock types that solidified below ground. Fractures within these units are filled with silica-bearing minerals (Simpson 1995d). Most of the rock units mapped in the valley bottom are Quaternary deposits related to glacial and alluvial processes. Moraine materials (Qm; formed as the glacier picked up rocks, carried them and dropped them at various locations in the valley) are found blanketing the valley from end to end. Some streambed deposits (Qal) and sediments remaining from a small lake (Ql) are found in the current Kirkwood Creek floodplain. A small landslide (Qls) mapped on the north end of the valley is composed of talus and moraine deposits

(Simpson 1995d). In addition, manmade fill was mentioned as being present in the area, but was not mapped as a separate geologic unit on the map shown in Figure 4.1.

Table 4.1. Lithologic Units of the Project Area.

Map Symbol	Rock Type	Unit Name	Geologic Period	Geologic Period (million yrs.)
Kgr	Granodiorite	Silver Lake Pluton	Cretaceous	144 - 67
Kgd	Diorite	Silver Lake Pluton	Cretaceous	144 - 67
Tvs	Rhyolitic tuff and sedimentary rocks	Valley Springs Formation	Tertiary	36 - 5.3
Pvp	Pyroclastic mudflows with Andesitic breccia	Mehrten Formation	Tertiary	24 - 1.6
Qm	Lateral and terminal moraine material (poorly sorted silty sand, gravel, cobbles, and boulders)	Alluvial deposits	Quaternary	1.6 - 0.01
Ql	Lakebed deposits including layered silt and clay	Alluvial deposits	Quaternary	1.6 - 0.01
Qls	Landslide debris including rotational block of talus and moraine materials	Alluvial deposits	Quaternary	1.6 - 0
Qal	Alluvial deposits (poorly sorted silt, sand, and gravel)	Alluvial deposits	Quaternary	0.01 - 0
Qf	Fill, manmade	Fill	Recent	0

Glacial deposits paralleling SR 88 on the north end of the valley are composed of materials dropped at the end of the glacier, or terminal moraines. Lateral moraine deposits, consolidated on the sides of the glacier, are found flanking Kirkwood Creek to the west, east, and south (Simpson 1995d).

4.1.3.1.5 Subsurface Geology

Geotechnical drilling by Nolte and Associates (1996a) and east-west oriented cross sections stretching across the valley (Simpson 1995d; Nolte and Associates 1996a) suggest a thin veneer of Quaternary glacial, alluvial, and colluvial rocks cover the Mehrten Formation. The Mehrten Formation is thin in the center of the valley and thickens towards the edges of the valley, covering underlying granitic rocks. A map showing the thickness of alluvial deposits within the valley (Simpson 1995d) indicates they range in thickness from 0 to 80 feet. Depending on seasonal variations, the water table fluctuates between the surface and six feet below the surface (Roberts 1973). The presence of unconsolidated materials and a shallow water table creates conditions that could be susceptible to liquefaction during ground shaking. Liquefaction occurs in response to shaking when the soil behaves more like a liquid than a solid and loses the ability to support mass. Potential impacts associated with these conditions are evaluated in section 4.1.4.

Figure 4.1. Geology.

Back of Figure 4.1.

4.1.3.1.6 Structural Setting

Kirkwood is located in the interior of the westward-tilted Sierra Nevada block. No faults were identified in the study area. The closest faults include the Genoa Fault, approximately 15 miles to the east, capable of generating a Maximum Credible Earthquake (MCE) of magnitude 7.4 (de Polo et al. 1997); and an unnamed fault, located approximately 7 miles to the east, capable of generating an MCE of magnitude 6.5 (based on empirical relationships between fault length and earthquake magnitude)(Jennings 1994). Potential impacts related to the proximity of faults are evaluated in section 4.1.4.

4.1.3.1.7 Mineral Resources

This region of the Sierra Nevada has an extensive history of mining activity beginning with the discovery of gold and silver in the 1850s. Copper, lead, zinc, tungsten, mercury, antimony, sulfur, uranium, and other precious metals, and rock and aggregate products have also been found or produced in the vicinity (McKee et al. 1981, Clark 1977). However, no deposits of these metals have been identified in the immediate project area or within the proposed area of disturbance. In addition, no real potential exists for petroleum, geothermal, or nonmetallic-mineral resources in the Mokelumne Wilderness and roadless areas surrounding Kirkwood (McKee et al. 1981). Common construction aggregates are the only materials that may present a potential mineral resource (Simpson 1995d), but no rock product mine was identified in the eastern part of the project area in Alpine County (Clark 1977). Mineral resources were not identified as being potentially impacted by this project and were not included in the evaluation of significant issues.

4.1.3.1.8 Geologically Significant Features

Comments received from the public during scoping indicated there may be geologic features of local significance in the project area. These features were addressed by one or two individuals and include: granitic outcrops and a cave located north of SR 88, and the rock cliffs surrounding Kirkwood. The ENF has listed Geological Special Interest Areas within the National Forest (Forest Service 1988). None of these Special Interest Areas are located in the vicinity of Kirkwood. In addition, Ann Boyd, ENF geologist (Boyd 1999) knew of no geologic features in the Kirkwood area that were thought of as "significant." She was also unaware of any mining adits or tunnels in the study area that might be of some historical significance.

The local features of concern identified during scoping are not considered to be of geologic significance, as they do not represent geologic outcrops, forms, or structures that are unusual or unique to the region. Therefore, they are not included in the evaluation of potentially significant geologic issues. However, these features may be considered locally interesting for other reasons, such as recreational use or aesthetic appeal.

4.1.3.2Soils

Soils are defined by Birkeland (1984) as "...a natural body consisting of layers or horizons of mineral and/or organic constituents of variable thicknesses, which differ from the parent material in their morphological, physical, chemical, and mineralogical properties and their biological characteristics" and generally require thousands to millions of years to form. Soils are the medium for plant growth, and ultimately, the basis for nearly all terrestrial life. But, when eroded or otherwise destabilized, soils lose the ability to sustain vegetation and instead serve as a pollution source of sediment to aquatic systems (Clark et al. 1985).

The primary soils issue in the project area is accelerated erosion. Soil erosion could have two effects : (1) sedimentation of Kirkwood Creek and the down-stream watershed, and (2) loss of soil productivity, which would impede revegetation efforts necessary to stabilize soil after development. The potential for soil to shrink and swell, or for the presence of collapsible soils, are also issues of concern. Liquefaction of soils and unconsolidated materials is also discussed below.

Because some commercial and residential development is already in place at Kirkwood, limited soil disturbance has already occurred as a result of past construction activities. Some of these disturbed areas have been converted to impervious surfaces (e.g., buildings, paved parking lots, paved roads). While conversion to impervious surfaces reduces the risk of erosion, it also increases runoff flows, and inhibits groundwater and aquifer recharge, an issue which is explored in greater depth in the Water Resources section of this document. Table 4.2 lists the existing disturbed acreage at Kirkwood, and indicates what portion of that acreage is composed of impervious surfaces.

Table 4.2. Existing disturbed area and impervious surfaces at Kirkwood. All figures are expressed in acres.

Degree of disturbance	Subareas						On-mountain facilities[1]	Totals
	KW North	East Meadows / Juniper Ridge	Village (East and West)	Ski in/ out (North and South)	Timber Creek Village/ Service	West Meadow (KMA)		
Disturbed	2.2	18.6	18.2	7.5	6.3	32.5	0.5	85.8
Impervious	0.4	16.5	14.6	2.4	5.0	31.2	0.5	70.6

[1] Includes ski patrol and cat storage buildings, and ski lift structures.

4.1.3.2.1 Local Setting

Classification systems are used to describe various chemical and physical properties of soils. Soils in the Kirkwood area are classified as cryic, meaning they formed within a mean annual soil temperature of 32 to 45°F. (See Figure 4.2) Soil moisture regimes range from xeric, or seasonally dry, to aquic, or saturated. The mean annual precipitation in the project area ranges from 50 to 55 inches, falling mainly as winter snow with occasional high-intensity summer thunderstorms. Slopes range from flat to very steep, up to 75 percent.

Soils are derived from granitic and andesitic rock, glacial, alluvial and colluvial deposits of this granitic and andesitic rock, and lakebed deposits. The project area lies within the Northern Sierra Bioregion in the Red Fir vegetation series (USDA/NRCS 1985).

Figure 4.2. Soil Types.

Back of Figure 4.2.

4.1.3.2.2 Description of Soil Types

Soil map units, descriptions, and properties are based entirely on information found in the ENF Soil Survey (USDA/NRCS 1985). Table 4.3 summarizes soils mapping units displayed in Figure 4.2. Soil mapping unit numbers are associated with a soil taxonomic name. The soil taxonomic names themselves provide a key to many soil properties, but because the nomenclature may be obscure the map unit descriptions contain common translations. A more detailed explanation of the soils types follows.

Table 4.3. Soil map units and selected soils data.

Map Unit Number	Name Slope Drainage Class	Description
102	Andic Cryumbrepts 15-50% well drained	Deep soils (20-60 in.) formed in andesitic rock under cryic soil temperature regime; dark, thick (12 in.) surface layer; coarse fragments range from 15-85%.
	Lithic Cryumbrepts 15-50% excessively drained	Shallow soils (4-20 in.) formed in andesitic rock under cryic soil temperature regime; dark surface layer; coarse fragments range from 20-80%.
103	Aquepts 0-15% very poorly to poorly drained	Deep (60 in.) seasonally saturated soils formed in alluvial deposits; dark, very thick surface layer (20 in.); coarse fragments may be >35% in some layers; oxygen depleted conditions.
	Umbrepts 0-15% poorly drained to moderately well drained	Deep soils (48 in.) formed in alluvial deposits; dark, very thick surface layer (20 in.); coarse fragments range from 50-70%.
161	Lithic Cryumbrepts 15-75% excessively drained	Shallow soils (4-10 in.) formed in andesitic rock under cryic soil temperature regime; dark surface layer; coarse fragments range from 20-80%.
198	Rock Outcrop steep rapid runoff	Barren, andesitic rock.
199	Rock Outcrop steep rapid runoff	Barren, isolated and massive bodies of granitic rock.
	Cryumbrepts 15-75% moderately well drained or well drained.	Deep soils (60 in.) formed in glacial alluvium under cryic soil temperature regime; dark, thick surface layer (17 in.); coarse fragments range from 15-60%.

All data compiled from USDA/NRCS, 1985.

102 - Andic Cryumbrepts-Lithic Cryumbrepts Association: These soils occur on mountainsides, often with the Red fir series or Mules Ears series, respectively. They comprise roughly 50 percent of the KMR property (Simpson 1995d) and a large portion of the surrounding SUP area to the west. The main management concern for these soils is their often steep slopes and high erodibility. Also included in this unit are areas of Cryumbrepts, wet soils, found along tributary drainages vegetated with willows, mixed grasses and forbs. Small areas of rock outcrop are also included in this unit.

The Andic Cryumbrepts component is moderately deep or deep and well drained. Soil textures range from sandy loam to coarse sandy loam or loam throughout the profile. These soils have moderately rapid permeability and a low available water capacity. They are highly erodible and have low productivity due to a short growing season. The maximum erosion hazard is high.

The Lithic Cryumbrepts component is shallow and excessively drained. Soil textures are typically sandy loam, fine sandy loam or loam. These soils have moderately rapid permeability and a very low available water capacity. They are highly erodible and have low productivity due to a short growing season. The maximum erosion hazard is very high. Due to the lithic component found in these soils, high runoff potential and topsoil loss are added management concerns.

103 - Aquepts and Umbrepts: These soils occur on broad valley flats and along drainages, typically supporting meadow vegetation of the Sedge-Rush series. Aquepts and Umbrepts cover approximately 20 percent of the KMR property (Simpson 1995d) and also occur sporadically in the SUP area. Management concerns for these soils include stream bank stability, downstream sedimentation from point and non-point erosion sources and stream bank failure, and seasonal flooding. Grazing should be delayed in these areas until the soil has drained and is firm enough to withstand trampling. Small areas of Cryumbrepts, Xerochrepts, Haploxeralfs, Haploxerults, Xerumbrepts, and Haplumbrepts are included in this unit. For further explanation of these soils, refer to Keys to Soil Taxonomy (USDA/NRCS 1996).

The Aquepts component is very poorly drained or poorly drained, with slow or very slow permeability. They formed from alluvial material and have highly variable soil textures ranging from silty clay loam to sandy clay loam. Aquepts are oxygen-depleted ("reduced") due to a seasonally fluctuating water table. The water table is at or near the surface during the spring melt, but may drop below six feet in the late summer (Roberts 1973). These soils have a low maximum erosion hazard and low productivity due to a short growing season.

The Umbrepts component is somewhat poorly drained or moderately well drained and has slow or moderately slow permeability. Textures range from clay to loam. These soils are primarily located on the periphery of Kirkwood Meadow and have a low maximum erosion hazard. Umbrepts have low productivity due to a short growing season.

161 - Lithic Cryumbrepts: These soils are found on ridgetops and mountainsides around Kirkwood Meadow, comprising roughly 17 percent of the KMR property (Simpson 1995d) and a large portion of the eastern side of the SUP area. The Mules Ear series is typically associated with this unit, but the Red Fir, Alder, Lodgepole Pine, and Mountain Hemlock series are also found. Management concerns include high runoff potential and erosion hazard, especially in steep areas. This is a shallow, excessively drained soil, with textures including sandy loam, fine sandy loam and loam. Permeability is moderately rapid. The maximum erosion hazard is very high. Andic Cryumbrepts and small rock outcrops are included in this unit.

198 - Rock outcrop: Consists of exposed andesitic breccia or granite rock. This soil type covers approximately 13 percent of KMR property (Simpson 1995d) and higher portions of the SUP area. Little noticeable erosion occurs on the rock, but bare rock acts as a conduit for very rapid runoff and contributes to erosion downslope.

199 - Rock outcrop-Cryumbrepts Association: This unit occurs on glaciated mountainsides surrounding the SUP area. The Lodgepole Pine series is usually associated with the Cryumbrepts component of this unit. This component is moderately deep, deep, or very deep and moderately well drained or well drained. Textures include loamy sand, sandy loam and coarse sandy loam. Xerumbrepts and Lithic Xerumbrepts are included in this unit. The maximum erosion hazard is high.

> **The Rock outcrop component is comprised of massive granite bodies; the rock concentrates water downslope and increases downslope erosion hazards.**

4.1.3.3 Geologic Hazards

Geologic hazards may be a concern because of the proximity of the site to earthquake activity, and because of the 2,000-foot topographic relief surrounding Kirkwood. Included in this section are discussions of earthquake-induced (seismic) rockfall or landslides, ground settlement, and snow avalanches.

Seismic hazards can be grouped into primary and secondary hazards. The primary hazard is ground movement by active faults resulting in surface rupture. Secondary hazards include liquefaction, shaking, rockfall or landslides. Landslides may also occur in response to mass loading, static failure, or changes in saturation of materials.

4.1.3.3.1 Primary Seismic Hazards – Fault Rupture

No active or inactive faults are mapped in the immediate vicinity of Kirkwood (Jennings 1994, Nolte and Associates 1996a). The Alquist-Priolo Earthquake Fault Zone Act was passed in 1972 with the purpose of preventing construction of buildings for human occupancy on the surface trace of active faults. Alquist-Priolo maps have been created for Alpine County, but not Amador or El Dorado Counties. However, the Alpine County map does not identify any faults passing directly through the study area (Hart and Bryant 1997). Because no faults exist in the valley, concerns with rupture during seismic events were not evaluated as a potentially significant issue.

4.1.3.3.2 Secondary Seismic Hazards – Shaking, Liquefaction, and Landslides

Although no faults are mapped in the immediate Kirkwood area, active faults are located in the region and events related to these faults could result in ground shaking in the Kirkwood area. The area is located within Seismic Zone III (on a scale from 0 to IV, with IV the maximum), which indicates moderate shaking could occur. The California Division of Mines and Geology (DMG) has created a map showing regional ground shaking. Using Probabilistic Seismic Hazard Analysis (PSHA) techniques, this analysis indicates Kirkwood is located in a zone where the M7.5- weighted peak acceleration has a 10 percent probability of being exceeded in 50 years and is greater than or equal to 0.2-0.3 g (Petersen et al. 1996). This means a nearby, disastrous earthquake event could result in movement of the ground in the Kirkwood area with a force of 20-30 percent the force of gravity.

Liquefaction occurs in response to shaking when the soil behaves more like a liquid than a solid, losing the ability to support weight, including buildings. It is dependent on soil types and their cohesive strengths, and the degree of saturation. Guidance presented to assess liquefaction potential by the DMG (1997) indicates that an area such as Kirkwood would be considered a "susceptibility zone" meaning it is located where seismic activity could potentially result in liquefaction. This determination is based on geologic attributes including the presence of recently deposited alluvial materials and a shallow water table (less than 30 feet) in an area experiencing M7.5-weighted peak acceleration having a 10 percent probability of being exceeded in 50 years (DMG 1997).

One geotechnical report previously completed with a reference to liquefaction for the Kirkwood area (Kleinfelder 1990) suggests the liquefaction potential may be low in the East Meadows subdivision residential development area, but moderate in the adjacent meadow. Other reports indicate the presence of loose soils encountered in test pits and drill holes, but offer no assessment for the liquefaction potential. Additional discussion of liquefaction potential and areas of concern is found in section 4.1.4.

Besides liquefaction, avalanches, landslides, and rockfalls may also occur as a result of intense ground-shaking. However, as these impacts also occur without seismic triggers, they are instead discussed under the generic headings of Rockfall and Unstable Slopes, and Avalanches.

4.1.3.3.3 Rockfall and Unstable Slopes

Rockfall hazard analysis for the Kirkwood area performed by Mears (1995a) suggests the primary source of rocks is the steep "volcanic cliffs immediately above most of the avalanche starting zones." Mears indicates rockfall paths are the same as the avalanche paths, and that the rocks would not extend beyond the high hazard (red zones) delineated for avalanches due to the less-competent nature of these volcanic rocks. Simpson (1995d) suggests that shaking of a moderate level would have the potential for creating rockfall and landslide problems for Mehrten formation cliffs surrounding the valley.

Unstable slopes related to the presence of large boulders in soils, or loose colluvial deposits, were identified as a potential issue in the Ski-In/Ski-Out lots, East Meadows III, and the North Highway lots (Nolte and Associates 1996a). The DMG has produced Landslide Hazard Identification maps delineating potential slope-stability problem areas. None of these maps indicate problems in the Kirkwood area. A small landslide is mapped in moraine and talus deposits adjacent to the southern side of SR 88 between Kirkwood Inn and Caples Lake (Simpson 1995d; Nolte and Associates 1996a). The slide is apparently moving north, away from the project area, but failure of this small landslide may cause temporary road blockage across SR 88 and potentially interfere with access to and from Kirkwood. However, this landslide is located away from proposed development and is not included in the evaluation of significant issues. Due to the presence of steep terrain and the potential for rockfall and unstable slopes to occur, this issue is assessed further in section 4.1.4.

4.1.3.3.4 Ground Settlement

Ground settlement can result from collapse of alluvial sediments, fill, or structures such as caves formed in underground deposits or mining tunnels. A few caves have been identified in the vicinity of Kirkwood, but are located away from the proposed development areas (Eichar 1999c). Nolte and Associates (1996a) identifies a cave in East Meadows Unit III that they say is "a geologic hazard for which entry should be
restricted." No mining adits or tunnels were identified in the study area (Boyd 1999).

A potential for differential settling of soils has been identified in East Meadows III and Kirkwood North (Nolte and Associates 1996a). In addition, uncompacted fill may be present at one or more locations in the Kirkwood Basin. Other reports indicate that soils and alluvial materials are suitable for structures and loads, suggesting that site-specific analysis may be required to determine materials suitability. Issues related to settling of soils and alluvial materials have been included in the evaluation of significant issues, section 4.1.4.

4.1.3.3.5 Avalanches

Kirkwood is located in a glacially scoured valley with steep walls on three sides creating a topographic relief of approximately 2,000 feet. This steep topography creates a situation where avalanches occur,

and as such require monitoring on a regular basis. Kirkwood has a program in place to assess avalanche activity with the potential to affect patrons of their facility. In addition, avalanche hazard analyses were conducted by Mears (1995a,b; 1997) in order to delineate development areas that could be affected by avalanches.

Mears described and mapped locations of snow avalanches, divided these avalanche paths into moderate and high hazard zones, made recommendations of appropriate land uses for these areas, and recommended appropriate mitigation procedures. Figure 4.3, based on the Design-Magnitude Map of Mears (1995b, 1997), illustrates: high hazard areas, moderate hazard areas, and hazard-free zones. High hazard zones indicate avalanche paths that occur every 10 years, and moderate zones indicate avalanche paths that occur every 100 years. The use of recognized avalanche paths in designating hazard zones has limitations including:

- **The areas of known hazard are constrained to mapped zones.**
- **Avalanches may occur outside of mapped areas.**
- **Design-magnitude (or 100-year) avalanches may be exceeded by extraordinary events.**

Avalanches are included in the discussion of significant issues, section 4.1.4.

4.1.4 ENVIRONMENTAL IMPACTS

4.1.4.1 Level of Significance Before Mitigation

As discussed in section 4.1.3, mineral resources, geologically significant features, landslides, and fault rupture hazards were determined to be issues having insignificant impacts or remote probability of occurrence. Issues identified as having potentially significant impacts include soil disturbance and erosion, decreased soil productivity, shrink/swell potential of soils (so-called "expansive" soils), earthquake shaking, liquefaction, physiography and rockfall or unstable slopes, and avalanches.

4.1.4.1.1 Soil Disturbance and Erosion

Accelerated soil erosion as a result of construction activities is of major concern in the proposed project area, especially on soils with a Lithic subgroup designation. Accelerated soil erosion would increase stream sedimentation, resulting in reductions in water quality and potentially decreasing the storage capacity of downstream public water supplies (Clark et al. 1985). The current magnitude of sedimentation is uncertain, but the Forest Service determined the sediment inputs to Kirkwood Creek before ski-area development to be 5,750 cubic feet per year. Post-Kirkwood development sediment inputs were projected to be 5,880 cubic feet per year (Roberts 1973).

In the ENF Soil Survey (USDA/NRCS 1985) each soil was assigned a soil manageability class, which rates soils and their topography on the basis of specific land uses and disturbances. The soil manageability class includes the level of management difficulty, and accounts for factors such as slope stability, maximum erosion hazard, depth, available water capacity, drainage, and large coarse fragments (stones and cobbles). It also rated equipment limitations, the susceptibility of soil to displacement, and the degree of difficulty involved in revegetating exposed subsoil. Ratings from least impact to greatest impact were: "slight," "moderate," and "severe." If a map unit was not rated, "not rated" was assigned to the rating table. In addition, an erosion hazard rating was assigned to each soil unit based on the soil properties and percent slope. "Low," "moderate," "high," and "very high" are used to describe erosion hazard. This information, summarized in Table 4.4, is based on the Woodland Management and Productivity table found in the ENF Soil Survey (USDA/NRCS 1985).

Once soils are disturbed by construction activity they are no longer in their native state. This is an unavoidable, significant impact prior to mitigation that will occur wherever ground is disturbed and developed. Results of this disturbance vary depending on the severity and extent of the activity, but can include (1) overly compacted areas which inhibit water infiltration and oxygen transfer, and also increase
surface water runoff, and (2) loosened soils which can result in accelerated erosion, loss of soil cover, and downgradient sedimentation into surface waters. Mitigation measures have been designed to address these two main issues associated with soil disturbance. The soils in the proposed project area are susceptible to short-term and long-term consequences, including units 102, 103, 161, and 199 (see Table 4.4).

Figure 4.2 displays where the different soil units occur at Kirkwood. Soils containing Lithic Cryumbrepts (units 102 and 161) may present a very high erosion hazard and are particularly susceptible to the immediate, short-term effects of disturbance. These soils typically have a shallow profile less than 10 inches thick, and are considered difficult to revegetate. Long-term effects of continued erosion and productivity loss are also of concern. Most of the Draft Plan elements and the associated alternatives would be in areas with soil units 102 and 161. The WWTP is located within soil unit 102, but associated ground disturbance is limited primarily to a 25 x 25-foot expansion of the existing building. Many of the MMDP proposed projects are also located in unit 102 and extend into unit 161. The erosion hazard associated with the on-mountain projects is greater than that of projects proposed in the Draft Plan due to steeper slope gradients. However, severity and extent of ground disturbance associated with the on-mountain projects is less than that of the Draft Plan projects.

Development at Kirkwood North would occur in unit 198, which is described as primarily consisting of rock outcrop, and is not considered susceptible to the same significant post-disturbance consequences as are units composed of soils. However, these areas do have a high potential for rapid runoff. Some MMDP elements would occur in soil units 198 and 199. Depending on the slope, Cryumbrepts of unit 199 are increasingly susceptible to short-term accelerated erosion. However, a lithic layer is not present in this unit so topsoil loss is not as prevalent and less difficulty is reported in revegetating these areas, thus reducing the potential of significant long-term impacts.

Soil unit 103 represents a low to moderate maximum erosion hazard. Areas along stream banks and locations susceptible to flooding may lose soil from bank undercutting or mass failure, and soil compaction could be an issue associated with heavy equipment use. Actual risk to these soils is low because they are found primarily in the meadow zone of Kirkwood where most development is prohibited. *Trenching activities for utility installations are allowed in this area. Disturbance caused by trenching can be minimized through coordination among utility providers to place multiple utilities in a common trench.* Trail construction around the meadow has the potential of producing short-term erosion effects. Subsequent trail use and loss of vegetation would result in compaction and the long-term effect of increased runoff. Any construction or disturbance would be on the periphery of the meadows, where erosion potential and productivity loss would be low due to the low angle slopes and limited growing season. Nevertheless, short-term and long-term effects of erosion and sedimentation in Kirkwood Creek could still be significant. Two smaller areas of unit 103 exist on both the eastern and western edges of Kirkwood North and avoidance is recommended.

The proposed implementation of the MMDP would result in ground disturbance activities such as grading and blasting. Some of the disturbed areas would be revegetated following construction, while a percentage of the disturbed area would be converted to other cover types such as buildings or chairlift infrastructure. Terrain grading would be needed for lift terminal installation and some trail construction, and is included in the disturbance estimates associated with lifts and trails in Table 4.5.

Some blasting would take place for
tower and terminal installations as well, and is accounted for in the lift figures. Localized blasting within the boundaries of proposed ski runs would be necessary to minimize risks to skiers, snowboarders, and grooming equipment. This blasting would reduce rock outcrops to a safe size and height from the existing grade. Aside from reducing the size of some rock outcrops, no ground disturbance is expected to be associated with

Figure 4.3. Avalanche Hazard.

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Table 4.4. Soil Erosion and Woodland Management and Productivity Ratings.

Map Unit #	Taxonomic Name	Soil Manageability Class[1]	Equipment Limitations[2]	Susceptibility to Soil Damage from Displacement[3]	Revegetating Exposed Subsoil[4]	% slo
102	Andic Cryumbrepts	Moderately difficult to manage; high erosion hazard; AWC is 1.2 to 2.4 in.	Moderate	Moderate	Moderate	15-2 20-4 45-5
	Lithic Cryumbrepts	Very difficult to manage; high or very high erosion hazard; soil is less than 10 in. thick.	Moderate	Severe	Severe	15-2 20-4 45-5
103	Aquepts	Not Rated	Severe	Severe	Moderate	0-5 5-15
	Umbrepts	Not Rated	Moderate	Severe	Slight	0-5 5-15
161	Lithic Cryumbrepts	Very difficult to manage; high or very high erosion hazard; soil is less than 10 in. thick.	Severe or Slight	Severe	Severe	15-2 25-4 45-7
198	Rock Outcrop	Not Rated	Severe	Not Rated	Not Rated	Not Ra
199	Rock Outcrop	Not Rated	Severe	Not Rated	Not Rated	Not Ra
	Cryumbrepts	Moderately difficult to manage; high erosion hazard; AWC is 1.2 to 2.4 in.	Severe to Slight	Moderate	Slight	15-2 25-4 45-7

Table adapted from ENR Soil Survey (USDA/NRCS 1985).

[1] - summarizes moderate and severe limitations from: slope, erosion hazard, shallow soils, low available water capacity (AWC) high cobble/stone composition.

[2] - impacts caused by heavy equipment.

[3] - impacts from equipment and other traffic when the soil is dry.

[4] - revegetation limitation when the topsoil (A horizon material) is removed.

[5] - assesses relative risk of accelerated sheet and rill erosion.

Table 4.5 provides an estimate of soil disturbance associated with implementation of the Proposed Project.

Table 4.5. Surface disturbance estimates associated with KMR's Proposed Project. (All figures are expressed

Disturbance Type	Subareas- Draft Plan						Totals	Buildings	MMDP					Sno mak
	Kirkwood Nor	East Me / Juniper	Village (East af West)	Ski-In/Ski-Out (No	Timber Creek Vil	West Meadow[B] (KMA)			Ski Trails		Lifts		Multi-use trails	
									new	alterations	new	alterations		
Temp. construction disturbance	22.8	22.7	30.3	37.7	15.5	16.7	145.7	0.4	200.8	13.1	5.3	1.8	18	1
Impervious[1]	12.4	13.2	18.9	22.3	8.4	10.1	85.3	0.3	0	0	0.2	0.2	18	
Revegetated[2]	10.4	9.5	11.4	15.4	7.1	6.6	60.4	0.1	200.8	13.1	5.1	1.6	0	1

Notes:
[A] WWTP upgrade building expansion (0.01 ac) included here.
[B] Kirkwood Meadows Drive was attributed to the closest subarea, e.g., West Meadow accounts for its own roads as well as a portion of Kirkwood Me
[1] Includes building footprints and paved surfaces.
[2] Includes landscaped areas, reseeded disturbed areas, and altered vegetation types (e.g., ski trails and lift corridors).

blasting. Proposed ski trails would be cleared of trees within the designated width of each run, and some existing runs would be widened by removing individual trees. Stumps would be cut flush with the existing grade and left in place. On slopes exceeding 35 percent, trees would be removed using helicopter logging techniques. On slopes less than 35 percent, trees would likely be removed over the snow with the use of snowcats, greatly minimizing ground disturbance. In both instances, forest practice rules regarding harvest activities would be strictly followed. In the event that harvest activities did not take place over the snow, Best Management Practices (BMPs) for erosion control would be employed throughout implementation of the project.

Recreational activities such as hiking, biking, and horseback riding can accelerate erosion due to soil compaction and vegetation destruction, but they do not generally instigate larger-scale events such as landslides or earth slumps. Summer user populations will likely increase as Kirkwood transforms into a four-season resort, increasing the impact from recreational use.

4.1.4.1.2 Decreased Soil Productivity

Soil disturbance may negatively affect long-term soil productivity. Decreased soil productivity resulting from erosion of the A horizon (topsoil) may inhibit growth of vegetation and impede natural filtration processes within the soil column.

Soils subject to accelerated erosion and an associated loss of soil productivity in the proposed project area are primarily soils in units 102 and 161 (Figure 4.2 and Table 4.2). As noted previously, the shallow Lithic soils found in these units are particularly susceptible to disturbance. Areas located in unit 198, consisting of rock outcrop naturally have a very high erosion hazard rating because of their lack of true soil development and association with steep slopes; however, as shown in Table 4.4, manageability and erosion hazard of these soils are not rated in the ENF Soil Survey.

Without mitigation, particularly to impede any loss of the A horizon and ensure successful revegetation, significant long-term reductions in productivity could occur to any soils within the project area. Productivity in this area is already considered relatively low due to the short growing season.

4.1.4.1.3 Shrink/Swell Potential of Soils

The expansive properties of soils can be a geologic hazard because of the potentially damaging effects on structures, including foundation and building settlement, shifting during wet and dry periods, and even lost structural integrity. Soils with significant shrink/swell potential may dictate more stringent structural design requirements. They may even be deemed unsuitable for building, thereby requiring relocation of planned facilities or extensive excavation and removal of the poor soils with appropriate fill imported from an off-site source.

Based on soil textures, coarse fragment content, and soil clay types, the majority of soils in the Kirkwood area have little or no shrink/swell potential. The greatest shrink/swell potential for soils in the project area exists within the small, isolated area of lake bed deposits (Ql) mapped in the southern portion of Kirkwood Meadow (Simpson 1995d; Figure 4.1). The proposed development will not extend into these soils; therefore, the effects of shrink/swell soils are less than for the Proposed Project or alternative actions.

4.1.4.1.4 Seismic Hazards

Because of the proximity of the area to seismically active faults, there is a probability that moderate earthquake shaking will occur throughout the Kirkwood area at some time. As outlined in section 4.1.3.3.2, Kirkwood is located within Seismic Zone III. Construction and design of proposed development structures must meet county requirements for building within an area designated as Seismic Zone III. Earthquake-related ground movement in this area is significant for the following reasons:

- Shaking may induce extensive rockfalls and create unstable slopes within the Merhten formation (Pvp; Figure 4.1) palisades (Simpson 1995d). It also may initiate landslides on moderate to steep slopes within the glacial moraine deposits (Qm; Figure 4.1). The hazards and associated impacts of mass movements would likely increase as soil and/or geologic deposits are saturated.

- Multiple snow avalanches could be triggered.

- Liquefaction potential is high within unconsolidated deposits (Qal, Qm) and overlying soils (Figures 4.1 and 4.2), especially under saturated conditions. Based on the location of geologic deposits and soils mapped by Simpson (1995a) and the ENF Soil Survey (1985), and the shallow water table in much of the project area, the general areas of concern include the eastern portion of Kirkwood North (within soil type 103 on Figure 4.2), the western edge of East Meadows, West Village, Ski-In/Ski-Out South, Timber Creek Village, Ski-In/Ski-Out North, and Kirkwood Meadow West. Concern increases with development on moderate-to- steep or loaded slopes.

- Overall threat to human health and safety or to the integrity of existing/proposed structures.

Inadequate planning for an earthquake event exceeding design specifications could result in significant risk to human health and safety, but the low probability of such an event renders this risk less than significant. Note that mitigation measures for rockfall and unstable slopes and avalanche are discussed under those headings rather than under seismic hazard below.

4.1.4.1.5 Rockfall and Unstable Slopes

Kirkwood is located in a narrow steep-walled valley. The relief, proximity of high cliffs to structures, and type of rock in the area create conditions where rockfalls can occur. Cliffs of the Mehrten formation, found in the SUP area, have the potential to initiate rockfall if disturbed. The avalanche paths often initiate beneath these cliffs. Possible rockfall hazards exist within the red zones (Mears 1997) shown on the avalanche hazards map in Figure 4.3, and have been mapped in the vicinity of Ski-In/Ski-Out North, Timber Creek Village, Ski-In/Ski-Out South, West Village, East Village, Juniper Ridge, and East Meadows (Mears 1995a,b; 1997). In addition to rockfall in the surrounding palisades, slopes having a large variation in sediment sizes have the potential to be unstable. If people or structures were to be in the path of a rockfall, there would be a threat to human health or integrity of the structures. Therefore, this impact is considered significant without proper planning and mitigation.

4.1.4.1.6 Ground Settlement

Recently deposited alluvial sediments and fill in the Kirkwood area have been identified as having some potential for settlement. Local variations in the water table and spring activity could exacerbate this problem (Simpson 1995a). This presents a threat to the integrity of structures and is considered significant without proper planning and mitigation measures.

4.1.4.1.7 Avalanches

Kirkwood is located in a narrow steep-walled valley. Similar to most ski areas, avalanches are an inherent geologic hazard. The relief, proximity of high cliffs to structures, and amount of snowfall in this area create

a situation where avalanches are both a routine occurrence and a potential hazard. Avalanche paths have been mapped by Mears (1995a,b; 1997) in the vicinity of Ski-In/Ski-Out North, Timber Creek Village, Ski-In/Ski-Out South, West Village, East Village, Juniper Ridge, and East Meadows. If people or structures were to be in the path of an avalanche, there would be a significant threat to human health and integrity of the structures unless land use regulations and other preventative measures were in place.

Besides land-use planning to avoid development in avalanche zones, structural controls and non-structural methods (Mears 1995a) may be used to reduce avalanche hazards to less than significant. However, this issue is identified as significant here based on the high degree of uncertainty associated with specifying the behavior, impact pressures, flow path directions, and exact stopping positions of avalanche flows (Mears 1995a).

4.1.4.2Mitigation

4.1.4.2.1 Soil Disturbance and Erosion

Temporary soil disturbance cannot be fully mitigated as it is unavoidable, although with the following mitigation measures, the impacts of soil disturbance can be reduced to less than significant levels. Implementation of standard erosion control practices outlined in KRMOA (Kirkwood Resort Master Owners Association) Design Guidelines (KMR 2001b), conformance to requirements of the Kirkwood erosion control ordinance (see Mitigation Measures 4.1 (b) - (h)), and goals, objectives, and forest practices of the ENF Forest Plan, as amended by the SNFPA (Forest Service 2001), would also minimize the mid- to long-term impacts of disturbance.

For development projects on KMR property, an erosion control plan must be submitted with building permit applications. The pertinent county must review and approve these plans prior to issuing a permit. The minimum requirements of the erosion control plans are included in the mitigation measures listed below.

Mitigation Measure 4.1 (a). Construction will comply with the requirements of the Kirkwood erosion control ordinance, which includes, but is not limited to measures (b) through (h) below:

Mitigation Measure 4.1 (b). Practice selective soil exposure by removing soil only in areas of immediate development/construction; coordinate erosion and sedimentation control with grading, development, and construction practices.

Mitigation Measure 4.1 (c). Stockpile topsoil for use as a revegetative media on disturbed areas and restore sites with topsoil placed over subsoil fill; control runoff from these stockpiled areas to minimize erosion and sedimentation.

Mitigation Measure 4.1 (d). Utilize sediment basin and retention structures when other control measures are unacceptable.

Mitigation Measure 4.1 (e). Preserve floodplains and riparian areas adjacent to natural drainages and streams.

Mitigation Measure 4.1 (f). Design runoff control to fit the hydrologic setting of the area and be in compliance with the Alpine County Subdivision, Parcel Map and Site Improvement Standards.

Mitigation Measure 4.1 (g). Preserve natural features (e.g., existing vegetation, wetlands) through effective construction-site management.

Mitigation Measure 4.1 (h). KMR will coordinate phasing with ENF and TC- TAC in order to preclude having the amount of concurrent construction so great that a torrential storm or other high-runoff event could cause significant erosion.

In addition to the Kirkwood erosion control ordinance, other elements of erosion control recommended for the project area include:

Mitigation Measure 4.1 (i). Utilize construction roads only where and when necessary.

Mitigation Measure 4.1 (j). Limit soil disturbance and vegetation removal to only permanent disturbance locations and those areas necessary for access to construction zones.

Mitigation Measure 4.1 (k). Construction roads and road beds will require water bars, mulching, and other erosion control techniques.

Mitigation Measure 4.1 (l). KMPUD will include sedimentation monitoring as a component of water quality monitoring efforts, including tests for total suspended solids.

Mitigation Measure 4.1 (m). Construction activities will be monitored to ensure compliance with soil erosion prevention practices and mitigation measures, outlined above.

Mitigation Measure 4.1 (mm). Utilities (power, phone, water, sewer, cable) for new projects will be placed in a common trench whenever feasible.

4.1.4.2.2 Decreased Soil Productivity

Application of the above erosion control measures and conformance with requirements and guidelines of the Kirkwood erosion control ordinance, the KRMOA Design Guidelines (KMR 2001b), and the ENF Forest Plan, as amended by the Sierra Nevada Forest Plan Amendment (Forest Service 2001), would substantially mitigate effects on soil productivity, as disturbance effects are highly dependent on soil stabilization. Other mitigating elements should include:

Mitigation Measure 4.1 (n). Apply Mitigation Measures 4.1 (a) through 4.1 (k), as described above to maintain soil stability.

Mitigation Measure 4.1 (o). Promptly revegetate all disturbed ground immediately following construction. This revegetation effort will be supplemented by the placement of erosion matting during seeding to preserve topsoil and prevent erosion if an unforseen runoff event occurs. Temporarily disturbed areas will be reseeded to re-establish the vegetation type and density comparable to native vegetation surrounding the disturbed area.

Mitigation Measure 4.1 (p). Mulching, hydromulching, landscape netting, sterile straw, or other protective materials will be used to maintain soil moisture. This will enhance revegetation efforts.

Mitigation Measure 4.1 (q). Fill placed in areas to be revegetated will be compacted to a bulk density and porosity similar to adjacent native soils.

4.1.4.2.3 Shrink/Swell Potential of Soils

The possibility of encountering shrinking and swelling soils in the Kirkwood area is low, excluding the lakebed deposits (Ql) at the southern end of Kirkwood Meadow.

Mitigation Measure 4.1 (r). If shrink/swell soils are discovered at proposed building sites they should be avoided by relocating the proposed facility, or the material should be removed and replaced with non-expansive soils.

4.1.4.2.4 Seismic Hazards

Application of the following mitigation measures would minimize the impact of seismic hazards. These measures should be considered by appropriate county personnel prior to issuance of building permits.

Mitigation Measure 4.1 (s). Plans and specifications for structures should integrate engineering and design standards appropriate to UBC Seismic Zone III to minimize structural effects.

Mitigation Measure 4.1(t). Specific building sites will be evaluated by a geotechnical or soils engineer to determine the level of liquefaction hazard. The factors to consider include: soil density, porosity, moisture content, water table, gradation, and depth.

Mitigation Measure 4.1(u). In areas of high liquefaction potential, engineering will include standard measures (e.g., increasing the density of foundation soils, employing larger foundations, and site drainage) to increase stability.

4.1.4.2.5 Rockfall and Unstable Slopes

Areas designated by Mears (1995a,b, 1997) in Figure 4.3 as high hazard (red zones) should be avoided. The Draft Plan would not allow development in the high hazard zones (KMR 2001a). These measures should be reviewed by appropriate county personnel prior to issuance of building permits. Structures constructed in areas of moderate risk should incorporate appropriate construction management practices and engineering controls such as:

Mitigation Measure 4.1 (v). During excavation, remove loose sediments and large boulders by scaling to minimize the hazard.

Mitigation Measure 4.1 (w). If appropriate, install temporary barricades and/or wire mesh fencing on unstable slopes.

Mitigation Measure 4.1 (x). A professional engineer or engineering geologist should certify that slopes associated with excavation are designed to ensure stability.

4.1.4.2.6 Ground Settlement

These measures should be assessed by appropriate county personnel prior to building permit issuance. Plans and specifications for structures should integrate appropriate design factors such as:

Mitigation Measure 4.1 (y). Alluvial soils at the site of specific structures should be evaluated by a geotechnical or soils engineer to determine if the risks associated with ground settlement are significant.

Mitigation Measure 4.1 (z). Where feasible, remove susceptible soils to eliminate risk.

Mitigation Measure 4.1 (aa). Incorporate accepted engineering controls to minimize effects on the structure, or avoid problematic sites.

Mitigation Measure 4.1 (ab). Note water table elevations and identify active springs at each site and adjust designs or preventative measures per accepted engineering standards.

4.1.4.2.7 Avalanches

Mitigation Measure 4.1 (ac). In accordance with the Specific Plan, avoid residential development, or development that concentrates human activity (ticket areas, parking lots, trail heads, etc.) in areas designated as high hazard (Figure 4.3; Mears 1995a,b;1997). Limited road construction in these zones is acceptable.

Mitigation Measure 4.1 (ad). Construction of private buildings may be acceptable in zones of moderate hazard. However, reinforcement or protection for design avalanche loads is necessary. Incorporation of Mears' (1997) four structural types of avalanche mitigation is recommended: (1) direct protection structures, (2) deflecting structures, (3) retarding mounds, and (4) catchment dams.

Mitigation Measure 4.1 (ae). To minimize hazards, the current avalanche forecasting and control program carried out within the ski area boundaries at Kirkwood should continue.

Mitigation Measure 4.1 (af). Properties adjacent to the boundaries of mapped avalanche hazard zones should display signs identifying the potential for this hazard.

4.1.4.3Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts in the area of geology, soils, or geologic hazards.

4.1.5 Unavoidable Adverse Impacts

No significant, unavoidable, adverse impacts in the area of geology, soils, or geologic hazards were identified.

4.1.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area. Neither of these actions have the potential to interact with the Proposed Project to generate cumulative effects to geology, soils, or geologic hazards in the project area.

4.2 WATER RESOURCES

The purpose of this section is to describe existing conditions regarding water resources at Kirkwood and the potential impacts of the Proposed Project to these water resources, specifically surface and ground water quality, which includes effects of erosion and sedimentation, and water supply. Water quality could be affected by future activities and development planned for Kirkwood. Additional development within the community would increase water demands and wastewater disposal needs accordingly.

4.2.1 ISSUES

The following issues were identified through public and agency scoping and resource specialist review:

- Effects of development on water quality in Kirkwood Lake, specifically limnology, coliform, and sedimentation levels. (Revisions to the Specific Plan, which have excluded the Kirkwood Lake watershed from development, have now removed this as an issue. Impacts related to increased recreational use are discussed in the Recreation section.)

- Effects of development north of SR 88 on water quality and sedimentation impacts.

- Effects of project implementation on water quality in the Silver Fork of the American River.

- Effect of any changes on water quality, including sedimentation impacts, within the riparian zones of Kirkwood Creek, Caples Creek, Kirkwood Meadow, or any other riparian zones potentially directly or indirectly affected by the Proposed Project.

- Effects of development, structures, and impervious and disturbed areas on surface runoff velocities and flows that could be sufficiently large to cause significant increases in the potential for surface erosion, sedimentation, and/or flooding.

- Effects on the future source(s) of water supply for Kirkwood.

- Effects of future water demands and resulting consumptive use at buildout on water supplies and instream flows, especially downstream from Kirkwood's wellfield.

- Effects of increased wastewater volumes on the infiltration capacity of the wastewater absorption beds and on Kirkwood Meadow.

- Effects of any increased storm water infiltration volumes on the infiltration capacity of the absorption beds and on Kirkwood Meadow.

- Effects of increased treated effluent disposal on the water quality of the Kirkwood Valley groundwater basin and on Kirkwood and Caples Creeks.

- Effects of increases in non-point source emissions from storm water runoff from impervious and disturbed areas, particularly any flows containing excessive oil and grease, toxic heavy metal and pesticide residuals, organic and inorganic particulates, salts, and nutrients.

- Effects of potential seepage from poor quality groundwater contained in the joints of ancient

granitic rock formations into the high quality supplies contained in the Kirkwood Valley aquifer and surface streams. Impacts could potentially occur if the drilling of new wells causes water to flow from the older formations to the younger shallow aquifers that are utilized for water supply and from which accretions to Kirkwood Creek occur.

- Potential for contamination from untreated wastewater leakage and spillage from sewer lines, particularly at vulnerable locations such as watercourse crossings, manholes, and lift stations.

- Effects of increases in impervious areas and compaction of disturbed soils on infiltration rates and resultant recharge of the Kirkwood Valley groundwater basin.

- Recent contamination of soils and shallow groundwater from MTBE-contaminated petroleum products. Spills and leaks have occurred from surface and subsurface storage tanks at the maintenance shop and powerhouse sites.

- Potential effects of expansion of the wastewater treatment plant, conversion of some treatment processes, and expansion of the infiltration beds.

- Temporary closure of one shallow production well (Well 2) as a result of increasing (but not above-standards) concentrations of MTBE in the pumped water supply.

- Effects of building water supply wells in close proximity to each other and to the proposed expanded absorption beds.

4.2.2 METHODS

Potential effects of the Proposed Project on water resources were determined using existing information and previous studies, on-site field observations, calculations of potential impervious and disturbed acreages resulting from implementation of the Proposed Project, and professional judgement. The source studies and information included the results of engineering and scientific studies investigating the geology and water resources of the Kirkwood Basin, water quality data from Kirkwood Creek, groundwater, wells and wastewater treatment plant effluent, and discussions with knowledgeable persons. A complete list of references and sources is included in section 4.2.2.4.

4.2.2.1 Assumptions

All methodological assumptions are inherent in the methods section above or the significance criteria section below.

4.2.2.2 Significance Criteria

Elements of the Proposed Project would have a significant impact on water resources if they contributed to any of the following criteria.

- Substantially degraded surface water quality in Kirkwood Creek, Caples Creek, the Silver Fork American River, or any other downstream water body.

- Degraded water quality in Kirkwood Lake.

- Utilized a quantifiable percentage of the assimilative capacity of the Silver Fork American River.

- Substantially degraded groundwater quality within the Kirkwood basin.

- Interfered with groundwater recharge or deplete groundwater resources in a manner or to a degree that would reduce or exceed the safe yield of the aquifer, or reduce downstream flows to the extent that the water rights of other users would be adversely affected.

- Caused or exacerbated any water-related hazards, such as flooding, or subsidence caused by excessive groundwater withdrawals.

- Altered the existing drainage patterns or channels of the site or area in a manner which could result in any substantial adverse increases in flooding, erosion, or siltation.

- Caused contamination in any public water supply.

- Caused any potentially significant adverse cumulative effects, including cumulative watershed impacts.

4.2.2.3 Regulatory Setting

Regulations with specific relevance to this analysis include the waste discharge requirements for Kirkwood Meadow Public Utility District (KMPUD), water quality objectives outlined by the Central Valley Regional Water Quality Control Board (CVRWQCB), and U.S. Forest Service land management objectives outlined in the Sierra Nevada Forest Plan Amendment (SNFPA) (Forest Service 2001).

The Central Valley Regional Water Quality Control Plan identifies beneficial uses and water quality objectives for the South Fork American River and its tributaries. The beneficial uses include municipal and domestic water supply, power supply, recreation (contact and non-contact), freshwater habitat, cold water spawning habitat, and wildlife habitat (CVRWQCB 1994a). Beneficial uses of Caples Creek, as specified in the waste discharge requirements, are municipal and domestic water supply, recreation, freshwater habitat, fish migration, fish spawning, wildlife habitat, and groundwater recharge. The beneficial uses of the aquifer underlying the Kirkwood area include domestic, industrial, and agricultural supply (CVRWQCB 1994b).

Waste discharge requirements by the KMPUD fall under the jurisdiction of the CVRWQCB (1994b). Order No. 94-108 specifies the discharge prohibitions and effluent and receiving water limitations (e.g., constituent concentrations, aesthetic qualities) based upon the Sacramento River Basin Plan water quality objectives.

Board Order No. 74-252 specifies that "the Silver Fork American River's assimilative capacity will not be assigned to the products of any activities of man." Assimilative capacity refers to the capability of the river to dilute contaminants contained in waste discharges and convert them into benign end products as a result of the action of natural biological, chemical, and biochemical processes.

Under the Environmental Protection Agency's (EPA) Phase I regulations, operators of construction activity disturbing a minimum of 5 acres must apply for an National Pollution Discharge Eliminiation System (NPDES) storm water permit. This also applies to operators of sites disturbing less than 5 acres if the activity is part of a "larger common plan of development or sale" with a disturbance of at least 5 acres. Beginning in 1999, small development projects (1-5 acres) are subject to EPA's Phase II regulations, which also require NPDES permitting (small construction permit applications are due by March 10, 2003 with specific compliance dates set by each State) and implementation of practices to minimize pollutant runoff

(EPA 2000).

The SNFPA (Forest Service 2001) amended the *Eldorado National Forest: Land and Resource Management Plan* (Forest Plan) (Forest Service 1988). The amended plan contains specific management direction related to aquatic, riparian, meadow, and wetland activities on NFS lands. The plan establishes riparian conservation areas (RCAs) and critical aquatic refuges (CARs) to protect these resources and prevent the pollution of water resources. Best Management Practices (BMPs) and establishment of streamside management zones are also outlined. Widths of RCAs have been established at a minimum of 300 feet (horizontal) on each side of perennial streams and wetlands, and 150 feet on each side of seasonally flowing streams.

4.2.2.4Existing Studies and Information

Several studies investigating the Kirkwood region's water resources were completed prior to this analysis and were used in determining the existing conditions and projecting potential impacts to water resources. These studies include:

- *Kirkwood Basin Geohydrology Study* (Culp/Wesner/Culp 1984).
- *Wastewater Facilities Plan* (Kennedy/Jenks Consultants 1998) (Prepared for Kirkwood Meadow Public Utility District).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties* (Simpson 1995d).
- *Wastewater Discharge Requirements for Kirkwood Meadow Public Utility District* (CVRWQCB 1994b).
- *Kirkwood Meadows Water Resources Investigations: Assessment of Opportunities and Review of Existing Data* (Watershed Systems 1996).
- *Reconnaissance Evaluation of Two Wastewater Treatment and Disposal Alternatives*. Roseville, CA. (ECO:LOGIC 1996).
- *Kirkwood Specific Plan* (KMR 2001a).
- *Wastewater Facilities Plan Update* (ECO:LOGIC 2001c).
- Negative Declaration KMPUD WWTP Upgrade and related letters (ECO:LOGIC 2000).
- Fax to Neal Artz re: Cumulative Watershed Effects Analysis, Kent Sharp, SE Group. April 6, 2001.
- Projections of cumulative watershed effects using El Dorado National Forest (ENF) model, forwarded by Cheryl Mulder, ENF hydrologist.
- KMR Summer Operating Plans, transmitted by memo, May 11, 2001.
- *Hydrogeologic Characterization of Absorption Bed Area*, KMPUD (Full Final Report), June 12, 2001; Kleinfelder
- *Technical Memorandum re: Water Supply* (ECO:LOGIC 2001a).

- Memorandum from Kent Sharp (SE GROUP) to Neal Artz re: MMDP, May 29, 2001.
- *Technical Memorandum re: Sludge Disposal* (ECO:LOGIC 2001b).
- *Second Quarter 2001 Groundwater Monitoring Report*, Kirkwood powerhouse, Kirkwood, CA July 12, 2001.

4.2.3 Environmental Setting

4.2.3.1 Basin Hydrology

4.2.3.1.1 Surface Water

The community of Kirkwood lies within the Kirkwood Creek drainage basin (Figure 3.3). Kirkwood Creek is a tributary to Caples Creek, entering it approximately 1.5 miles downstream of Caples Lake. Caples Lake drains into Caples Creek upstream of the Kirkwood Creek/Caples Creek confluence. Caples Creek is a major tributary to the Silver Fork American River, which flows into the South Fork American River, which flows into Folsom Reservoir. Water at Folsom Dam is released to the lower American River, which flows into the Sacramento River, and subsequently the Sacramento-San Joaquin Delta. The following is a discussion of the water bodies within the study area.

4.2.3.1.1.1 Kirkwood Lake

Kirkwood Lake is located northwest of Kirkwood, on the north side of SR 88. There is no hydrologic connection between Kirkwood Creek and Kirkwood Lake (Culp/Wesner/Culp 1984). A small portion of the Kirkwood property is within the Kirkwood Lake drainage area.

4.2.3.1.1.2 Kirkwood Creek

The Kirkwood Creek watershed encompasses approximately 2,265 acres (Simpson 1995d). Runoff from the basin is governed by winter snows and spring snowmelt. Flows are greatest during the spring snowmelt period (April through June), gradually decrease through the summer, and increase again in the fall with the coming of rain and snow.

Kirkwood Creek streamflows are not gauged, so no actual streamflow data are available. A hydrologic model simulation was conducted by Culp/Wesner/Culp (1984) to estimate the normal and drought-year runoff for the basin. The estimated annual runoff from the Kirkwood Creek watershed is 5,665 acre-feet for a normal year and 1,869 acre-feet for a drought year. Approximately 80 percent of this runoff is estimated to occur from April through June, based upon the runoff patterns in the neighboring Twin Lakes and Silver Lake watersheds (Culp/Wesner/Culp 1984). Table 4.6 summarizes the monthly runoff pattern from the Kirkwood Creek basin.

The relative contribution of Kirkwood Creek to downstream water bodies is small. Kirkwood Creek basin's annual runoff volume represents approximately:

- 4 percent of the average annual Silver Fork American River flow volume;
- 0.5 percent of the South Fork American River above Folsom Reservoir, and;
- 0.2 percent of the lower American River average annual flow volume.

These percentages are based upon USGS streamflow data and estimated streamflows in Kirkwood Creek. In the upper reaches of the basin, Kirkwood Creek is a "losing" stream, meaning that water from the creek percolates down to the underlying aquifer, which recharges the aquifer year-round. In the lower reaches, Kirkwood Creek alternates between a losing and gaining condition, depending upon the seasonal hydrology,

underlying geology, and resultant positions and elevations of the groundwater table. During periods of high basin infiltration, such as during snowmelt or direct precipitation, the groundwater table can rise above stream surface elevations, thereby recharging the stream. Stream recharge typically occurs from April through June (Culp/Wesner/Culp 1984). The meadow surrounding Kirkwood Creek, Kirkwood Meadow, has the ability to store groundwater and release it as summer base flow.

Table 4.6. Estimated runoff from Kirkwood Creek basin during normal and drought years, by month (acre-feet).

Month	Normal Year	Drought Year
January	133.0	43.9
February	119.0	39.2
March	240.0	79.4
April	850.0	280.0
May	2,141.0	707.0
June	1,560.0	513.0
July	297.0	98.0
August	34.0	11.2
September	5.7	1.9
October	37.8	12.2
November	102.0	33.6
December	150.0	49.5
Total	**5,664.5**	**1,868.9**

Source: Culp/Wesner/Culp (1984).

Upslope from the creek, water flows primarily through fracture zones in the rock, through the soil, and over the surfaces of exposed and soil- or talus-covered bedrock. Climatic factors control the seasonal availability of water at the surface. Soil development, vegetation, and slope control the rate of surface runoff and percolation of water into the underlying geologic formations. Annual variations in basin soil moisture and runoff are closely tied to quantitative and temporal fluctuations in precipitation and temperatures.

4.2.3.1.1.3 Caples Creek

Caples Creek drains a watershed of approximately 8,772 acres. The mean annual discharge in Caples Creek, at the Caples Lake outlet, is 26,260 acre-feet (from 1923 to 1992 at USGS gauging station 11437000) (Simpson 1995d). During this period, the greatest annual flow was 57,590 acre-feet in water year 1983, and the lowest annual flow was 8,125 acre-feet during water year 1924. The Federal Energy Regulatory Commission (FERC) license requires a minimum flow of 5 cfs (approximately 3,620 acre-feet per year) below Caples Lake (Simpson 1995d).

4.2.3.1.1.4 Silver and South Forks of the American River

The Silver Fork American River is a major tributary to the South Fork. The watershed encompasses 107 square miles and drains into the South Fork American River near the community of Kyburz. The mean

annual discharge of the river near Kyburz was 148,000 acre-feet (from 1925 to 1944). Streamflow is no longer measured at this location.

The South Fork American River is the largest of the three principal streams in the American River basin (North, Middle, and South Forks), and drains an area of approximately 673 square miles (10 miles upstream of Folsom Reservoir). The mean annual runoff is approximately 1,036,000 acre-feet (Simpson 1995d). Significant development of water resources has occurred on the South Fork, including water storage and hydroelectric projects. The natural flow is supplemented with imported water from the Truckee River and Rubicon River watersheds.

4.2.3.1.2 Groundwater

The annual average withdrawal rate from the Kirkwood Creek groundwater basin is 48 acre-feet; current maximum daily withdrawals of 109,000 gpd occur at both Christmas and New Years (KMR 1998). The geohydrology study by Culp/Wesner/Culp (1984) identified the capacity of the aquifer underlying Kirkwood to be 1,100 acre-feet. Recharge of this aquifer is primarily from surface water runoff during the spring snowmelt period. Surplus groundwater recharges Kirkwood Creek. A full seasonal flushing of the aquifer occurs during all years (except drought years) at the time of spring snowmelt (Culp/Wesner/Culp 1984).

A more recent water resources investigation conducted by Watershed Systems (1996) indicated that additional groundwater could be found on the east side of the meadow, which could provide a sustainable yield of 2,000 to 3,000 acre-feet of water annually. This estimate was based upon a 2-square-mile drainage area, primarily on the steep, forested, east-facing slope above Caples Lake, and 30 or more inches of snowmelt added to the groundwater annually. This water is separate from the 5,660 acre-feet of runoff in the Kirkwood Creek basin estimated by Culp/Wesner/Culp (Table 4.6).

Average horizontal hydraulic conductivity of the unsaturated soils and alluvial aquifer at the location of the KMPUD absorption beds has been calculated by Kleinfelder (2001c) as 27.4 feet per day (0.01 centimeters/second) based on their on-site percolation and slug tests. Depth to groundwater was measured at the same location to range from 20 feet below ground surface (bgs) in the spring, to 33 feet bgs in the late fall. Groundwater was determined to flow northeast under hydraulic gradients ranging from 0.04 feet/foot in the spring to 0.1 feet/foot in the late fall (Kleinfelder 2001c).

4.2.3.2 Water Quality

4.2.3.2.1 Surface Water Quality and Sedimentation

Kirkwood Creek was monitored in the early 1980s above and below the wastewater treatment plant to determine if and how the treatment and discharge of wastewater affected surface water quality. Of the constituents analyzed, only chemical oxygen demand (COD), nitrate-nitrogen, and electrical conductivity (a measure of total dissolved solids) showed statistically higher downstream values. The higher downstream COD values were attributed to organics from decaying plant material, manure from grazing horses, and other non-point sources rather than from wastewater. The higher nitrate levels were attributed to a recent application of fertilizer (Culp/Wesner/Culp 1984). However, in waste discharge requirements issued in 1994, the CVRWQCB concluded in the KMPUD waste discharge permit that higher nitrogen concentrations downstream of the treatment plant may be attributable to subsurface drainage from absorption beds. The CVRWQCB also recognized that although the discharge could result in increased nitrate levels, the impact on beneficial uses, if any, is not significant (CVRWQCB 1994b).

Surface water quality is currently monitored by KMPUD. Water is sampled at seven stations along the creek; the most upstream station is located near Kirkwood base facilities, and the most downstream station is located near the confluence with Caples Creek. This sampling program measures temperature, pH,

dissolved oxygen, electrical conductivity, and nitrite and nitrate concentrations. Data from the 1996, 1997 and 1998 monitoring periods are contained in Appendix C.

Separate monitoring was recommended by the CVRWQCB (1994b) to determine if the absorption beds contribute to the increased concentrations of nitrate, which increase the potential for algal growth. Higher levels of algal growth occur in the stagnant portions of Kirkwood Creek, adversely affecting aesthetics. The algal growth is stimulated by lower flow rates, lower dissolved oxygen levels, and higher temperatures. In the winter, the water is warmest near the treatment plant; temperatures in the summer do not have a longitudinal trend.

The existing wastewater treatment plant is designed to handle maximum wastewater flows up to 100,000 gpd. The present maximum monthly flow is 87,600 gpd. KMPUD has completed planning for expansion to 190,000 gpd (which is 26,000 gpd less than the 1988 Master Plan authorized capacity of 216,000 gpd) and has proposed construction of interim improvements to increase capacity to at least 120,000 gpd. Existing waste discharge requirements permit 150,000 gpd of treated wastewater to be discharged to the effluent absorption beds.

During both the summer and winter seasons, dissolved oxygen levels are generally lower at the nearest two monitoring stations downstream of the wastewater treatment plant. The dissolved oxygen levels increase as the water moves downstream, likely through aeration of the water as it moves in the streambed. Nitrite-nitrogen and electrical conductivity levels are generally higher downstream of the treatment plant, regardless of the time of year.

Observations and monitoring along Kirkwood Creek indicate that its turbidity generally ranges from low to moderate, depending on creek flows and the location of the sample taken within the stream grid. Flood events produce very high turbidities. Bed loads range from zero during extreme low flow conditions to large amounts during extreme flood conditions. As discussed in the Geology and Soils section, the Forest Service estimated average sediment inputs to the creek after development of the ski area to be approximately 5,880 cubic feet per year, a 2.3 percent increase over their estimate of pre-development sediment loads. Precise estimates of the magnitude of present-day erosion and sedimentation are not available. However prevailing conditions are probably typical for an alpine meadow stream draining granitic and volcanic parent materials and deposits, and that also actively meanders through Pleistocene and recent glacial and lake deposits. Natural sources of sediment, such as streambank erosion, are likely to have been augmented by local anthropogenic sources such as runoff from parking lots and roadways, grazing, and construction sites (to the extent that such impacts were not mitigated).

The presence of large deposits of sediments in a deltaic formation at the confluence of Kirkwood and Caples Creeks may indicate an imbalance between the amounts of sediment produced in one or both creeks and the peak flows required to transport them. Caples Creek is subject to some dampening of its peak flows due to storage in the upstream reservoir. Kirkwood Creek is subject to a small amount, but higher overall percentage, of flow attenuation than Caples Creek. Sediment deposition at the confluence of these two creeks also occurred following a historic flood event in the Kirkwood Valley. Whether these sediment deposits are attributable to natural causes or upstream erosion caused by human activities, this condition in Kirkwood Creek points to the need for strict attention to mitigation measures aimed at reducing sediment inflows to the creek.

4.2.3.2.2 Groundwater Quality

Groundwater quality was monitored at the primary water supply wells, Well 2 (the Lodge well) when in production, Well 4 (the New Meadow well), and the new Well 5. The 1996 Water Quality Report (Table C.4 in Appendix C) for the Lodge and New Meadow wells indicated that the water from these wells was of

excellent quality and met all of California's standards for drinking water. However, following this report, contamination of the shallow production Well 2 by MTBE and total petroleum hydrocarbons was detected, leading to the closure of Well 2 and an extensive groundwater-quality remediation program.

A fuel additive, MTBE has a secondary maximum contaminant level (MCL) of 5ug/L. In general, MCLs are established to protect the public against consumption of drinking water contaminants that present a risk to human health. An MCL is the maximum amount of a contaminant allowable in drinking water that is delivered to the consumer. However, MTBE is considered a secondary contaminant, meaning that the standard established for its acceptable level acts as a guideline to assist public water systems in managing their drinking water only for aesthetic considerations (EPA 2001). The EPA does not enforce secondary MCLs. MTBE contamination warrants special concern due to its high rate of transmissivity through soils, as well as its unacceptable taste and odor. Conclusions about its potential health effects have not been reached (EPA 1999).

No MCLs were exceeded at Well 2, which was the only well where contamination was detected. At the time of the worst contamination, only the secondary California MCL of 5ug/L was exceeded at one contamination location. The contamination of the impacted production well was in the center of the plume at a distance of over 200 linear feet. The primary MCL of 13 ug/L was never exceeded at any location near a production well. Near Well 2, all of the detectable concentrations were confined to the shallow aquifer (from higher than 10 ug/L to less than 1 ug/L). The highest concentrations ever detected at Well 2 were in the order of 0.79 ug/L. While this contamination did represent a significant problem all appropriate actions were taken and continue to be taken to remediate the situation.

During the second quarter of 2001, total purgeable petroleum hydrocarbons (THP-P) in the range of gasoline were detected in three groundwater samples and locations (MW-1, MW-3 and MW-5). Each of them exceeded the California secondary MCL of 0.050 mg/L for gasoline in groundwater. Total extractable hydrocarbons (THP-E) were reported in 14 groundwater samples as diesel and in nine groundwater samples as oil. The diesel range concentrations all exceeded the California secondary MCL of 0.1 mg/L. The volatile organic compounds toluene and xylene were reported in one sample (MW-9B), but they were below the primary MCLs for these compounds in groundwater. Benzene, toluene, ethylbenzene, and xylenes were non-detectable in all other samples.

Although contamination of the deeper aquifer is not likely, due to the demonstrated degree of separation between the two horizons (Kleinfelder 1994), the contaminant sources (underground storage tanks and contaminated soils) have been removed and/or filled with concrete. The aggressive groundwater remediation project consisted of testing, characterizing, vapor extracting, and ozone sparging. These measures should absolutely insure that no preventable contamination of the deep aquifer occurs as a result of the presence of petroleum hydrocarbons and MTBE.

As a result of the cleanup program, MTBE and petroleum product levels have been steadily dropping in all of the contaminated zones. MTBE concentrations at Well 2 have fallen sufficiently low that it soon will be brought back on line. Most recently, MTBE was reported to be above detection limits in only two groundwater samples (from monitoring wells MW-3 and MW-9B). Both concentrations were below the California secondary MCL of 5ug/L for MTBE in groundwater. Reopening of Well 2 is anticipated at a yet-to-be-specified, near-future date.

Well 5 is currently producing excellent water quality. It has not been in production long enough to have established a long-term water quality record.

Culp/Wesner/Culp (1984) investigated the potential for contamination of the water supply through

discharge of treated wastewater into the underlying aquifer in Kirkwood. The investigation included a review and analysis of ground and surface water quality monitoring data over a period of 2 years. Nitrate-nitrogen, total phosphorus, and electrical conductivity were evaluated. The data did not consistently support the hypothesis that wastewater contributed a significant portion of the nitrate-nitrogen in the groundwater. Observations showed the nitrate-nitrogen concentrations in the water supply matched the concentrations in the monitoring well that should have intercepted wastewater discharge. Phosphorus levels were commonly below detectable limits. Electrical conductivity levels were not consistently higher than background levels in the basin (Culp/Wesner/Culp 1984).

4.2.3.3 Kirkwood Water Supply and Treatment

KMPUD is responsible for operation of the water and wastewater systems serving Kirkwood. Kirkwood's domestic water supply currently consists of four wells, with one additional well reserved for emergency needs (KMR 2001a). Well 2, the Lodge well, located at the southeast edge of Kirkwood Meadow, was taken out of service in late summer 1999 due to MTBE contamination and replaced by Well 5 (completed during the Fall of 1999). As discussed above, remediation with ozone and oxygen injection should result in bringing Well 2 back on line in the near future. Well 3 is located on the southwest edge of Kirkwood Meadow. Well 1, used for emergency purposes only, is located at the northern end of Kirkwood Meadow. Long-term well yield during the fall and winter months was approximately 80 gallons per minute (gpm) for Wells 2 and 3 combined. These gpm ratings were based upon continuous pumping during the time period that the aquifer is at its lowest level (KMR 2001a).

The current combined short-term production rate from Wells 4 and 5, the primary production wells, is approximately 140 gpm. The long-term rate is 110 gallons per minute. They need to run only part time (9 hours/day on average) to meet Kirkwood's current maximum monthly water demand of 70,000 gpd. The low run-time requirement is a good indicator of the high reserve capacity available. Continued use of the replacement Well 5 should insure that there are no adverse effects on Kirkwood's long-term water supply or water quality.

Well 2 is a shallow well, which draws virtually all of its supply from alluvial deposits less than 50 feet in depth. Wells 3, 4, and 5 are deep wells, typically about 400 feet deep, with the shallow alluvial deposits sealed off. The short- and long-term yields are indicated in Table 4.7. Short-term capacity refers to the pumping rate over several days, whereas long-term capacity considers the pumping rate over several weeks (ECO:LOGIC 2001a).

KMPUD currently has two welded steel water storage tanks: the Lodge tank with 700,000 gallons of capacity, and the Dangberg tank with 250,000 gallons of capacity, for a combined total storage capacity of 950,000 gallons. Assuming a 250,000-gallon reserve for fire fighting and a 117,000-gallon reserve for equalization storage, 593,000 gallons remain for emergency purposes. These reserves would be available for power outages or periods when one or more wells are down for repairs. This is equivalent to 1.5 days of supply at maximum usage or almost 3 days of supply on an average annual basis.

Table 4.7 Short-term and long-term well yields at Kirkwood.

Well Number	Short Term Pumping Rate (gpm)	Long Term Pumping Rate (gpm)
2	100	50
3	100	30
4 and 5 combined	140	110

Total rate in gallons per minute:	340	190
(Total daily yield in gallons)	(489,000 gpd)	(273,600 gpd)
Capacity with Largest Well Out of Service:	240	140
(Total daily yield in gallons)	(345,600 gpd)	(201,600 gpd)

Source: ECO:LOGIC 2001a.

At present, 587 equivalent dwelling units (EDUs) are connected to the water supply system. Demand from these units averaged 56,700 gpd in 2000, an annual average of 63.5 acre-feet. The maximum daily demand is currently 130,000 gpd (ECO:LOGIC 2001a). The four existing wells can produce 489,600 gpd on a short-term basis. The daily deficiency with the largest well out-of-service is projected to be approximately 143,400 gpd. At this rate of usage, the emergency reserve would last 13.5 days, a period that is considered to provide ample safety. On a long-term basis, the wells can just about meet the maximum monthly demand with the largest well indefinitely out of service (ECO:LOGIC 2001a).

The results of water quality monitoring conducted at Wells 1 and 2 over the 3-year period from 1995 through 1997 are shown in Tables C.4, C.5, and C.6, in Appendix C. Results include measurements of inorganic chemicals, organic chemicals, and radioactive constituents included in primary drinking water standards; constituents and parameters included in secondary drinking water standards; and other constituents. Maximum contaminant levels are also shown for comparison where applicable.

With the recent exception of Well 2 (which was recently taken out of production) the reported concentrations are indicative of excellent drinking water quality, with no violations or near violations of any primary or secondary drinking water standards. Although some differences and variations are apparent from year to year, especially between 1995 and 1996, the results are generally consistent throughout the 3-year period of record. Most of the observed differences are considered representative of reductions in the concentrations of constituents (possibly due to the leaching away of construction-related residuals), variations that fall within the range of normal sampling error, and/or changes in testing methods and detection limits. When viewed over the entire period, none of the remaining differences are considered to be either large enough, or sufficiently sustained, to indicate a significant trend.

4.2.4 Environmental Impacts

4.2.4.1 Basin Hydrology

4.2.4.1.1 Surface Water

4.2.4.1.1.1 Increased Surface Runoff Volumes, Velocities, Flooding, and Erosion

Construction disturbance and development of new structures and impervious surfaces could increase surface runoff volumes and velocities in some subareas of Kirkwood. Flows could be sufficiently large to cause significant increases in surface erosion. These potentially adverse effects would be reduced when impervious and disturbed areas are minimized through site rehabilitation and revegetation. Table 4.8 shows changes in surface runoff by project component, as estimated by comparing existing areas of impervious surfaces to projected future totals. Table 4.9 shows erosion potential by project component as estimated by the area of disturbed surface *in each subarea*. Estimated acreage of future impervious and disturbed surfaces are from Table 4.5.

As shown in Table 4.8, surface runoff from impervious acreage could increase with implementation of the Proposed Project, particularly in Kirkwood North, Ski-In/Ski-Out North and South, the Timber Creek

Village/service area, and the Village subareas.

The increase in impervious acreage from on-mountain projects is primarily attributed to the proposed construction of multi-use trails. These trail surfaces are considered impervious because they become compacted, which impedes infiltration and creates a conduit for surface runoff. Actual on-mountain structures account for approximately 1 acre of new impervious surfaces. Since few impervious areas currently exist in the SUP area, the change in impervious acreage is high, but the percent change of total area to impervious surfaces is low.

The change in impervious surface from the Proposed Project results in an *148.6 percent increase,* which could significantly increase total runoff at Kirkwood. Much of this increase in impervious surface is due to final building pads, which do not result in a runoff surface. The watershed-wide percent change in impervious surfaces is small*, 3.8 percent of the total watershed area*, and is considered less than significant.

Further increases in surface runoff could also result if soil compaction occurs during the course of construction activities. However, immediate site rehabilitation and revegetation would reduce the potential for excessive soil compaction to occur, and soil compaction would be avoided and mitigated to the maximum extent possible through implementation of BMPs. Therefore, this potential impact on runoff volumes is considered insignificant.

Table 4.8. Impervious surfaces and potential increase in runoff with implementation of the Proposed Project.

Project Component	**Acreage**	**Watershed Area (Acres)**	**Existing Impervious Surface (Acres)**	**Proposed Project Total Impervious Surface (Acres)**	***Total* Impervious Surface (Acres)**	**Percent of *Acreage Changed to Impervious Surface* (%)**
Kirkwood North	74	74	0.4	12.4	*12.8*	*16.8*
East Meadows/ Juniper Ridge	105	105	16.5	13.2	*29.7*	*12.6*
Village (East and West)	141	141	14.6	18.9	*33.5*	*13.4*
Ski-In/Out (North and South)	168	168	2.4	22.3	*24.7*	*13.3*
Timber Crk. Village/service area	42	42	5.0	8.4	*13.4*	*20.0*
West Meadows (KMA)	79	79	*30.6*	10.1	*40.7*	*12.8*
MMDP (SUP area)	2,129	2,129	0.5	18.7	*19.2*	1.0
Remaining Watershed Area	0	123	N/A	N/A	N/A	N/A
Total	**2,738**	**2,861**	**70.0**	**104.0**	***174.0***	***3.8***

As shown in Table 4.9, disturbed areas created by construction activities would increase by approximately *475* percent, resulting in a *significant* increase in erosion potential. In particular, significant increases in erosion potential could occur in Kirkwood North, Ski-In/Ski-Out North and South, the Timber Creek/service subareas, and the SUP area. Overall, the net potential increase in surface erosion is considered significant. The watershed-wide change in erosion potential is *14.9* percent. This change is considered less than significant.

Erosion potential is higher for the on-mountain (SUP) areas due to the steeper slopes and areas of rocky, shallow soils. These areas are more difficult to rehabilitate and require strict attention to topsoil conservation techniques and revegetation efforts. Disturbed on-mountain area would increase by approximately 12 percent. Most of this disturbance would be revegetated, except for areas assigned to multi-use trails and structures such as the Caples Crest Restaurant. If unmitigated, impacts would be significant.

Another potential source of sediment to Kirkwood Creek and Caples Creek is livestock grazing in Kirkwood Meadow. Currently, up to 25 horses may be grazed in the meadow, with 15 to 20 horses more common. This activity may contribute sediment to Kirkwood Creek and result in a significant impact.

Table 4.9. Disturbed areas and potential increases in erosion with implementation of the Proposed Project.

Project Component	Acreage	Watershed Area (Acres)	Existing Disturbed Surface Area (Acres)	Proposed Project Total Disturbed Surface Area (Acres)	*Total* Disturbed Surface Area (Acres)	Percent of Acreage Changed to Disturbed Surface (%)
Kirkwood North	74	74	2.2	22.8	*25.0*	*30.8*
East Meadows/Juniper Ridge	105	105	18.6	22.7	*41.3*	*21.6*
Village (East and West)	141	141	18.2	30.3	*48.5*	*21.5*
Ski-In/Out (North and South)	168	168	7.5	37.7	*45.2*	*22.4*
Timber Crk. Village/service area	42	42	6.3	15.5	*21.8*	*36.9*
West Meadows (KMA)	79	79	32.5	16.7	*49.2*	*21.2*
MMDP (SUP area)	2,129	2,129	0.5	262.0	*262.5*	*12.3*
Remaining Watershed Area	0	123	N/A	N/A	N/A	N/A
Total	**2,738**	**2,861**	**85.8**	**407.7**	***493.5***	***14.9***

Flooding has historically occurred along Kirkwood Creek. Increases in impervious and disturbed surfaces could contribute to the potential for flooding during a large storm event. However, implementation of the Proposed Project is considered unlikely to contribute significantly to additional flooding as surface runoff

would not channel and flow directly into Kirkwood Creek.

4.2.4.1.1.2 Increased Future Water Demands and Resultant Consumptive Use

Effects of increased water demands and resultant consumptive use at buildout on water supplies and instream flows would not be significant, as adequate water supplies are available. The present annual water demand of 63.5 acre-feet per year is projected to reach 190.4 acre-feet per year due to increased demands from residential and commercial development and increases in visitor numbers (ECO:LOGIC 2001a). This equates to an average of 170,000 gpd, serving 1,757 EDUs (this number accounts for water demand for the planned 1,503 units and associated commercial space). Maximum monthly demands (typically during January, February, and March) are projected to reach 2,100,000 gallons per month (equivalent to 70,000 gpd, on average). The maximum daily demand of 130,000 gpd is projected to increase to 390,000 gpd at full buildout of the Proposed Project.

Adequate sustainable water supplies are presently available within the upstream watershed and Kirkwood Meadow aquifers from normal year snowmelt and runoff. Temporary shortages, insignificant streamflow reduction, or small amounts of groundwater drawdown could occur during extended periods of drought. However, the estimated capacity of the underlying aquifer (1,100 acre feet), the simulated runoff from Kirkwood Creek during normal and drought years (5,665 and 1,869 acre-feet respectively), and the anticipated recharge rates within Kirkwood Valley are projected to be adequate to meet the predicted demands associated with the Proposed Project during any single year or recorded historical sequence of years.

Considering the amount of pumping capacity and emergency storage KMPUD has available, it appears that existing supplies will be capable of sustaining 100 percent of Kirkwood's ultimate buildout demand. Impacts to sustainable water supplies are less than significant. This conclusion assumes that Well 2 is returned to service as expected.

4.2.4.1.2 Groundwater

4.2.4.1.2.1 Reductions in groundwater surface elevations and supplies

Culp/Wesner/Culp calculated that the Kirkwood Valley aquifer underlying Kirkwood Meadow contains approximately 1,100 acre-feet of water. Future demands for groundwater are projected to increase from 63.5 acre-feet annually to 190.4 acre-feet annually (ECO:LOGIC 2001a). This increased dependence on groundwater is expected to have a less-than-significant impact on groundwater recharge of the aquifer underlying Kirkwood.

A water resources investigation (Watershed Systems 1996) concluded that new wells placed near the center of the east side of the valley could access an additional 2,000 acre-feet of groundwater annually. This additional source is derived from precipitation and snowmelt originating on the east side (the Caples Lake side) of the ridge formed by Red Mountain. The Watershed Systems investigators believe that this source of aquifer recharge is entirely separate from that which originates on the west (Kirkwood Valley) side of the ridge, and that it could supplement the annual computation derived for the Kirkwood Valley aquifer by Culp/Wesner/Culp (1984). They also concluded that supplemental pumping from the newly-hypothesized source would not significantly impact inflows to Caples Lake.

During subnormal snowmelt years or prolonged sequences of drought, groundwater surface elevations in the upper and lower Kirkwood Valley aquifer could be temporarily reduced, especially near the wellheads. Such reductions could also reduce the rates of groundwater accretions to Kirkwood Creek. However, the long-term impacts on overall groundwater levels and potential secondary effects on ground surface elevations, wetlands, and Kirkwood Creek, are not projected to be significant. The potential amounts of local drawdown that may occur during prolonged dry periods cannot be predicted because no model

simulations were made of the effects of multiple consecutive years of drought.

Groundwater recharge is tied directly to runoff in Kirkwood Valley. Runoff from the basin decreases significantly during drought years relative to normal years (1,869 acre-feet versus 5,665 acre-feet in Kirkwood Valley), but is still much greater than the future annual water demand, especially if both recharge sources are tapped. Any short- or long-term effects of drought conditions on groundwater recharge would be greatest during the summer and fall, when demand for water would be lowest (despite any increases in summer visitation). High winter demands during normal years are not expected to adversely impact the aquifer since recharge would have begun with precipitation events in the preceding spring. Based on runoff estimates, the annual mean precipitation in the Kirkwood watershed during a normal year would exceed the amount required to completely recharge the aquifer following a drought year (Culp/Wesner/Culp 1984). However, if summer visitation levels dramatically increase, water conservation mitigation measures will need to be implemented to curtail excessive new demands. If water demand increases beyond the predicted amounts, aquifer storage levels could be adversely impacted. For this reason, implementation of a robust water conservation and reuse program will be very important.

Groundwater withdrawal would not have any effect on Kirkwood Lake levels since there is no hydrologic connection between the two basins (Culp/Wesner/Culp 1984, Simpson 1995d, Watershed Systems 1996).

4.2.4.1.2.2 Increased Infiltration Rates and Groundwater Surface Elevations in the Vicinity and Down-gradient of the Wastewater Absorption Beds

The results of groundwater flow modeling (using MODFLOW) indicate that groundwater levels would rise between 9 and 11 feet at the increased effluent loading rate of 190,000 gpd over the peak 90-day period (December 20 to March 20). These modeling results are conservative (i.e., worst case), insofar that the December-March effluent loads were imposed on groundwater elevations starting in May, the month when groundwater levels would presumably be the highest. This loading rate could raise groundwater levels to a maximum height of 9 feet bgs at the location of the absorption beds by the end of the peak period, a level that actually allows additional capacity for increases in future discharges without utilizing storage. The modeling assumed that the effluent was loaded into each of the three sets of absorption beds during alternating periods. Groundwater surface elevations would be expected to decline down-gradient from the absorption beds and never reach the surface. These results indicate that the absorption beds and the groundwater system will be able to accept the projected peak sustained-seasonal volume without causing groundwater levels to reach the ground surface at any point.

Although no modeling was conducted for the discharge rate of 216,000 gpd, the maximum rate envisioned under the 1988 Master Plan's simple vertical extrapolation would indicate a maximum rise in groundwater surface elevation of approximately 12.5 feet. This would increase levels to no higher than 5.5 feet bgs. Horizontal movement of the effluent would limit this increase to a lower elevation, well below that which would cause any significant potential for surfacing of the discharged effluent. Also, projected maximum monthly flow at buildout would be 190,000 gpd. If necessary, the addition of effluent storage capacity during the peak period would further decrease the chance for any effluent surfacing. These conditions indicate a less-than-significant impact. The locations of the existing and proposed wastewater absorption beds are shown in Figure 3.11.

4.2.4.1.2.3 Reduced Infiltration Rates and Recharge of the Kirkwood Valley Groundwater Basin

Development that results in increases in impervious surfaces and compaction of disturbed soils could reduce infiltration rates and resultant recharge of the Kirkwood Valley groundwater basin. This potentially adverse effect would be partially compensated as impervious and disturbed areas are rehabilitated and revegetated, or lessened through impervious area reductions. Also, because some groundwater recharge occurs through

interchange with Kirkwood Creek, and some of the runoff from the impermeable and compacted areas would percolate downslope at favorable alternative infiltration sites, all water acting as runoff would not be considered lost from groundwater recharge. Using results shown in Tables 4.8 and 4.9 it is estimated that some changes in groundwater infiltration capacity would occur as a result of proposed development.

Localized decreases in infiltration are likely in the Timber Creek Village/service area, Kirkwood North, Ski-In/Ski-Out North, Ski-In/Ski-Out South, and the West Meadows subareas due to increases in impervious surfaces. Overall, the net potential decrease in infiltration is considered to be less than significant. From a watershed-wide perspective, the maximum change in groundwater infiltration potential is even smaller.

4.2.4.2 Water Quality

Many surface and groundwater quality issues are involved in preventing impacts to Kirkwood's groundwater supplies and downstream beneficial uses. Since surface and groundwater resources are in reality inseparable, they are treated here together as co-dependent resources.

4.2.4.2.1 Groundwater Contamination from the Routine Discharge of Treated Wastewater

Groundwater could potentially be contaminated by wastewater disposal into the shallow aquifer via absorption beds. The potential for contamination of Kirkwood's water supply through discharge of treated wastewater into the underlying aquifer was investigated by Culp/Wesner/Culp (1984). A hydrologic model of the groundwater basin was formulated to estimate ground and surface water quality under a drought condition, assuming a 260,000 gpd peak wastewater discharge (compared to the currently-projected peak monthly flow of 182,500 gpd). This scenario was considered to represent a worst-case condition, since if a drought were to occur, visitor attendance, and therefore wastewater generation, would probably be much lower. A normal year discharge and flushing simulation followed this in order to test aquifer recovery performance. A true worst-case situation would actually consist of an extended sequence of dry years.

The Culp/Wesner/Culp results indicated that during a normal year, any wastewater constituents that had built up in the aquifer would be swept out of the basin by runoff-induced flushing. This would occur because a normal season produces approximately 5,660 acre-feet of runoff, which is five times the storage capacity of the aquifer. During a drought year, flows would be insufficient to flush the basin of all of the contaminants that would accumulate. However, the relatively large amount of runoff generated during a normal year would be sufficient to flush the basin of the constituents accumulated during both the drought and the subsequent normal year. By the end of the normal year, the amounts of contaminants leaving the basin would be roughly equal to those entering the basin in the wastewater discharge, thus stabilizing the concentrations of contaminants in the basin. The model results also indicated that the constituents would be transported out of the valley by both groundwater seepage and Kirkwood Creek flows (Culp/Wesner/Culp 1984).

Enough reserve capacity is believed to exist in the aquifer to absorb reduced annual quantities of wastewater produced during several successive, moderate-drought years. This conclusion would be valid assuming the annual volume of wastewater produced is less than normal (predicted as a result of lower wintertime visitation due to inadequate snowpack), and as long as the drought cycles were followed by subsequent years of at least normal precipitation levels. The occurrence of prolonged or severe droughts may require imposition of visitor limitations or export by tanks of some of the wastewater from the basin to prevent adverse buildups or concentrations of wastewater contaminants. These are considered emergency measures and details concerning types of visitor limitations would be determined if deemed necessary.

Based upon monitoring data and modeling results, Culp/Wesner/Culp (1984) concluded that chemical constituents of wastewater origin would not collect and/or reach high concentrations at any point in the

aquifer, especially because of the bedrock slope with reference to the locations of the points of wastewater disposal and the water supply wells. All of the water supply wells (except for the emergency backup well, Well 1) are located up-gradient from the proposed infiltration beds and leach lines, and/or the path of subsurface flows leading away from them.

KMPUD retained consultants to undertake reconnaissance-level evaluations of wastewater treatment alternatives for handling effluent levels generated by growth authorized under the 1988 Master Plan (ECO:LOGIC 1996). Accordingly, plant expansion alternatives were considered to handle wastewater flows up to 190,000 gpd (which is 26,000 gpd less than the 1988 Master Plan build-out capacity of 216,000 gpd). The alternatives included expansion of the absorption beds and wastewater treatment plant upgrades. The study also considered the potential need for supplemental spray irrigation of effluent on higher slopes or discharge to surface receiving waters. The most viable alternative was determined to be disposal of treated wastewater through newly constructed absorption beds. The discharged effluent would meet direct discharge requirements; however, the effluent would be indirectly discharged via the absorption beds. The treatment of wastewater to levels that meet direct surface discharge requirements, coupled with indirectly discharging it via the effluent entering the absorption beds is intended to avoid any possibility of significant adverse water quality impacts to Kirkwood Creek. As reflected in the WWTP upgrade proposal, the final Wastewater Treatment Plan involves treatment to meet surface discharge criteria, followed by discharge to the absorption beds for infiltration through the media and underlying soils to the underlying shallow aquifer.

Effluent quality would need to at least meet the following criteria contained in the existing set of Waste Discharge Requirements listed in Table 4.10:

Table 4.10. Minimum Effluent Standards of the Waste Discharge Requirements.

Effluent Parameter/Constituent	Monthly Average	Daily Maximum
Effluent Flow (gpd)	150,000	460,000
BOD (mg/L)	10	30
Settleable Solids (ml/L)	0.2	0.5
Total Coliform (MPN/100ml)	2.2	23
Total Nitrogen as N (mg/L)	15 [a]; 25 [b]	
Total Phosphorus as P (mg/L)	3.0	

[a] From 1 May through 31 October.

[b] From 1 November through 30 April.

The treatment process selected for implementation with the Proposed Project consists of flow equalization, denitrification, clarification, filtration, and biological treatment using a membrane system. A dual train system was incorporated into the final design, with two or more aeration basins and two or more anoxic basins. Dual contained bulk storage and feed systems were also included for alum, sodium hypochlorite and caustic (the caustic is required to replace alkalinity losses due to the addition of nitrification and alum feed). All proposed wastewater treatment plant upgrades are described in Chapter 3, section 3.5.3, and in *KMPUD's Wastewater Facilities Plan Update* (ECO:LOGIC 2001c). (Technical aspects of the processes and flows are described in more detail in Kennedy/Jenks 1998, included here by reference and available for review at the Alpine County planning office, Markleeville, CA.) The approximate ranges of principle effluent water quality characteristics are given in an appendix to the Kennedy/Jenks report containing the kinetic design criteria. These effluent characteristics will meet the requirements of the existing infiltration

discharge permit.

Any future imposed water quality requirements would be met through additional treatment and mitigation, as necessary and required by the CVRWQCB. Water quality in Kirkwood Creek will continue to be monitored in compliance with the current Waste Discharge Requirements. Any deterioration of Kirkwood Creek water quality that proves to be attributable to the wastewater discharge will trigger the imposition of requirements for additional or modified treatment, wastewater storage and discharge, effluent infiltration bed design, in-lieu non-point source controls, or other measures. When the KMPUD expands existing absorption beds or installs new beds for wastewater disposal, the CVRWQCB will require well-drilled groundwater monitoring (Wyels 1999) to assure that existing groundwater quality is not degraded. This analysis assumes that, with the exception of expressly designated reserve capacity, all of the proposed absorption beds will be utilized.

4.2.4.2.2 Contamination from Treated Effluent Inadvertently Exceeding the Intended and Assimilative Waste Loads and Inadvertently Discharged to Surface and Groundwaters

Increased waste loads of treated effluent from the KMPUD wastewater treatment plant unintentionally discharged to surface and groundwaters could inadvertently degrade water quality in the Kirkwood Valley groundwater basin and in Kirkwood and Caples Creeks. This could occur by excessive percolation from the absorption/infiltration beds. These discharges could lead to significant environmental impacts.

There is a regional board prohibition (Board Order No. 74-252) which specifies that "the Silver Fork's assimilative capacity will not be assigned to the products of any activities of man." This order effectively precludes the intentional or unintentional extension of the downstream waste discharge plume of any potentially degrading constituent into the Silver Fork American River (i.e., beyond the confluence of Caples Creek with the Silver Fork), whether it be from a point source, non-point source, or combination of sources.

To avoid interim problems, KMPUD has recently upgraded its disposal facilities and installed monitoring instruments. Two new beds totaling 900 feet have been constructed in the area known as the Chair 9 parking lot. Four reliable absorption beds totaling 1,440 feet in length remain in service in the Chair 7 parking lot. Two additional absorption beds totaling 720 feet would be constructed in the Chair 7 parking lot. Three additional absorption beds totaling 840 feet are proposed in the vehicle maintenance shop area (ECO:LOGIC 2001c). The location of these existing and proposed disposal facilities is shown in Figure 3.11. Geotechnical investigations of these sites determined conditions to be as described below:

- Silty sands or silty sands and gravels well-suited for absorption beds.
- Satisfactory percolation rates ranging from 2 to 16 minutes per inch of infiltration.
- Satisfactory horizontal hydraulic conductivity of the unsaturated soils and alluvial aquifer averaging 27.4 feet/day (0.01 centimeters/second).
- Adequate bedrock depths ranging from 18 to 28 feet.
- Satisfactory depth to groundwater ranging from 20 feet below ground surface during spring to 33 feet below ground surface in the late fall (the monitoring wells constructed during April-May 2001 encountered groundwater at 21 to 24 feet).
- Positive groundwater gradients toward the northeast, ranging from 0.04 ft/foot in the spring to 0.1 ft/foot in the late fall.

All of these results are consistent with geotechnical conditions needed for good absorption (Pacific Geotechnical 1976; Kleinfelder August 13, 2000 and Kleinfelder August 23, 2000 *in* ECO:LOGIC 2001c; Kleinfelder 2001).

The most recent telemetry results, commenced during the winter and early spring of 2001, indicated that

water levels were at or near the bottom of all the absorption beds except for one (Bed 2 in the Chair 7 parking lot). This was one of the original 1976 trenches that was probably experiencing some clogging problems at the gravel soil interface. The District installed monitoring instruments and presently cycles all of the wastewater flow to the two beds in the Chair 9 parking lot for 24 hours, then rests those beds while diverting the entire flow to the four beds located in the Chair 7 parking area for 24 hours. The cycle is then repeated.

Flow rates varied from 40,000 gpd to 119,000 gpd in 2001. All of the beds except one have performed satisfactorily under existing conditions. Depths to groundwater in the vicinity of the beds of at least 20 feet indicate that groundwater from melting snow and rain is not interfering with bed performance, nor is a significant groundwater mound being created as a result of percolation into the absorption beds. Impacts are less than significant.

4.2.4.2.3 Groundwater Contamination from Poor Quality Groundwater Seepage

Poor quality groundwater may be contained in the joints of ancient granitic rock formations lying adjacent to or beneath the high quality waters contained in the Kirkwood Valley aquifer. The high quality aquifer is also the source of groundwater accretions to Kirkwood Creek and interconnecting surface streams and springs. Impacts could potentially occur if the drilling of new wells caused water to flow from the older formations to the younger shallow aquifers, which are utilized for water supply and from which accretions to Kirkwood Creek occur. These effects could potentially degrade future source(s) of water supply for Kirkwood and downstream water users. However, new wells are not proposed.

While the drilling of new wells is not proposed in the Proposed Project, this potential impact would be avoided if future water supply wells were placed high on the east side of the valley among or just above the east-side home sites. In addition, the use of cased wells would avoid contamination by old water from granitic fractures. More certain prediction of impacts is precluded by the fact that the exact location of the lowest point of an inferred pre-Mehrten valley is not presently known (Watershed Systems 1996).

4.2.4.2.4 Leakage or Spillage of Untreated Wastewater

Untreated wastewater could leak and/or be accidentally spilled from sewer lines, particularly at vulnerable locations such as watercourse crossings, manholes, and lift stations. Any such incidents could cause contamination of surface and subsurface water supplies and would constitute a significant impact. Design and mitigation measures should be incorporated to minimize significant impacts from potential accidents and leakage.

4.2.4.2.5 Contamination Resulting from Excessive Treated Effluent Volumes

Increased treated effluent volumes could cause significant impacts on the water quality of the Kirkwood Valley groundwater basin and the quality of Kirkwood and Caples Creeks. The following two conditions could exacerbate this potential problem by overloading and exceeding the infiltration volume capacity of the wastewater absorption beds and of Kirkwood Meadow:

- Increased wastewater volumes generated by the projected growth in population and visitor days if the resultant volumes exceeded the infiltration capacity.

- Increased storm water infiltration volumes if the resultant volumes exceeded the infiltration capacity.

4.2.4.2.6 Water Quality Degradation from Surface Drainage Entering Kirkwood Lake

Based on an evaluation of the zoning and topographic maps of the Kirkwood region and communications with the Lead Agency, no construction would occur in the Kirkwood Lake drainage. Therefore, there would

be no adverse impacts to Kirkwood Lake directly related to construction activities of the Proposed Project.

4.2.4.2.7 Contamination from Non-point Source Emissions in Storm Water Runoff from Impervious and Disturbed Areas

Increases in non-point source emissions from storm water runoff, particularly any containing excessive oil and grease, toxic heavy metal and pesticide residuals, organic and inorganic particulates, salts, nutrients, *and sediment* could decrease ground and surface water quality. Impacts from contamination could reach significant levels.

4.2.4.2.8 Water Quality Degradation from Erosion and Sedimentation Resulting from Increased Flooding or Increased Surface Runoff Velocities

Effects of increases in impervious and disturbed areas on surface runoff velocities, flows, and flooding could be sufficiently large in the Kirkwood North, Ski-In/Ski-Out North, Ski-In/Ski-Out South, and the Timber Creek Village/service subareas to cause increases in the potential for surface erosion and/or flooding. These changes could cause increased turbidities and other significant sedimentation impacts. Increased turbidities are detrimental to water quality, the treatability of water, and stream substrates. Increases in suspended soil particles and stream bedloads can introduce excessive concentrations of other contaminants adsorbed to the sediment particles. In addition, increased sedimentation can clog streambed gravels, raise the stream substrate elevation, and degrade habitat conditions for fish and aquatic invertebrates. Poorly managed grazing practices could result in these impacts, as well. With these potential impacts in mind, effects of increases in impervious and disturbed areas on surface runoff velocities, flows, and flooding would be significant.

4.2.4.2.9 Water Quality Impacts to Receiving Waters Outside the Project Area

As noted in section 4.2.3.1.1 above, Kirkwood Creek is a tributary of Caples Creek and hence of the Silver Fork American River, the South Fork American River, and the American River. Therefore, any contaminants in Kirkwood Creek generated by the Proposed Project would be delivered to these downstream waters, constituting an indirect project impact. The significance of this indirect impact would be determined by (1) the magnitude of the direct impact to Kirkwood Creek's water quality and (2) the relative contribution to the downstream flows and the resulting dilution effect.

Sections 4.2.4.1.1.1, 4.2.4.1.3.7, and 4.2.4.1.3.8 above identify potentially significant impacts to erosion potential and sedimentation due to on-mountain (MMDP) and base area (Draft Plan) construction, livestock grazing on Kirkwood Meadow, storm water runoff from impervious and disturbed surfaces, and increased flooding or increased surface runoff velocities. The potential for chemical contamination associated with inadvertent discharge of treated effluent to surface waters is discussed in section 4.2.4.1.3.2. This section concludes that no significant water quality impacts are likely due to (1) the documented efficacy of the absorption beds and (2) the fact that the treated effluent would meet the standards required for direct discharge to surface waters, though no direct discharge is proposed. In short, while some adverse water quality impacts are projected to occur, with identified mitigation in place such impacts are anticipated to be less than significant. Mitigation of the less-than-significant impacts mitigated, as outlined below, would further reduce adverse water quality impacts. The beneficial uses assigned to Kirkwood Creek would not be impaired.

Regarding Kirkwood Creek's contribution to downsteam flows, section 4.2.3.1.1.2 above notes that the entire basin's average annual runnoff volume represents only 4 percent of the Silver Fork American River's flow volume, 0.5 percent of the South Fork American River's, and 0.2 percent of the American River's. A similar calculation using information provided in sections 4.2.3.1.1.2 and 4.2.3.1.1.3 indicates that the Kirkwood Creek basin's runoff represents about 18 percent of the annual average flow of Caples Creek. These calculations are based on published USGS streamflow data for the downstream waterways and on a

hydrologic model simulation completed for the ungauged Kirkwood Creek by Culp/Wesner/Culp (1984). This is the best information available. It should be noted, however, that these estimates of Kirkwood Creek's contribution may be high, because, as discussed in 4.2.3.1.1.2, some of the basin's runoff goes to groundwater recharge and thus does not leave the basin via the creek. Any contamination delivered by Kirkwood Creek to larger, downsteam waters would be diluted by factors ranging from about 6 (in Caples Creek) to 500 (in the American River).

Combining the low potential for adverse impacts to water quality in Kirkwood Creek with the creek's minor contribution to downsteam flows, it is highly unlikely that any significant impact to water quality in the cited, downsteam waters would occur as an indirect effect of the Proposed Project.

4.2.4.3 Mitigation

Limiting population growth and development to those levels identified in the Proposed Project coupled with implementation of the following proposed mitigation measures is expected to avoid future significant adverse impacts.

4.2.4.3.1 Surface Water Hydrology

4.2.4.3.1.1 Increased Surface Runoff Volumes, Velocities, Flooding, and Erosion

The following mitigation measures are designed to address increases in the extent, frequency, and duration of flooding and erosion due to potential increases in surface runoff velocities and flows caused by new structures and increases in the areal extent of impervious and disturbed areas:

Mitigation Measure 4.2 (a). Implement grading measures to retard and reduce runoff, e.g., minimize slopes, construct detention basins, and design swales to diffuse runoff and absorb excessive energy.

Mitigation Measure 4.2 (b). Use vegetation, geotextiles, rock, gravel, and other surface treatments to retard and absorb runoff.

Mitigation Measure 4.2 (c). Avoid creation of future flow barriers, obstructions, and constrictions in streams and gullies.

Mitigation Measure 4.2 (d). Implement Mitigation Measure 4.1 (a).

Mitigation Measure 4.2 (dd). Implement grazing management practices outlined in the grazing plan (see Appendix B), such as fencing livestock out of the riparian area of Kirkwood Creek.

4.2.4.3.1.2 Increased Future Water Demands and Resultant Consumptive Use

Mitigation Measure 4.2 (e). Implement maximum water conservation and xeriscape landscaping measures, such as limited yard watering and use of drought resistant native plants.

Mitigation Measure 4.2 (f). Reclaim wastewater if necessary to help meet future water supply demands.

Mitigation Measure 4.2 (g). To avoid sustained drawdown of the Kirkwood Valley watertable, KMPUD will develop and implement a Water Stage Alert System establishing a sliding scale from voluntary to required water conservation measures based on their ongoing monitoring of aquifer levels, coupled with their projections of water supply (based on precipitation data) and water demand. This system would be triggered when aquifer levels fall to less than 40 feet above the top of well pumps. Specific water conservation measures may include restrictions on vehicle washing, landscape watering, and household consumption.

Mitigation Measure 4.2 (h). To assist in minimizing impacts to instream flows in Kirkwood Creek and downstream waterways, KMPUD will limit or cease pumping from Well 2, which taps the shallow aquifer and is indirectly associated with the creek, when the Water Stage Alert System is triggered.

4.2.4.3.2 Groundwater Hydrology

4.2.4.3.2.1 Reductions in Groundwater Surface Elevations and Supplies

Mitigation Measures 4.2 (e), (f), and (g) address the reduction of future groundwater supplies and dependent instream flows, especially downstream from Kirkwood's well-field, due to additional pumping needed to meet increased future water demands and resultant increased consumptive use at buildout.

4.2.4.3.2.2 Reduced Infiltration Rates and Recharge of the Kirkwood Valley Groundwater Basin

Mitigation Measure 4.2 (i). Minimize the extent of impervious surfaces and disturbed soils to those that are absolutely necessary for implementation of the Proposed Project.

Mitigation Measure 4.2 (j). Avoid soil compaction in disturbed areas by limiting use of heavy equipment, stockpiling and re-spreading of forest duff and topsoils, and use of geotextiles.

Mitigation Measure 4.2 (k). Install low-slope permeable swales, porous dams such as hay bales, earthen benches, and infiltration basins to retard and capture runoff from impermeable surfaces.

4.2.4.3.3 Water Quality

4.2.4.3.3.1 Groundwater Contamination from Poor Quality Groundwater Seepage

Mitigation Measure 4.2 (l). Use sealed well casings and other wellhead protection measures to preclude any movement of poor quality groundwater (and surface water) into pumped aquifers.

4.2.4.3.3.2 Leakage or Spillage of Untreated Wastewater

Mitigation Measure 4.2 (m). Install sewage spill catch basins at vulnerable locations located outside the flood plain.

Mitigation Measure 4.2 (n). Use proven engineering design and construction features at flood-prone locations, particularly stream crossings.

Mitigation Measure 4.2 (o). Install backup pump systems, auxiliary power sources, and system failure alarms.

4.2.4.3.3.3 Groundwater Contamination from the Routine Discharge of Treated Wastewater

Mitigation Measure 4.2 (p). Avoid infiltration areas underlain by impermeable or poorly permeable soils.

Mitigation Measure 4.2 (q). Pressure transducers have been connected to the existing absorption bed monitoring system in selected monitoring wells to monitor the projected increases in groundwater surface elevations. KMPUD will take avoidance actions such as more rapid rotation of the discharge to alternate beds and/or abandonment of individual beds that may cause problems, if monitoring results indicate potential surfacing or near-surfacing of effluent

Mitigation Measure 4.2 (r). Prevent excessive infiltration of sewage collection and disposal systems by storm water.

Mitigation Measure 4.2 (s). Police for and eradicate unauthorized discharges to the sewer system.

Mitigation Measure 4.2 (t). Expand the wastewater absorption beds and construct new ones in suitable areas.

Mitigation Measure 4.2 (u). Utilize low flow water conserving plumbing fixtures wherever possible.

4.2.4.3.3.4 Contamination from Treated Effluent Inadvertently Exceeding the Intended and Assimilatable Waste Loads Discharged to Surface and Groundwaters

See Mitigation Measures 4.2 (p) through 4.2 (u).

4.2.4.3.3.5 Contamination from Non-point Source Emissions in Storm water Runoff from Impervious and Disturbed Areas

Mitigation Measure 4.2 (v). Conduct street sweeping twice-a-year and when build up of loose materials occurs on paved road ways.

Mitigation Measure 4.2 (w). Develop drainage systems for parking lots which collect runoff from impermeable surfaces and channel it into settling basins or through drainage filter strips, grassy swales, sand traps, or alternative sediment control features.

Mitigation Measure 4.2 (x). Implement Mitigation Measure 4.3.3 (k).

Mitigation Measure 4.2 (y). Implement Mitigation Measure 4.3.1 (e).

4.2.4.3.3.6 Water Quality Degradation from Erosion and Sedimentation Resulting from Increased Flooding or Increased Surface Runoff Velocities

Mitigation Measure 4.2 (z). Implement Mitigation Measures 4.1 (a), 4.2 (a), and 4.2 (b). Implement surface and channel erosion control measures such as rock placement, bank stabilization, geotextiles, sedimentation basins and traps, porous barriers (e.g., hay bales) and earthen benches.

Mitigation Measure 4.2 (aa). KMPUD *will* monitor for total suspended solids in Kirkwood Creek, and ensure that construction activities are monitored so as to implement necessary sediment prevention measures.

4.2.4.3.3.7 Contamination Resulting From Excessive Treated Effluent Volumes

Mitigation Measure 4.2 (ab). Provide accommodations for wastewater storage in case of emergency situations.

Mitigation Measure 4.2 (ac). Add additional nitrate removal to the advanced treatment processes.

Mitigation Measure 4.2 (ad). Implement previously described non-point source and erosion control measures, including Mitigation Measures 4.2 (a) - (d), 4.2 (w) - (z), and 4.2 (aa) and (ab).

4.2.4.3.3.8 Water Quality Degradation from Surface Drainage Entering Kirkwood Lake

Because no construction would take place in the Kirkwood Lake watershed, no impacts requiring mitigation were identified.

4.2.4.4Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts to water resources. Mitigation monitoring will be needed following implementation of the Proposed Project.

4.2.5 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts to water resources were identified.

4.2.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Of these two cumulative actions, increasing dispersed recreation in the surrounding area has the potential to interact with the indirect, off-site water quality impacts discussed above (section 4.2.4.2.9) to generate cumulative effects. The preceding analysis indicates that the Proposed Project's indirect impact on Caples Creek, the Silver Fork American River, the South Fork American River, and the American River would be less than significant. While dispersed recreation can impact water quality, its impact on these waterways is likely to be minimal for the following reasons. First, dispersed recreation, by definition, tends to result in low-level impacts over a wide area, and the watersheds drained by these streams are extensive. Second, the parking areas, trail systems, camp sites, and other infrastructure developed to support dispersed recreation is typically planned and developed with protection of waterways, riparian areas, and wetlands in mind. Third, dispersed recreationists in general have a stronger conservation orientation than the general public and avoid actions that adversely impact water quality. In light of these considerations, the relatively minor, potential, additive impact of the Proposed Project would not likely result in any significant cumulative effect.

4.3 Biological Resources

4.3.1 Aquatic Resources

Aquatic resources that could be directly or indirectly impacted by the Proposed Project include Kirkwood Creek, Kirkwood Lake, Caples Creek, and Caples Lake. Kirkwood Creek is located within the project area and is most susceptible to direct impacts. Potential impacts include habitat degradation from erosion and sedimentation resulting from construction activities, and contamination resulting from non-point source emissions in storm water runoff from parking lots and other impervious and disturbed areas. Although Caples Creek is outside of the project area, it could be impacted by sediment transported in Kirkwood Creek. Kirkwood Lake and Caples Lake would not be directly impacted by the Proposed Project. However, they could be indirectly impacted through increased visitor use of the resort area. This section focuses on those impacts related to fisheries. Amphibians are discussed under the Wildlife Resources section.

4.3.1.1 Issues

The following issues were identified through public and agency scoping and resource specialist review:

- Potential impacts to fish populations in Kirkwood and Caples Creeks due to construction-induced sedimentation.

- Potential impacts to fish populations in Kirkwood Lake and Caples Lake due to increased recreational usage.

4.3.1.2Methods

This aquatic resources analysis addresses impacts to on-site streams that support fisheries, as well as off-site aquatic systems which could be impacted by the Proposed Project. The analysis was based largely on existing data, combined with information gathered during a site visit to the project area. The assessment of sedimentation risk has been completed and is included in section 4.2, Water Resources, and is used in this analysis.

Potential indirect impacts due to increased visitor usage of the area were assessed based on the professional judgement of the biologist.

Mitigation measures were developed based on the standard best management practices (BMPs) used by ski areas to minimize both short- and long-term erosion and sedimentation.

4.3.1.2.1 Assumptions

For the purposes of this analysis, it was assumed that erosion control techniques and revegetation protocols (i.e., BMPs) suggested as mitigation measures would be effectively implemented during and after the construction process.

4.3.1.2.2 Significance Criteria

Significance criteria were determined based on the magnitude of ground disturbance and proximity to fishery-supporting water bodies in the project area. As explained above, most potential impacts to aquatic resources would result in sedimentation due to ground disturbance during facility and on-mountain infrastructure construction. The likelihood of sediment transport from disturbed areas to a stream channel is dependent upon three factors: the intensity of ground disturbance, the topography between the disturbance and a water body, and the distance from and type of vegetated ground between the ground disturbance and the receiving water body. Criteria for each level of significance are described below:

- Less Than Significant: Ground disturbance up to 100 acres occurring outside of the riparian zone/floodplain or more than 100 feet from a water body supporting a fishery.

- Significant: Ground disturbance occurring within the riparian zone/floodplain or less than 100 feet from a fishery-supporting water body.

- Significant and Unavoidable: Non-mitigable ground disturbance occurring within the floodplain or within 100 feet of a fishery-supporting water body. This would include ground disturbance greater than 1 acre occurring immediately adjacent to perennial streams supporting fisheries.

- Beneficial: Any activity which decreases the likelihood of sedimentation, increases minimum instream flows, or otherwise improves aquatic habitat in fishery-supporting water bodies.

4.3.1.2.3 Regulatory Setting

All fisheries in the project area are under the jurisdiction of the California Department of Fish and Game (CDFG). All activities in the project area, as well as mitigation measures to reduce the impacts of those activities, must conform to the regulations and direction of that agency. Other activities (including recreation) on lands surrounding Kirkwood are regulated by the Eldorado National Forest (ENF), Amador Ranger District. Regulations and objectives related to water quality are outlined by the Central Valley Regional Water Quality Control Board (CVRWQCB). See Table 4.11 for additional details on the

regulatory setting at Kirkwood.

4.3.1.2.4 Existing Studies and Information

The following documents were utilized to provide data on the existing aquatic habitat and fisheries status in the project area:

- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d).
- *Draft Environmental Impact Report: East Meadows 3 Subdivision in Alpine County, California* (Simpson 1996).
- *Kirkwood Creek - Caples Creek Water Quality, Periphyton and Aquatic Macrophyte Study: Effect of Nitrogen and Phosphorus on Periphyton Growth* (Aquatic Ecosystems Management 1990).
- *Kirkwood Meadow Water Resources Investigations: Assessment of Opportunities and Review of Existing Data* (Watershed Systems 1996).
- *Kirkwood Creek Floodplain Study* (EBCE 1996).

4.3.1.3 Environmental Setting

4.3.1.3.1 Kirkwood Creek

Kirkwood Creek is a second-order intermittent stream which drains most of the project area. Using Rosgen's stream classification system (Rosgen 1996), the portion of Kirkwood Creek located within the project area would best be classified as a C4 stream type. This stream type is characterized as a slightly entrenched, meandering, gravel-dominated, riffle/pool channel with a well-developed floodplain. This stream type is usually found in U-shaped glacial valleys, valleys surrounded by glacial and Holocene terraces, coarse alluvial valleys, and glacial outwash terrain. C4 stream channels usually have less than 2 percent gradients, a high width/depth ratio, and sinuosity (stream length divided by valley length) greater than 1.4. Their stream banks are generally composed of unconsolidated, heterogenous, non-cohesive, alluvial materials that are finer than the gravel-dominated channel bottom (Rosgen 1996). Consequently, this stream type is susceptible to accelerated bank erosion, as is seen on sections of Kirkwood Creek where banks have been undercut and some bank degradation is evident. This bank erosion is influenced by the condition of the riparian vegetation along the stream. In the case of Kirkwood Creek, it is evident that those areas of Kirkwood Meadow which have been grazed have experienced elevated levels of bank degradation. Additionally, Kirkwood Creek has become more incised and isolated from its floodplain. Under the Proposed Project, grazing management in Kirkwood Meadow will be guided by a grazing management plan, which outlines measures to reduce grazing impacts to Kirkwood Creek.

Because Kirkwood Creek flows intermittently, it does not provide consistent fishery habitat throughout Kirkwood Meadow. Often the stream is running at the northern end of the meadows but is dry at the southern end where the ski resort base area is located. However, brook trout (*Salvelinus fontinalis*) were observed in Kirkwood Creek during a field trip to the stream in 1998. These trout were located at the northern end of Kirkwood Meadow where the stream was still flowing. Brook trout were also observed in various reaches of Kirkwood Creek from the northern end of Kirkwood Meadow downstream to Caples Creek. These downstream sections of Kirkwood Creek also support brown trout (*Salmo trutta*) (Simpson 1995d) and sculpin (*Cottus* sp.) populations (Forest Service 1973). The brook and brown trout populations are self-sustaining; CDFG does not plant fish into Kirkwood Creek.

In 1971 and 1972, the CDFG conducted electrofishing surveys in the Kirkwood Meadow reach of Kirkwood Creek. Biomass estimates from those surveys ranged from 114 to 160 pounds of fish per acre, with densities ranging from 1,173 to 2,252 fish per mile (Forest Service 1973). These biomass estimates are high in comparison with the 73 pounds-per-acre average for other streams in the Sierra ecoregion (Platts and McHenry 1988) and the 73 pounds per acre average for the ENF streams (Forest Service 1988). These electrofishing results indicate that, in spite of its intermittent flow characteristics, Kirkwood Creek can provide relatively good habitat for resident salmonids.

4.3.1.3.2 Kirkwood Lake

Kirkwood Lake is a small sub-alpine lake approximately 23 acres in size. It supports a fishery composed of annually stocked rainbow trout (*Oncorhyncus mykiss*) and brook trout; according to CDFG, there is no natural reproduction of fish stocks in the lake (O'Brien 1999). The lake also contains a population of golden shiners. Kirkwood Lake is stocked at the approximate rate of 800 pounds of rainbow trout per year, or approximately 1,600 fish per year. A CDFG biologist checks the lake sporadically to monitor stocks and fish activity, but no regular creel census program is conducted at the lake (O'Brien 1999). Compared to nearby Caples and Silver Lakes, which are stocked annually at a much greater rate, Kirkwood Lake is a small fishery resource that receives comparatively light use.

Water quality in the lake is excellent and the lake is used as the drinking water source for the surrounding cabins. Kirkwood Lake is not hydrologically connected to Kirkwood Creek, but instead it is supported by runoff from the small watershed where the lake is located. Currently, there are 23 cabins, a 12-unit campground, and an organization camp (150 PAOT) located around Kirkwood Lake. The lake is utilized both for angling and non-consumptive recreation (e.g., canoeists, swimmers, etc.).

4.3.1.3.3 Caples Creek

Caples Creek, of which Kirkwood Creek is a tributary, is located approximately 0.5 miles north of the project area. As with Kirkwood Creek, the reach of Caples Creek located at the Kirkwood Creek inflow is best characterized as a slightly entrenched, meandering, gravel-dominated, riffle/pool channel with a well-developed floodplain. Habitat quality of Caples Creek appears to be generally good with reasonable bank stability, good water quality, and abundant spawning gravel. Brook trout were observed in Caples Creek during a site visit in 1998. Caples Creek likely supports populations of rainbow trout, brown trout and cutthroat trout (*Oncorhynchus clarki*).

4.3.1.3.4 Caples Lake

Caples Lake is located approximately one mile east of Kirkwood. It is a popular recreation destination with facilities including a campground, a resort, recreational residences, and two parking lots. It supports a fishery composed of annually stocked rainbow trout, brook trout, brown trout, and lake trout (*Salvelinus namaycush*) (Lehr 2001). CDFG annually stocks approximately 7,200 pounds of rainbow trout, at two fish/pound, 3,400 pounds of brook trout, 220 pounds of brown trout, and 30,000 lake trout fingerlings (Lehr 2001). Cutthroat trout have been planted in Caples Lake in the past and remnant populations of this species may be present. The lake also contains a population of self-sustaining suckers (*Catostomus sp.*) that were probably introduced originally as bait fish (Lehr 2001). Additional non-game fish species present include Lahontan redsides (*Richardsonius egregious*) and tui chub (*Gila bicolor*) (Simpson 1995d).

4.3.1.4Environmental Impacts

4.3.1.4.1 Description of Impacts

This section provides a qualitative description of potential impacts to aquatic resources. The types of impacts would be identical under all action alternatives, but levels of impact would differ. The impacts associated with the Proposed Project are discussed below under each aquatic system heading (i.e., Kirkwood Creek, etc.), while impacts associated with the other action alternatives are described in Chapter

5. As stated previously, potential impacts would result from erosion and sedimentation due to construction activities.

4.3.1.4.1.1 Sedimentation

The combination of construction and clearing for base area and ski area facilities would result in accelerated erosion from disturbed soil surfaces. This erosion would likely elevate the amount of sediment transported to waterways. This sedimentation would likely occur as short-term sedimentation events resulting when heavy soil disturbance occurs in concert with peak runoff conditions (e.g., during snowmelt or heavy precipitation events). Short-term heavy sedimentation decreases water clarity, raises stream temperatures, and smothers fish eggs, larvae and benthic macroinvertebrates. This type of sedimentation is most likely to impact species such as rainbow trout and cutthroat trout, which spawn in the late-spring and early summer, if both construction and peak flow are coinciding. Impacts to brook trout are not as likely to be significant as this species spawns in the fall when flows are low.

If revegetation is not effective, sedimentation could transition from short-term acute sedimentation to chronic long-term sedimentation. This long-term sedimentation could result in the eventual depression of macroinvertebrate production. A drop in macroinvertebrate production would have impacts throughout the food chain, ultimately affecting all resident fish species.

4.3.1.4.2 Direct and Indirect Impacts

4.3.1.4.2.1 Kirkwood Creek

The Draft Plan would result in approximately 146 acres of temporary construction disturbance. Of this disturbance, 85 acres would become impervious surfaces and 60 acres would be revegetated. On-mountain projects proposed under the MMDP would temporarily disturb approximately 262 acres, but all except 18.7 acres would be revegetated (see Table 4.5 for acreage by construction area or activity). Less than 1 acre of disturbance would occur within Kirkwood Meadow due to the installation of utility lines. These utility installations in the meadow would require successful revegetation; however, their installation does present a risk of short-term sedimentation impacts to Kirkwood Creek. If unmitigated, this sedimentation could impact localized brook trout populations in the reach of Kirkwood Creek located in Kirkwood Meadow. However, it is doubtful that this short-term sedimentation would have a major impact on the overall brook trout population in Kirkwood Creek. Construction in the Village area also poses a risk of short-term sedimentation impacts to Kirkwood Creek that could impact brook trout if not mitigated.

Approximately 22.8 acres of temporary construction disturbance would occur at Kirkwood North. Following construction, approximately 10 acres of this total would be revegetated. Some of this development would occur upslope of and adjacent to the Kirkwood Creek floodplain. The construction of dwellings could result in potential short-term sedimentation impacts to brook trout in Kirkwood Creek.

Potential increases in non-point source emissions from storm water runoff from impervious and disturbed areas could decrease ground and surface water quality, as discussed in section 4.2, Water Resources. If unmitigated, contamination of Kirkwood Creek could result in reduced quality of fisheries habitat and populations.

Grazing that occurs primarily at the northern end of Kirkwood Meadow is another potential impact on water quality and aquatic habitat in Kirkwood Creek. Under the Proposed Project, a grazing management plan (Appendix B) would be implemented to manage this grazing and protect the creek. Electric fencing would be used to keep livestock out of the riparian corridor, and the stocking rate and season of use would be limited.

Of the proposed on-mountain developments, only the Caples Crest Express lift would be within 100 feet of

Kirkwood Creek. If unmitigated, construction of this lift would likely cause significant impacts to trout habitat within the Creek.

Application of machine-made snow associated with the MMDP would result in increased flows in the headwaters of Kirkwood Creek that would extend later into the summer. Spring run-off flows would be higher than mean spring flows without snowmaking; however, these flow increases would be well within the normal ranges of variation and would not be expected to reduce channel stability or cause increased erosion or turbidity and thus would not substantially impact fisheries. These increased flows could also be beneficial to fisheries by increasing habitat area and volume during dry years. A full analysis of the impacts of snowmaking can be found in the *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d) and is incorporated by reference. This document is available for review at the Alpine County planning department office, Markleeville, CA, and Kirkwood land planning office, Kirkwood, CA.. Construction associated with the snowmaking expansion, although more than 100 feet from Kirkwood Creek, could also create the potential for sedimentation into the creek. This could degrade habitat for fisheries and aquatic invertebrates. Areas disturbed for burying pipeline would be revegetated however, so this represents only a short-term disturbance.

No impacts to aquatic resources would result from the proposed expansion and upgrade of the wastewater treatment facilities at Kirkwood. No direct discharge of treated effluent into Kirkwood Creek would occur and no absorption beds would be located in Kirkwood Meadow.

4.3.1.4.2.2 Kirkwood Lake

All of the proposed development at Kirkwood North would occur outside of the Kirkwood Lake watershed. Consequently, no impacts to the lake from construction-related activities would occur, but indirect impacts related to increased population in the area are possible. It is likely that increased residential development in the area would result in increased recreational use of Kirkwood Lake (see the Chapter 4 Recreation section for additional discussion). Increased angling pressure could impact sport-fish populations in the lake, with the level of impacts dependent on how the CDFG regulates catch limits and stocking rates at the lake.

4.3.1.4.2.3 Caples Creek

If unmitigated, sedimentation impacts from construction disturbance around Kirkwood Meadow and at Kirkwood North could have a short-term impact on fish populations in Caples Creek near the Kirkwood Creek confluence. Based on the amount of construction disturbance at Kirkwood North (approximately 24 acres), the resultant sedimentation would not be substantially greater than that which Caples Creek already experiences during peak runoff. Therefore, any sedimentation impacts to fish populations in Caples Creek are likely to be minor.

Flows in the 1.5-mile reach of Caples Creek between the dam and Kirkwood Creek confluence could be slightly reduced as a result of snowmaking operations and reduced spill events. Flows in this reach are regulated by releases from the dam and minimum flows are mandated by the Federal Energy Regulatory Commission and established to protect Caples Creek fisheries and aquatic resources. Therefore, any flow-reduction would result in minor impacts to aquatic resources in Caples Creek. A full analysis of the impacts of snowmaking can be found in the *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d).

4.3.1.4.2.4 Caples Lake

All of the proposed development would occur outside of the Caples Lake watershed. Consequently, no impacts to the lake from construction-related activities would occur, but indirect impacts related to

increased population in the area are possible. It is likely that increased residential development in the area would result in increased recreational use of Caples Lake (see the Chapter 4 Recreation section for additional discussion of recreational use of the lake).

The *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d) analyzed impacts and resulted in the authorization of a direct water supply line from Caples Lake for snowmaking activities. The MMDP proposes to increase snowmaking coverage by 56 acres. KMR's water rights of 500 acre-feet per year are sufficient to accommodate the proposed increase in snowmaking coverage (SE Group 2001) so no *further* impact on the lake's water level is projected from this activity though a minor reduction in overwintering fish habitat in the lake could result.

The intake for the snowmaking equipment was designed to preclude fish entrainment and minimize the potential for impingement. Fish screens are installed on the Caples Lake intakes and the pumps are placed 40 feet under the surface of the lake, well away from shoreline areas commonly inhabited by fry and juvenile fish. Therefore, the likelihood of fish becoming entrained in water withdrawn from Caples Lake or impinged upon by the intake is extremely low, and impacts to fish populations are not projected.

4.3.1.4.3 Level of Significance Before Mitigation

4.3.1.4.3.1 Kirkwood Creek

Without mitigation, the Proposed Project would likely have both a significant short-term and long-term impact on fisheries habitat in reaches of Kirkwood Creek in Kirkwood Meadow, Kirkwood North, and the Village area.

4.3.1.4.3.2 Kirkwood Lake

Without mitigation, the Proposed Project could have significant impacts to sport fisheries in Kirkwood Lake.

4.3.1.4.3.3 Caples Creek

The Proposed Project would have a less-than-significant impact to fisheries habitat in Caples Creek.

4.3.1.4.3.4 Caples Lake

The Proposed Project would have less-than-significant impacts to fisheries in Caples Lake.

4.3.1.4.4 Mitigation

The following mitigation measures are proposed to moderate or, in some cases, eliminate potential impacts associated with the Proposed Project.

4.3.1.4.4.1 Kirkwood Creek Short-term Sedimentation Impacts

Mitigation Measure 4.3.1 (a). Implement Mitigation Measures 4.2(a) - 4.2(d), 4.2 (w), 4.2 (x), 4.2 (z), and 4.2 (aa), as described in the Water Resources section.

Mitigation Measure 4.3.1 (b). Allow no heavy construction equipment to operate within the Kirkwood Creek floodplain or within 100 feet of the Kirkwood Creek stream channel during periods when soils are saturated from rain or snowmelt.

Mitigation Measure 4.3.1 (c). Implement Mitigation Measures 4.2 (k) and 4.2 (z). Sediment control structures will remain in place until vegetation has been established in disturbed areas.

4.3.1.4.4.2 Kirkwood Creek Long-term Sedimentation Impacts.

Mitigation Measure 4.3.1 (d). Implement Mitigation Measure 4.1 (a), 4.1 (l), 4.1 (m), *4.1 (mm)*, and 4.1(o) to prevent erosion and subsequent sedimentation into Kirkwood Creek.

Mitigation Measure 4.3.1 (e). Minimize salting and/or sanding of parking lots or other impervious surfaces within 100 feet of the floodplain.

Mitigation Measure 4.3.1 (f). Implement *the following* site-specific recommendations from the *Kirkwood Creek Floodplain Study* (EBCE 1996) (hereby incorporated by reference and available for review at the Alpine County Planning Department Office, Markleeville, CA) prior to the initiation of any proposed construction:

> *1) Build a diversion structure to operate with the existing drain and inlet for diversion of surface water between lifts 10 and 11; 2) prevent flooding in the area near Base Camp One condominiums by either clearing snow out of the sharp bend in Kirkwood Creek, or constructing a low floodwall; 3) replace the two existing footbridges upstream of Kirkwood Meadows Drive, which currently restrict the flow of Kirkwood Creek; 4) prevent the infrequent overtopping of Kirkwood Meadows Drive by enlarging the bridge opening or constructing a floodwall eastward along the east creek bank. Some boulders could be removed from the creek in this area as well; 5) any proposed structures in this area should be built a few feet above the floodplain elevation; 6) channel work such as bank protection (subject to permit requirements).*

Mitigation Measure 4.3.1 (ff). Implement the grazing management plan (Appendix B).

4.3.1.4.4.3 Kirkwood Creek Contamination Impacts.

Mitigation Measure 4.3.1 (g). Implement Mitigation Measures 4.2 (a), 4.2 (b), 4.2 (e), and 4.2 (k) from section 4.2.4.2 of Water Resources to reduce impacts associated with storm water runoff from parking lots and other impervious surfaces.

4.3.1.4.4.4 Impacts to Kirkwood Lake Fisheries.

Mitigation Measure 4.3.1 (h). KMR will assist in educating Kirkwood residents and visitors about fishing regulations at Kirkwood Lake and, with the permission of the Forest Service, post such regulations at angler access points to the lake.

Mitigation Measure 4.3.1 (i). KMR will not create additional parking for the purpose of facilitating access to Kirkwood Lake.

4.3.1.4.5 Level of Significance After Mitigation

4.3.1.4.5.1 Kirkwood Creek

Implementation of the suggested mitigation measures would result in less-than-significant impacts to aquatic resources in Kirkwood Creek.

4.3.1.4.5.2 Kirkwood Lake

Implementation of the suggested mitigation measures would result in less-than-significant impacts to Kirkwood Lake fisheries.

With the proposed mitigation in place, there would be no significant impacts to aquatic resources.

4.3.1.5Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts to aquatic resources were identified.

4.3.1.6Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of these cumulative actions have the potential to interact with the Proposed Project to generate cumulative effects on aquatic resources in the project area. Growth and development in surrounding communities would add to increasing dispersed recreation, which in turn would increase fishing pressure on Kirkwood Lake, Caples Lake, and other lakes and streams in the area. Development at Kirkwood under the Proposed Project, particularly the emphasis on making it a year-round resort, would add to this pressure, as discussed above. Since Kirkwood Lake is within walking distance of the project area, impacts to its fishing resource are expected to be the greatest. The CDFG would need to consider whether current regulations on catch limits and stocking rates of the noted lakes and streams remain adequate to this anticipated increase in fishing pressure, or whether management practice revisions would be needed in order to meet the increased demand and avoid a significant cumulative impact.

4.3.2 WILDLIFE RESOURCES

In developing its Proposed Project, KMR has acknowledged the value of the natural setting of the resort and stated that preservation of the natural setting is a desired goal (KMR 2001a). The wildlife resource is one of the biological components of Kirkwood's environment that contributes to the area's unique character. In addition to KMR's broad goal of preserving Kirkwood's natural setting, there are numerous federal and state laws with implications for assessing impacts to wildlife, particularly those species protected under the federal Endangered Species Act, the California Endangered Species Act, and the Fish and Wildlife Coordination Act.

This subsection of the larger Biological Resources analysis examines the potential impacts to wildlife associated with implementation of the Proposed Project. In general, impacts are assessed with regard to whether they would contribute to the direct or indirect loss or displacement of federal or California designated endangered or threatened species, or other sensitive species, or generally cause a decline in other local wildlife populations.

4.3.2.1Issues

The following issues were identified through public and agency scoping and resource specialist review:

Impacts to Kirkwood Lake and surrounding area:

- Impact on wildlife and habitat around Kirkwood Lake.
- Potential ecological damage to Kirkwood Lake.

Impact of development north of SR 88:

- Effect on wildlife habitat, including habitat fragmentation.

Impact of development in the vicinity of Ski-In/Ski-Out North:

- Development related degradation of wildlife habitat associated with creeks and riparian areas both east and west of Kirkwood Meadows Drive.

General wildlife related comments:

- Disturbance impacts on wildlife (particularly bear and osprey) from construction and structures.
- Effect on habitat, including habitat fragmentation.
- Impacts to wildlife within state right-of-way zones.
- Indirect loss of meadow habitat in the Kirkwood area.
- Impacts to the biological diversity (biodiversity) of the region.
- Cumulative disturbance, including cumulative habitat effects.

4.3.2.2Methods

This wildlife analysis is based on the studies listed below in section 4.3.2.2.4. These studies focused on the habitat in the proposed development areas and if applicable, on particular listed species. Because vegetation communities are closely tied to wildlife habitats, this assessment of impacts also relies heavily on the vegetation impacts discussed in this EIR (section 4.3.4). Also, because wetlands are an increasingly rare and important resource, impacts to wetlands are considered a potentially significant impact for the wildlife species dependent on this habitat type (Simpson 1995d). This analysis discusses the likelihood of impacts occurring and their relative magnitude expressed in qualitative terms.

4.3.2.2.1 Assumptions

As discussed in Chapter 1, this is a Program EIR, reflecting the fact that some elements of the Proposed Project have not been sited and designed. As a result, analysis of such elements addresses broad areas rather than specific development sites.

As numerous surveys and other wildlife studies have been completed in the Kirkwood area, this analysis draws heavily on existing information complemented and verified as necessary with more focused surveys conducted for this analysis.

Mitigation measures have been developed to ensure that programmatic determinations regarding wildlife

impacts remain valid as the project is designed and built.

In developing this analysis of potential impacts to wildlife or wildlife habitat, it was assumed that wetlands, a critical wildlife habitat type, will be avoided during the design phase to avert direct impacts. However, some linear water features (perennial and intermittent streams) may be impossible to avoid because of their extent in the project area. Development in areas that contain intermittent channels and streams may result in impacts associated with road crossings. Most building sites will avoid the channel systems and will be situated in the upland areas.

4.3.2.2.2 Significance Criteria

The criteria for identifying a significant impact to wildlife resources were developed using the CEQA Guidelines for potentially relevant standards of significance (section 5.6.11 in Hernandez et al. 1993) and include the following:

- Activities which will impact sensitive wildlife either through direct mortality, displacement, or disruption of breeding activity.
- Loss of critical wildlife habitat through conversion of native vegetation or open lands to other uses, resulting in secondary displacement of wildlife.
- Conversion of habitat to types which will disrupt migration patterns.
- Activities that change the mix of wildlife species in the Kirkwood area, causing a shift in species composition away from native species and towards species naturalized or adapted to human environments.
- Direct impacts on a rare, endangered, or threatened animal species or its habitat.
- Indirect impacts on a rare, endangered, or threatened animal species or its habitat.
- Substantial interference with the movement of resident or migratory wildlife species.
- A substantial reduction in wildlife habitat.

4.3.2.2.3 Regulatory Setting

CEQA requires state and local agencies to avoid or mitigate significant environmental impacts whenever feasible (Guidelines Sections 15021, 15091). Significant impacts are defined in part by applicable state and federal regulations governing the protection of natural resources. Statutes which regulate impacts to biological resources and which may affect private land development at Kirkwood are listed in Table 4.11.

Table 4.11. State and federal statutes considered in the wildlife impact analysis at Kirkwood.

Regulated Activity and Resource	Implementing Agency	Regulatory Authority
Activities affecting species listed as	U.S. Fish and Wildlife Service	Sections 7 & 9, Endangered Species Act (16 USC 1536).

Endangered or Threatened.	California Dept. Fish & Game	California Endangered Species Act (California Fish and Game Code, Section 2081).
Activities affecting general fish and wildlife concerns.	U.S. Fish & Wildlife Service California Dept. of Fish & Game	Fish and Wildlife Coordination Act (16 USC 661-666); California Environmental Quality Act; National Environmental Policy Act.
Discharge of dredged or fill material into waters of the United States or construction within a floodplain.	U.S. Army Corps of Engineers	Section 404, Clean Water Act (33 USC 1344). Section 10, Rivers and harbors Act of 1899 (33 USC 403).
	U.S. Forest Service	Executive Order 11990, Protection of Wetlands. Executive Order 11988, Floodplain Management.
	California Dept. Fish & Game	Streambed Alteration Agreement (California Fish & Game Code, Section 1603).
Activities affecting designated wilderness areas.	U.S. Forest Service	Wilderness Act of 1964 (16 USC 1131).
	California Resources Agency	California Wilderness Act (California Public Resources Code, Section 5093.30 et seq.).
Activities involving timber harvests on private land.	California Dept. Forestry and Fire Protection	Z'Berg-Nejedly Forest Practice Act (California Public Resources Code, Section 4511 et seq.).

Source: Bass et al. 1996.

4.3.2.2.4 Existing Studies and Information

Because the long-term fate of the wildlife resource is closely linked to habitat quality, this analysis relies heavily on a habitat-based approach to assess development impacts. As a consequence, there is substantial overlap in source materials for this section and the vegetation and wetland impact analyses.

Primary source material for the wildlife analysis includes the following documents:

- California Department of Fish and Game (CDFG) Natural Diversity Data Base (CDFG 1998).
- Special animals. California Natural Diversity Data Base (CDFG 2001a).
- California species of special concern. Habitat Conservation Planning Branch (CDFG 2001b).
- State and federally listed endangered and threatened animals of California. California Natural Diversity Data Base (CDFG 2001c).
- Region 5 Forest Service designated sensitive species. Eldorado National Forest (Forest Service 2001).
- Federal endangered and threatened species. Sacramento Fish and Wildlife Office (USFWS 1998 and 2001).
- Unpublished field notes collected at Kirkwood by D. Branson, Wildlife Biologist, Pioneer Environmental Services, Inc., Logan, UT (Pioneer 1997).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment, Kirkwood*

Water Rights and Snowmaking Project (Simpson 1995d).

- *Technical Appendices for the Final Environmental Impact Report and Environmental Assessment for Public Comment, Kirkwood Water Rights and Snowmaking Project* (Simpson 1995b).

- *Draft Supplemental Environmental Impact Report: East Meadow 3 Subdivision in Alpine County CA* (Simpson 1996a).

- *Technical Appendices B-1 for the Draft Supplemental Environmental Impact Report: East Meadows Phase 3 Subdivision* (Simpson 1996b).

- Unpublished report of northern goshawk surveys conducted for the Kirkwood water rights and snowmaking project. Dale Keyser and Associates (Keyser 1994 and 1995).

- Unpublished report of great gray owl surveys conducted for the Kirkwood water rights and snowmaking project. Dale Keyser and Associates (Keyser 1994).

- Unpublished report of willow flycatcher surveys conducted for the Ski-In/Ski-Out subdivision project, Kirkwood Ski Resort. Dale Keyser and Associates (Keyser 1999).

- Unpublished report of mountain yellow-legged frog surveys conducted in the Ski-In/Ski-Out Subdivision Project, Kirkwood Ski Resort. Moore Biological Consultants (Moore 1999).

- Unpublished report of mountain yellow-legged frog and Yosemite toad surveys conducted for the Kirkwood on-mountain and off-mountain projects. Wildlife Resource Consultants (Fox 2001).

4.3.2.3 Environmental Setting

Kirkwood and the surrounding Eldorado National Forest (ENF) provide habitat for about 320 wildlife species (Simpson 1995d). While not all of these species occur on the project site, the site does provide habitat for both resident and migratory wildlife. Based on the classification of plant communities (section 4.3.4), both common and more important wildlife habitat types occur within the project area. Developed ski slopes provide open grassland, considered a common habitat (Simpson 1995d). More important wildlife habitat types provide life history requisites such as water or nest sites for a variety of wildlife species. Important wildlife habitats within the project area include riparian areas, mountain meadows, and streams. Approximately 90 acres of wetlands and other waters of the U.S. have been delineated within potential Draft Plan development areas. Refer to Wetland Resources, section 4.3.3, for additional descriptions of the components of the wetlands habitat type.

Other vegetation types in the project area include upper montane coniferous forest, whitebark pine/mountain hemlock forest, upper montane/subalpine sagebrush scrub, Jeffrey pine/western juniper, subalpine wet meadow, riparian scrub, and disturbed/developed. Kirkwood meadow is bisected by Kirkwood Creek and includes wetlands and a variety of low-growing meadow and riparian plant species (KMR 2001a). A more complete description of the meadow vegetation, as well as the other listed vegetation types is included in the Wetland and Vegetation Resources sections of this document.

A variety of bird, mammal, reptile, and amphibian species are known to occur in association with the habitat types found in the project area. Wildlife species considered non-sensitive but likely to be found at Kirkwood include cavity nesting birds, mule deer, black bear, and mountain quail (KMR 2001a). These species, along with American marten, are designated as Management Indicator Species (MIS) by the Forest Service. MIS

species have habitat requirements encompassing the diversity of vegetation and special habitat components required by a range of other wildlife species sharing a particular habitat type. A list of wildlife species recorded in the project area is included in Table 4.12.

Table 4.12. Wildlife species documented at the Kirkwood project site.

Class	Common name	Scientific name
Birds	Bald eagle	*Haliaeetus leucocephalus*
	Northern goshawk	*Accipiter gentilis*
	Red-tailed hawk[1]	*Buteo jarnaicensis*
	Golden eagle	*Aquila chryseatos*
	Blue grouse	*Dendragapus obscurus*
	Mountain quail	*Oreortyx pictus*
	Western screech owl[1]	*Otus kennicottii*
	Great horned owl	*Bubo virginianus*
	Great gray owl	*Strix nebulosa*
	Common nighthawk	*Chordeiles minor*
	Black swift	*Cypseloides niger*
	Calliope hummingbird	*Stellula calliope*
	Hairy woodpecker	*Picoides villosus*
	Common flicker	*Colaptes auratus*
	Western wood-pewee[1]	*Contopus sordidulus*
	Steller's jay	*Cyanocitta stelleri*
	Clark's nutcracker[1]	*Nucifraga columbiana*
	Common raven[1]	*Corvus corax*
	Black-capped chickadee[1]	*Parus atricapillus*
	Mountain chickadee[1]	*Parus gambeli*
	White-breasted nuthatch[1]	*Sitta carolinensis*
	Red-breasted nuthatch[1]	*Sitta canadensis*
	Mountain bluebird[1]	*Sialia currucoides*
	Hermit thrush[1]	*Catharus guttatus*
	American robin[1]	*Turdus migratorius*
	Solitary vireo[1]	*Vireo solitarius*
	Fox sparrow[1]	*Passerella iliaca*
	White-crowned sparrow[1]	*Zonotrichia leucophrys*
	Dark-eyed junco[1]	*Junco hyemalis*
	Brewer's blackbird[1]	*Euphagus cyanocephalus*
	Rosy finch	*Leucosticte tephrocotis*
	Cassin's finch	*Carpodacus cassinii*
	Red crossbill	*Loxia curvirostra*
Mammals	Pika	*Ochotona princeps*
	Snowshoe hare	*Lepus americanus*
	White-tailed hare	*Lepus townsendii*
	Lodgepole chipmunk	*Tamias speciosus*
	Yellow-bellied marmot[1]	*Marmota flaviventris*
	Belding's ground squirrel	*Spermophilus beldingi*
	Golden-mantled ground squirrel	*Spermophilus lateralis*
	Douglas' squirrel[1]	*Tamiasciurus douglasii*
	Deer mouse	*Peromyscus spp.*
	Bushy-tailed woodrat	*Neotoma cinerea*
	Montane vole[1]	*Microtus montanus*
	Porcupine	*Erethizon dorsatum*

	Coyote	*Canis latrans*
	Black bear	*Ursus americanus*
	Marten	*Martes americana*
	Long-tailed weasel	*Mustela frenata*
	Badger	*Taxidea taxus*
	Bobcat	*Felis rufus*
	Mule deer[1]	*Odocoileus hemionus*
	Blacktail deer	*Odocoileus columbianus*
Amphibians	Western toad	*Bufo boreas*
	Chorus frog[1]	*Pseudacris regilla*
Reptiles	Rubber boa	*Charina bottae*
	Western rattlesnake	*Crotalus viridis*
	Northwestern garter snake	*Thamnophis ordinoides*
	Sagebrush lizard	*Sceloporus graciosus*
	Western fence lizard	*Sceloporus occidentalis*
Fishes	Brook trout[1]	*Salvelinus fontinalis*
	Brown trout	*Salmo trutta*
	Sculpin	*Cottus spp.*

[1]Observed during 1994 field surveys by Simpson Environmental and Keyser & Associates.
Source: Simpson (1995b,d), and citations therein; Forest Service (1973).

4.3.2.3.1 Threatened, Endangered, and Sensitive Wildlife Species

Threatened, endangered, and sensitive wildlife species that could be affected by the Proposed Project were identified through correspondence with the U.S. Fish and Wildlife Service (USFWS), CDFG, and the Forest Service as well as a review of CDFG's California Natural Diversity Data Base (CNDDB) (CDFG 1998, 2001a). The habitat requirements and known distribution of each sensitive wildlife species identified by the agencies or included in the CNDDB were reviewed. Species identified as threatened, endangered, and/or sensitive which have a reasonable probability of occurrence within the project area (Simpson 1995b) are listed in Table 4.13 and discussed in the succeeding text. Additional species identified by the agencies, such as the greater western mastiff bat (*Eumops perotis californicus*), Pacific western big-eared bat (*Plecotus townsendii townsendii*), and the California spotted owl (*Strix occidentalis occidentalis*) are not addressed as the project area is above the elevational range of these species and/or does not contain suitable habitat.

Table 4.13. Special status wildlife species potentially occurring in the Kirkwood project area.

Common name	Scientific name	Federal Status[1]	State Status[2]	Forest Service Status[3]
Spotted bat	*Euderma maculatum*	SC	CSC	--
Sierra Nevada snowshoe hare	*Lepus americanus tahoensis*	SC	CSC	--
Sierra Nevada red fox	*Vulpes vulpes necator*	SC	ST	S
Pine marten	*Martes americana*	SC	--	S
Pacific fisher	*Martes pennanti pacifica*	SC	CSC	S
California wolverine	*Gulo gulo*	SC	ST	S
Bald eagle	*Haliaeetus leucocephalus*	T	SE	--

Northern goshawk	*Accipiter gentilis*	SC	CSC	S
Peregrine falcon	*Falco peregrinus anatum*	D/FT	SE	S
Great gray owl	*Strix nebulosa*	--	SE	S
Willow flycatcher	*Empidonax traillii*	–	SE	S
Mount Lyell Salamander	*Hydromantes platycephalus*	SC	CSC	--
Yosemite toad	*Bufo canorus*	SC	CSC	S
Mountain yellow-legged frog[4]	*Rana muscosa*	SC	CSC	S

[1]E=Endangered; T=Threatened; D=Delisted; FT=Formerly Threatened; SC=Other species of concern to the Sacramento Fish and Wildlife Office. This is an informal term used by some USFWS offices. These species receive no legal protection.
[2]SE=State of California Endangered; ST=State of California Threatened; CSC=State of California Species of Special Concern. These species have no legal status; this category is intended for use as a management tool..
[3]S=FS Sensitive
[4]Proposed Endangered only for the southern population in the San Gabriel, San Jacinto, and San Bernardino Mountains.

The USFWS identified two listed or formerly listed wildlife species, the bald eagle and peregrine falcon, with the potential to occur in the project area or be affected by the Proposed Project (USFWS 1998 and 2001). The federally threatened bald eagle has been observed foraging at Caples Lake and Caples Creek during summer months (Simpson 1995d; Loffland 2001). Because Caples Lake is seasonally covered with ice, bald eagles are precluded from foraging for fish and therefore use of the area during winter. Consequently, bald eagle wintering use of the project site is unlikely, though summer use has been documented. Suitable bald eagle nesting habitat is present at Caples Lake and at Red Lake but no nests have been documented in this area. Helicopter surveys in the vicinity of Kirkwood conducted in the mid-1980s and in 1999 found no evidence of bald eagle nesting in or adjacent to the project area (Loffland 2001). Platform nests were seen in the 1999 surveys and were presumed to be osprey or another raptor species other than eagle, as no birds were present in the nests.

Highly suitable habitat for the delisted, formerly federally threatened peregrine falcon is found on cliffs in the Kirkwood area and on nearby Thunder Mountain. Peregrine falcons have not been documented in the project area. Helicopter surveys conducted in the mid-1980s by the Forest Service included all suitable cliffs and other rock formations in the area and found no evidence of nesting falcons. However, prairie falcons are known to nest in the Kirkwood area, and this species uses similar habitat features as peregrines. The closest nesting pair of peregrine falcons to the project area, about 9-10 air miles away, is near Salt Springs Reservoir. This nest has not been active for the last 3 years and it is thought that this pair moved nearby to the active nest at Calaveras Dome. It is possible that young could disperse from this area to Kirkwood, given the suitability of nest sites. (Loffland 2001).

Suitable habitat also exists in the project area for a number of California endangered and threatened species, Forest Service sensitive wildlife species, and other species of special concern to the Sacramento Fish and Wildlife Office and the CDFG (Table 4.13). Of these species, only the Sierra Nevada snowshoe hare and Pine marten have been documented in the project area (Simpson 1995d, Forest Service 1973).

A territory for a California wolverine (state threatened) was reported to extend to about 3.5 miles south of Kirkwood, in 1978 (CDFG 1998) and wolverines were also observed in 1979 and 1980 approximately 1 mile west of Kirkwood (Simpson 1995b). There have been no confirmed sightings on the ENF since this time. Although suitable habitat may exist within the project area, wolverines have never been documented there. A territory for a Pacific fisher was mapped extending to about 0.25 miles east of Kirkwood in 1987 (CDFG 1998). Habitats within and adjacent to the project area may provide suitable fisher habitat, therefore

presence of this species may be assumed.

Habitat for spotted bats is present within and adjacent to the project area, but their presence has not been documented in the Kirkwood area or in the ENF. However, surveys for this species have not been conducted so their presence cannot be discounted. Likewise, habitat for the Sierra Nevada red fox (state threatened) potentially occurs in the vicinity of the project area, as this species is thought to inhabit vegetation types similar to those used by the marten and wolverine. There are no records of the red fox in the project area. An individual was documented in 1994 near the Silver Lake dam, approximately 3 miles southwest of the project site (Simpson 1995b).

Surveys were conducted for northern goshawks in 1994 and 1995 at Kirkwood according to the 1992 Region 5 National Forest Lands survey protocol (Keyser 1994; 1995). No goshawks were detected during these surveys although suitable habitat was present in the project area (Simpson 1995d). Surveys were conducted for great gray owls (state endangered) in 1994 at Kirkwood using the 1992 Yosemite National Park survey protocol (Keyser 1994). No owls were detected during these surveys although suitable habitat was present (Simpson 1995d). A great gray owl was documented in the vicinity of the project area in the early 1970s (Forest Service 1973). However, the habitat has been modified greatly since that time so this record cannot be used to project this species' presence.

Willow flycatchers (state endangered) have been found at Carson Pass near Red Lake and in the Tahoe Basin (Hinz 1999). Surveys were conducted for willow flycatchers in 1992 and 1993 along Caples Creek, just downstream of Caples Lake. Although habitat in this area contained the well-developed willow thickets utilized by this species, no flycatchers were detected (Simpson 1995b). In 1999, surveys for willow flycatchers were also conducted in the riparian areas and meadows of the Ski-In/Ski-Out subdivision project using the 1996 Region 5 National Forest Lands survey protocol. No flycatchers were observed and habitat was assessed as unsuitable (Keyser 1999).

Surveys were conducted at Kirkwood for the mountain yellow-legged frog in 1999 and 2001 and for the Yosemite toad in 2001. The 1999 surveys were conducted for the Ski-In/Ski-Out subdivision project using techniques from yellow-legged and red-legged frog survey protocols. The 2001 surveys were conducted for the Kirkwood on-mountain and off-mountain projects using a modified form of the Matthews-NAP 2001 survey protocol. No egg-masses, larvae or adults were found in these surveys (Moore 1999; Fox 2001). Although some potentially suitable breeding habitat for the Yosemite toad occurs in the project area, it is considered marginal. Given the lack of historic records in the ENF the projected likelihood of occurrence of Yosemite toad in the project area is low. Mountain yellow-legged frogs have been found in numerous watersheds on the ENF, including at Caples Lake in 2000 (Lehr 2001). Potentially suitable habitat for this species exists in the project area, along Kirkwood Creek and in Kirkwood Meadow, but this habitat is considered only low to moderate in quality. Potential habitat also occurs within the project area for the Mount Lyell Salamander near creeks or in areas of snowmelt, but surveys for this species have not been conducted. The presence of this species within the project area and the ENF is unknown.

4.3.2.3.2 Biodiversity

Biodiversity is a term frequently used in evaluating and managing ecosystems using an integrated approach, rather than the traditional species-by-species approach. Biodiversity is an attribute of ecosystems, with high levels of biodiversity often associated with healthy or complex ecosystems, and low levels of biodiversity associated with simple, often degraded ecosystems. While the concept of biodiversity is generally understood, the term remains poorly defined for management purposes, and agencies with jurisdiction over the management of natural resources have adopted no standardized methods for quantifying biodiversity.

The *Environmental Impact Statement for the ENF Land and Resources Management Plan* provides an interpretation of biodiversity as "represent(ing) the richness, relative abundance, and pattern of different species of plants and animals or groups of species called communities" (Forest Service 1988). Biodiversity on National Forest System (NFS) lands is primarily defined for coniferous forest habitat and is broken down into three components: the number of different successional stages, the abundance of these stages, and the location of these stages with respect to one another. Categorizing biodiversity in this way reflects habitat diversity and provides a picture of the amount of potential habitat types available to support a wide variety of species. Higher levels of biodiversity are found in areas where parcels of several different successional stages are interspersed with each other. Lower levels of biodiversity are found in areas of monotypic vegetation. Based on the variety of vegetative communities present in the project area and the interspersion of these communities with each other, the biodiversity of the project site could be characterized as moderate.

4.3.2.4Environmental Impacts

4.3.2.4.1 General Wildlife and Biodiversity

Development of the Proposed Project would likely result in both direct and indirect impacts to wildlife resources in the project area. Direct impacts to wildlife include loss of habitat and disturbance during project construction, while indirect impacts include ongoing disturbance due to the increased human presence in the area.

The Draft Plan would result in disturbances varying in extent according to the amount of development actually undertaken in each subarea. According to actual and conceptual plans, approximately 146 acres would be disturbed during construction in all subareas of Kirkwood combined. A large portion of this land (approximately 86 acres) would be permanently converted to buildings, parking areas, or other non-vegetated cover types (Table 4.5). Expanded parking facilities account for approximately 22 acres of this permanent disturbance. These losses would be spread among the project subareas. Approximately 60 acres of the disturbed areas would be revegetated, thus the impacts to habitat in these areas would be short-term. However, some habitat conversion and associated wildlife displacement could still occur.

Temporary construction impacts associated with the MMDP would disturb a projected 262 acres, and result in approximately 19 acres of permanent impervious surface disturbance. While the remaining 243 acres would be revegetated, some habitat conversion would occur, which could displace species currently dependent on these areas.

Construction associated with the proposed expansion and upgrade of the wastewater treatment facilities at Kirkwood would result in minor impacts to wildlife associated with the construction disturbance. Expansion of the existing treatment plant at Kirkwood would result in less than 0.1 acre of permanent impervious surface disturbance. The proposed placement of absorption beds in the Chair 7 parking area and the vehicle maintenance shop area would not create any significant disturbance as this habitat has previously been modified, does not provide valuable wildlife habitat, and is greater than 100 feet from a water body.

Project construction associated with noise disturbance and human presence during the breeding season (late spring through mid-summer for most species) could result in potential breeding failure or mortality for any wildlife nesting or denning in the vicinity (Simpson 1995d). Disturbed species may abandon nest or den sites whether or not there are dependant young, and, if so, any offspring would likely die as a result of abandonment. This type of disturbance could recur seasonally until the resort reaches ultimate buildout. As buildout and implementation of the project elements is predicted to occur steadily over the next 20 years, it is likely that wildlife susceptible to this type of disturbance would be displaced from the project area.

While construction activity and increased human presence displaces those species intolerant of human activity, some species are more tolerant of human disturbance or even benefit from their proximity to humans. Consequently, populations of most small mammals and neotropical migrant songbirds may be largely unaffected by increased human presence, while raptor species and mammals such as black bear, marten, and wolverine could be displaced from the area. One of the implications of this displacement is a possible decline in biodiversity at Kirkwood. Although bear may be displaced by increased human presence, they also could be attracted to the residential developments if food and garbage were not stored properly.

Operation of snowmaking equipment would generate substantial noise in the Project Area, particularly in the immediate vicinity of the snowmaking guns and fans. This noise could disturb non-dormant wildlife, such as the snowshoe hare, that remain in the area throughout the winter. However, most subalpine wildlife species would not be impacted by this activity as they are either dormant or move to lower elevations during the winter months.

Kirkwood Meadow would not receive any significant direct impacts from construction activities, because zoning restrictions prohibit all but the most limited infrastructure-related uses of this area. A small amount of disturbance would occur degrading less than 1 acre of habitat in site-specific areas due to the installation of utility lines. These utility installations in the meadow require successful revegetation; however, their installation does present a risk of short-term sedimentation impacts to Kirkwood Creek. Indirect impacts to wildlife in the meadow would likely occur as a result of increased human presence and recreational use from surrounding developments, particularly during summer months. Regarding the initial development of Kirkwood, Roberts (1973, p.46) reported that "in an area of high wildlife value such as Kirkwood Meadow, it is a simple fact that when man moves in, most wildlife must move out and many wildlife values will be lost." Roberts also predicted impacts to the Salt Springs deer herd, which he stated utilized the forest meadow ecotone as fawning grounds. Such impacts likely have already occurred over the past 26 years, but may intensify if the Proposed Project is implemented.

Another indirect impact typically associated with residential development and human presence stems from the presence of domestic pets (primarily dogs and cats). Roberts (1973) also raised this concern, and pointed out that free roaming dogs often harass deer by chasing them, and at times kill or injure them. Likewise, domestic cats have been shown to have a dramatic impact on songbird populations.

Wetlands are interspersed throughout the project area. Because of the extent of the wetlands in relation to the proposed development, some impacts, primarily due to road crossings, would likely occur if the Proposed Project was implemented. These impacts include several road crossings for access in the East Meadow and Village areas, and potential stream crossings and riparian and wetland impacts in the Ski-In/Ski-Out areas. As reported in the Wetlands section of this document, avoiding impacts to all of the riparian areas in the Ski-In/Ski-Out area may not be feasible. Any losses would represent a direct impact to a small amount of habitat for amphibians and a very small, direct impact to habitat for riparian- and wetland-dependant species. Overall, these direct impacts would be minor if the road crossings were designed so that they do not prohibit upstream or downstream movement of biota.

Of the proposed on-mountain developments, only the Caples Crest Express lift would be within 100 feet of Kirkwood Creek. If unmitigated, sediment could potentially enter Kirkwood Creek. Construction associated with the snowmaking expansion and other on-mountain and off-mountain developments, although greater than 100 feet from Kirkwood Creek, could also create the potential for sedimentation into Kirkwood Creek. This could degrade habitat for amphibians and aquatic invertebrates. Where disturbed areas would be revegetated, this would represent only a short-term disturbance.

No impacts to amphibians and other riparian-dependent wildlife would result from the proposed expansion and upgrade of the wastewater treatment facilities at Kirkwood. No direct discharge of treated effluent into Kirkwood Creek would occur and no absorption beds would be located in Kirkwood Meadow.

The forested habitat within the project area provides nest sites and cover for small mammals (Simpson 1995d). However, the historical coniferous forest has been substantially fragmented due to the clearing of ski trails and siting of homes, commercial enterprises, roads, and other infrastructure for the existing resort. This fragmentation has reduced habitat suitability for species which require large contiguous tracts of undisturbed habitat, such as marten and fisher. In contrast, fragmentation of one major habitat type could result in an overall increase in the variety of habitats and increased benefits to species that favor earlier successional habitat types. Fragmentation also tends to increase the availability of ecotones — areas of transition between distinct habitat types — which are utilized by deer and other species preferring edge habitats. The increased habitat diversity tends to favor animals such as snowshoe hare and great gray owl (Simpson 1995d) which require a mixture of forest cover and meadows in which to forage. Because of the extent to which the existing environment at Kirkwood has already been fragmented, impacts due to additional fragmentation are likely to be minor in the project area.

Fragmentation of habitat, an issue specifically raised during scoping, is unlikely to be an issue of concern in Kirkwood North. To suffer from fragmentation-related impacts, Kirkwood North would have to either constitute an existing migration corridor for one or more species of wildlife, or would itself have to constitute a habitat connection between two larger islands of habitat. There is no evidence to suggest that the Kirkwood North area is used as a migration corridor. Furthermore, Kirkwood itself is essentially an island of development set against a matrix of natural habitats. Moderately expanding or establishing a higher density of development within this island would not produce fragmentation of the surrounding forest habitat by redistributing the remaining area into disjunct fragments (Wilcove et al. 1986).

4.3.2.4.2 Wildlife at Kirkwood Lake and Caples Lake

Because Kirkwood Lake and Caples Lake lie outside the boundaries of the project area, any effects on the wildlife resource at these lakes would be indirect. Such impacts could occur if Kirkwood Lake and/or Caples Lake received an increased amount of visitation from Kirkwood resort visitors or residents. Increased visitation could lead to physical degradation of wildlife habitat as well as disruption of wildlife behavior and possible displacement of individuals. Disturbance to potential mountain yellow-legged frog breeding habitat could occur.

Additional water withdrawals from Caples Lake *beyond what is currently allowed* would not be necessary for the increased snowmaking coverage proposed under the MMDP, thus aquatic wildlife overwintering habitat would not be impacted. KMR's water rights of 500 acre-feet per year would be sufficient to accommodate the proposal (SE Group 2001). There is a potential for amphibians, if present, to become entrained in water withdrawn from Caples Lake or impinged upon by the intake. However, fish screens are installed on the Caples Lake intakes and the pumps are placed 40 feet under the surface of the lake, well away from shoreline areas and potential amphibian habitat. In addition, a mitigation measure is in place under the Kirkwood Water Rights and Snowmaking Project EIR that requires annual monitoring of Caples Lake for mountain yellow-legged frogs. In the event that yellow-legged frogs colonized the impoundment, CDFG and ENF biologists would be notified and appropriately sized protective screening would be installed on the intakes to prevent potential entrainment of frogs into the snowmaking system.. The combination of the placement of the pumps and implementation of this measure would make the chance of entrainment and impingement of amphibians extremely unlikely. A full analysis of the impacts of snowmaking can be found in the *Final EIR and EA for Public Comment: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d).

4.3.2.4.3 Threatened, Endangered, and Sensitive Wildlife Species

The bald eagle, the only federally threatened wildlife species with the potential to occur in the project area, is unlikely to be directly impacted by the Proposed Project. The bald eagle, however, could be indirectly impacted at Caples Lake. Increased visitation to the lake would likely occur and could disrupt foraging behavior of eagles during the summer months. This disruption could lead to modification in feeding behavior or abandonment of this foraging area. Since there are no nesting eagles in the vicinity of the lake or project area, impact to the population is not projected. If eagles were discovered nesting in the project area, appropriate management action would be required by the appropriate land management agency to restrict access and disturbance to the nest site.

The formerly threatened peregrine falcon would not be impacted by the Proposed Project as this species has not been documented in the project area. However, suitable habitat for peregrines does exist in the project area, so if undetected falcons were nesting they could be temporarily disturbed by construction activities, depending on their location.

Sensitive species recorded in the project area may include great gray owl, snowshoe hare, and pine marten. Surveys in 1994 and 1995 did not locate great gray owls (Keyser 1994 and 1995), but the species is a historic resident of the Kirkwood area (CDFG 1998). If present in the project area, a few individuals of these species might be directly or indirectly impacted by implementation of the Proposed Project. Of these species, it is likely that only the great gray owl and marten could incur any long-term consequences, because they are relatively intolerant of human presence. Both great gray owls and marten are more likely to be associated with the adjacent NFS land than with the base area.

Removal of mature forest which provides suitable habitat for several sensitive species including northern goshawk, great gray owl, red fox, wolverine, fisher, and marten could directly impact these species, if present. However, the project area is surrounded by additional habitat suitable for most of these species. For species such as the wolverine, the project area would only encompass a small portion of their home range, so impacts would be somewhat minimized. Direct impacts to habitat through ski run alteration activities could be moderated by glading or thinning trees rather than clearing or grading. This would preserve canopy cover and limit the extent to which forest openings present barriers to travel, both features of particular importance to the pine marten (Buskirk and Ruggiero 1994).

Potentially suitable amphibian and willow flycatcher habitat in Kirkwood Meadow and Kirkwood Creek could be impacted by anglers and other recreationists utilizing these areas. However, a complete trail (the Meadow Trail Nature Walk) encircling the meadow and providing a single, designated crossing is proposed to protect the sensitive meadow ecology and to minimize unauthorized trail-blazing. In addition, KMR and KMPUD will construct additional bridges across Kirkwood Creek at appropriate locations. The bridges, with supporting signage and trail management would deter unauthorized trail blazing and direct hikers, bikers, and horseback riders to use designated trails. Habitat for these species would be protected from grazing impacts through implementation of guidelines in the grazing management plan (see Appendix B). Likewise, habitat would not be impacted by major development, as this would not be allowed within Kirkwood Meadow. However, a small amount of disturbance could occur during the installation of utility lines and present a risk of short-term sedimentation impacts to Kirkwood Creek. Impacts to amphibian habitat could also be created by potential construction-related sedimentation upstream in Kirkwood Creek. One probable indirect impact to sensitive species would be attributable to an increase in the number of people utilizing the on-mountain facilities with greater frequency during winter. This represents an incremental increase in activity in this area. If these recreationists utilize existing trails and ski runs, additional impacts (over existing or baseline conditions) to wildlife overwintering in the areas would be unlikely.

State road right-of-ways are not expected to be impacted in any disproportionate fashion. No sensitive

wildlife species are known to occupy these areas at Kirkwood, and because these zones tend to be heavily disturbed by habitat modification and the presence of traffic, no notable impacts are likely to occur in right-of-ways.

4.3.2.4.4 Level of Significance Before Mitigation

Without mitigation, direct impacts due to any construction activity could be significant. Siting and construction of buildings, construction of lift structures, and expansion of trails without regard to the values associated with Kirkwood's diverse habitats could lead to serious degradation. However, Kirkwood has a number of inherent management practices and mitigation measures in place that preclude a haphazard approach to building. These measures are described below as well as in Kirkwood Resort Master Owners Association CC & R (Cadwalader and Watters 1997) and Design Guidelines (KMR 2001b).

The indirect impacts to wildlife resulting from increased human presence (including pets) could potentially be significant and unavoidable. The presence of more people, and particularly the increased presence of people during summer months, could disproportionately impact sensitive wildlife species, although a broad change in the types of wildlife species that use Kirkwood might be expected as well.

Although the yellow-legged frog and the willow flycatcher have not been documented in the project area, potential habitat is present, and these species have been previously identified in areas near Kirkwood (Hinz 1999; Lehr 2001). If present at the time of project implementation, these species could be significantly impacted by construction-related activities. Because the time line for project buildout extends at least 20 years into the future, one or more threatened or endangered species could attempt to occupy the Kirkwood region. If this occurs, individuals could be significantly impacted, either directly or indirectly.

Deer in the area appear to be fawning along adjacent ridges (Hinz 1999), rather than in the meadow forest ecotone as Roberts (1973) reported. It is therefore unlikely that the Proposed Project would result in direct impacts to the deer herd, though some indirect impacts may occur through loss of foraging habitat and harassment by pets.

Impacts to biodiversity are likely to be less than significant. Habitat in the Kirkwood community is already highly fragmented, and further fragmentation as a result of construction is unlikely to contribute to a decline in biodiversity. While the increase in human presence may disproportionately affect certain species of wildlife, overall such an impact is unlikely to affect biodiversity.

Impacts to wildlife around Kirkwood Lake and Caples Lake due to increased human presence could potentially be significant. This impact could occur either from direct displacement of wildlife due to increased human activity or through degradation of the habitat through overuse.

As mentioned above, numerous inherent mitigation measures are in place to prevent haphazard development which would lead to degradation of habitats in the Kirkwood North area. Therefore, direct impacts to wildlife in Kirkwood North as a result of construction are expected to be less than significant.

Riparian habitat impacts in the Ski-In/Ski-Out area are likely to be less than significant. This issue is discussed in greater detail in the Wetland Resources section of this document.

Impacts due to habitat fragmentation are likely to be less than significant. As indicated above, habitat is already fragmented by base area and ski mountain development within the Kirkwood community. Species sensitive to habitat fragmentation are likely already impacted by past activities.

Impacts to road right-of-ways are likely less than significant. None of the right-of-ways at Kirkwood are known to harbor sensitive wildlife species, and because of proximity to roads, these corridors are already highly disturbed environments.

4.3.2.4.5 Mitigation

KMR has a number of inherent mitigation measures in place in their Design Guidelines (KMR 2001b), which regulate the siting and construction of buildings and infrastructure. These guidelines include consideration of the existing environment and limitations on building dimensions in siting and constructing facilities. KMR also has stringent guidelines for revegetation of disturbed areas, found in the Specific Plan landscape and revegetation guidelines (KMR 1998). These guidelines address issues such as which plant species should be used for revegetation purposes. Details on KMR's existing development guidelines and restrictions can be found in the Specific Plan (KMR 2001a) and the Kirkwood Resort Master Owners Association CC &Rs (Cadwalader and Watters 1997), and Design Guidelines (KMR 2001b) and are

incorporated here by reference. These documents are available for review in the Kirkwood Land Planning office, Kirkwood, CA and the Alpine County Planning Department office, Markleeville, CA.

4.3.2.4.5.1 Increased Human Presence

Mitigation Measure 4.3.2 (a). All dogs will be kept indoors or controlled on a leash.

Mitigation Measure 4.3.2 (b). Expand CC & Rs to include regulations to govern cat ownership, requiring owners to keep all cats indoors unless these pets are also controlled on a leash.

Mitigation Measure 4.3.2 (c). Require household garbage to be stored in wildlife-proof containers prior to pick up.

Mitigation Measure 4.3.2 (d). All pets will be fed inside, and pet food will not be stored or provided to pets where wild animals could gain access.

Mitigation Measure 4.3.2 (e). Implement restrictions to prohibit the feeding of wildlife, except seed feeders for birds and nectar feeders for hummingbirds.

Mitigation Measure 4.3.2 (f). Implement mitigation measures 4.3.3 (a) through 4.3.3 (k) as described in the Wetland Resources section (4.3.3) of this document to avoid or minimize impacts to wetlands and streams. All projects with the potential to impact waters of the U.S., including wetlands, will be reviewed by the COE and the appropriate county and will be designed to avoid and/or minimize impacts to the maximum extent possible.

4.3.2.4.5.2 Impacts to Wildlife at Kirkwood Lake and Caples Lake

Mitigation Measure 4.3.2 (g). KMR will retain a qualified wildlife biologist to survey the basin immediately surrounding Kirkwood and Caples Lakes in early summer *to determine the presence of special-status species identified in this analysis (see Table 4.13) and establish baseline conditions*. After the *initial* survey to establish baseline conditions, surveys will be performed every 3 years for a 6-year period (i.e., two additional surveys *or as determined to be needed by the Forest Service*). The summary results will be submitted within 60 days of the survey completion to the Amador Ranger District. If the wildlife populations or resources appear to be negatively affected, the Forest Service *will* develop management plans designed to mitigate the effects documented by the surveys. *These plans will include specific measures such as trail re-routing, interpretive signing, protective fencing, area closures, and limits on user numbers or seasons of use. They may also call for KMR involvement in the development and implementation of an education program for Kirkwood visitors. The objective of the management plans will be to insure that the pertinent statutory protections extended to special-status species (see Table 4.11) are met.*

4.3.2.4.5.3 Impacts to Endangered, Threatened, or Sensitive Species

Mitigation Measure 4.3.2 (h). The project proponent will employ a qualified biologist to conduct surveys for threatened, endangered, and sensitive wildlife species at Kirkwood prior to individual project construction. Surveys will be conducted within two breeding seasons prior to commencement of individual project construction. These surveys will be completed during the appropriate season addressing species for which suitable habitat exists in the project area. The geographic scope of the surveys should be limited to the area in which direct or indirect impacts could occur. A report outlining results of the surveys will be submitted to the CDFG and to the respective county where construction is to take place within one month of completion of the survey and prior to construction activities. If state listed species are found, a 2081 Permit will be obtained from CDFG. If federally listed threatened or endangered species are found, KMR will enter into consultation with the USFWS to determine the appropriate course of action, including

obtaining an Incidental Take Permit if necessary.

Mitigation Measure 4.3.2 (i). The project proponent will implement mitigation measures 4.3.3 (a) through 4.3.3 (k), and 4.3.4 (d), as suggested in the Wetland Resources and Vegetation Resources sections of this document to minimize impacts to wetlands and riparian areas.

Mitigation Measure 4.3.2 (j). Implement Aquatic Resources mitigation measures 4.3.1 (a) through 4.3.1 (e) to reduce short-term and long-term impacts to Kirkwood Creek and associated aquatic wildlife habitat to less-than-significant levels.

4.3.2.4.6 Level of Significance After Mitigation

With one exception, all impacts to wildlife could be mitigated to less-than-significant levels with the application of inherent restrictions or noted mitigation measures. The one possible exception is impacts associated with increased density of people at Kirkwood, particularly during the summer. The increased number of people is likely to impact wildlife populations in general rather than threatened, endangered, or sensitive wildlife species in particular. This impact is likely to be reflected in a reduction in the types and numbers of species sharing the Kirkwood area. This impact is likely to be restricted to the Kirkwood area, and should not affect wildlife populations on a regional basis.

With the proposed mitigation in place, there would be no other significant impacts to wildlife resources.

4.3.2.5Significant, Unavoidable, Adverse Impacts

As indicated in the preceding paragraph, it is likely that impacts to general wildlife due to increased human presence cannot be successfully mitigated to less-than-significant levels. Otherwise, there would be no significant, unavoidable, adverse impacts to wildlife.

4.3.2.6Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of these cumulative actions would likely interact with the Proposed Project to generate cumulative wildlife effects. While no future development is planned or proposed for the public and private lands surrounding Kirkwood, a continued increase in use of all recreational facilities is likely due to growth and development in South Tahoe and other surrounding communities, and to increasing dispersed recreation in the surrounding area. These trends will likely continue regardless of the proposed Kirkwood development. Once Kirkwood is at full capacity during the summer, it is likely that visitation of NFS lands surrounding the community will increase. Popular recreational areas that would likely receive increased visitation include Kirkwood Lake, Caples Lake, Caples Creek, Silver Lake, South Lake Tahoe, Hope Valley, Lake Margaret, and Woods Lake. Increased visitation of these areas could have an adverse impact on wildlife and wildlife habitat, particularly at Kirkwood Lake because it is within walking distance of Kirkwood. However, as these areas already experience relatively high levels of use, the incremental impact is projected to be minor.

There is also the possibility that recreational use of the upper Truckee watershed, "Meiss Country," and the Mokelumne Wilderness could increase. The Meiss area serves as the only corridor for wildlife migration between the Tahoe basin and the portion of the Eldorado National Forest south of Highway 50. Increased disturbance could put pressure on wildlife species unaccustomed or sensitive to human presence. As these areas are a substantial distance from Kirkwood, the influence of Kirkwood visitors would be minimal. Current and projected visitation at Meiss Country and Mokelumne Wilderness are not known, so potential

impacts to wildlife in these areas are difficult to assess and remain speculative at this time. It is unlikely that implementation of the Proposed Project would result in a significant, cumulative effect.

4.3.3 WETLAND RESOURCES

This section describes the wetland resources in the Kirkwood area and analyzes the potential impacts that could result to wetlands with implementation of the Proposed Project. Where potentially significant impacts are identified, mitigation measures to alleviate these impacts are presented. The level of significance following mitigation, and cumulative impacts are also discussed.

4.3.3.1 Issues

The following issues were identified through public and agency scoping and resource specialist review:

- Potential direct impacts to waters of the U.S., including wetlands.
- Potential indirect impacts to waters of the U.S., particularly streams, from decreased water quality due to sedimentation associated with disturbance in upland areas (including Caples Creek, Kirkwood Creek, Devil's Gate Tract, and the Kirkwood Lake drainage basin).
- The potential for increased flooding as a result of impacts to wetlands and floodplains.

4.3.3.2 Methods

This wetland analysis was based on the studies listed in section 4.3.3.2.4 - Existing Studies and Information. Preliminary wetland surveys delineated wetlands within proposed development areas. All wetland and drainage features were re-surveyed in 2000 and 2001 for recently identified special-status plant and moss species. This amendment survey updated the initial botanical resource survey and analysis through the use of current standards established by the CDFG, the California Native Plant Society (CNPS), and the Forest Service. The survey in 2000 also included a survey for potential jurisdictional wetlands and drainages within and near proposed on-mountain projects. The proposed trail along the perimeter of Kirkwood Meadow was intensively surveyed within a 100-foot-wide corridor. All species were identified in this project area. Botanical surveys of the other potential construction areas included a 50-foot buffer around the design footprint.

Disturbance acreage for each of the development areas in section 4.3.3.4.1 reflect temporary disturbance estimates. This acreage has been further divided into impervious and revegetated categories. Values for the revegetated area are reported below, with the difference from total disturbed area reflecting the building footprint or related impervious surfaces. Although some of the temporary disturbance would be revegetated, it would still alter the native communities and potentially impact wetlands.

4.3.3.2.1 Assumptions

This analysis of potential impacts with implementation of the Proposed Project was based on existing information. The exact location of building footprints and associated site disturbance will be determined on a project-specific basis prior to project permitting (section 4.3.3.4.3). Consequently, existing information gathered for related projects in the same geographic area was assumed to be sufficient to provide adequate analysis.

In developing this analysis of potential impacts to jurisdictional wetlands and other waters of the U.S., it was assumed that wetland areas could generally be avoided during the design phase, thus averting direct impacts. However, linear water features (streams and intermittent streams) would be more difficult to avoid. Development in areas that contain intermittent channels and streams would result in impacts associated

with road crossings. Most building sites would not impact channel systems and would occur primarily in the uplands.

4.3.3.2.2 Significance Criteria

The following criteria were used to identify significant impacts to wetland resources:

- Losses of wetlands, wetland functions and values, or other waters of the U.S. through the placement of dredged or fill material.
- Loss of vegetative cover such that wetland systems and streams would be degraded through siltation.
- Encroachment on the floodplain of streams that would limit the ability to buffer flooding.

4.3.3.2.3 Regulatory Setting

Waters of the U.S. are the broadest class of aquatic systems that receive protection under the federal Clean Water Act. This broad classification includes, among others, the following specific systems: wetlands, streams, lakes, and arroyos. Wetlands are defined as "those areas inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR 328.3, 40 CFR 230.3). Thus, wetlands are areas that have saturated or inundated hydric soils and support wetland vegetation.

Under the Clean Water Act, the Corps of Engineers (COE) has regulatory authority over wetlands and other waters of the U.S. and is charged with protecting these systems. The placement of dredged and fill material in wetlands is prohibited by the Clean Water Act unless prior authorization under Section 404 is obtained.

The California Department of Fish and Game (CDFG) has jurisdictional authority over rivers, streams, and lakes (Fish and Game Code 1600-1607 *in* Cylinder et al. 1995). As part of their authority, the CDFG reviews CEQA analyses when streams or lakes may be impacted. The CDFG typically considers impacts to wetlands and riparian habitats to be significant.

Guidelines for riparian conservation areas, outlined in the *Sierra Nevada Forest Plan Amendment*, are relevant to project elements occurring in the SUP area.

In addition to federal and state regulations, the Central Valley Regional Water Quality Control Board (CVRWQCB) also regulates activities that could affect water quality.

4.3.3.2.4 Existing Studies and Information

The following reports were used to compile the environmental setting description. Four wetland delineations were conducted in the analysis area:

- *Wetland Delineation: Kirkwood Specific Plan Expansion Areas* (Moore Biological Consultants 1997).
- *Wetland Delineation: Kirkwood Master Plan* (Simpson 1995a).
- *Wetland Delineation: Kirkwood Lodge* (Simpson 1995c).
- *Wetland Delineation: East Meadows 2* (Simpson 1995e).

The following reports were used as sources of additional information on local wetland resources:

- *Botanical Resource Survey Report for the Kirkwood Mountain Resort, Base Area Development (Private Lands) Alpine and Amador Counties, CA. Amendment to Initial Botanical Surveys conducted for the Kirkwood Specific Plan* (Dittes 2001).
- Wetland delineation map, Kirkwood Mountain Resort (Moore Biological Consultants 2001).
- *Botanical Resource Survey Report for the Kirkwood Mountain Resort, Amador County, CA. (Phase I Proposed Action Project Sites)* (Jones & Stokes 2000).
- *The Ski-In/Ski-Out Master Plan* (Design Workshop 1998).
- *Draft Supplemental Environmental Impact Report: East Meadows 3 Subdivision in Alpine County CA.* (Simpson 1996a).
- *Technical Appendices B-1 for the Draft Supplemental Environmental Impact Report: East Meadows Phase 3 Subdivision.* (Simpson 1996b).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment, Kirkwood Water Rights and Snowmaking Project.* (Simpson 1995d).
- *Technical Appendices for the Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project.* (Simpson 1995b).

4.3.3.3 Environmental Setting

4.3.3.3.1 Existing Wetland Resources

Approximately 90 acres of wetlands and other waters of the U.S. have been delineated within the potential development areas of the Draft Plan (Simpson 1995a,c,e; Moore Biological Consultants 2001). This acreage includes perennial and intermittent streams, seeps and swales, wet meadows, and open water.

Wetland acreage within the SUP was not formally measured or mapped, but suitable habitat for wetland vegetation was noted during vegetation surveys, and the occurrence of special-status plant species was ascertained. Official delineations have not yet been completed. Intermittent drainages do occur across the mountainside but the associated vegetation communities are typically more xeric because soils are well drained, often containing a lithic layer. Two areas with more mesic soils have been mapped (see Figure 4.2) but in general, soils that could support wetland vegetation are not common.

4.3.3.3.1.1 Perennial and Intermittent Streams

Perennial and intermittent streams within the development area typically have well defined channels characterized by beds and banks with a large fraction of gravels and small cobbles. The width of these features varies depending on the gradient, substrate, and size of the watershed. The streams also vary in the amount of flow and the successional status of adjacent wetlands. Streams that have surface flows for only a brief period during snowmelt or a storm event support limited, if any, adjacent wetlands, while streams with more sustained flows typically support at least a narrow band of riparian wetlands vegetation. Species that grow in these areas include corn lily (*Veratrum californicum*), red fireweed (*Epilobium angustifolium*), and arrow butterweed (*Senecio triangularis*) (Simpson 1995a).

4.3.3.3.1.2 Wet Meadow Wetlands

Wet meadow wetlands occur in areas with high water tables and are often associated with surface streams. Portions of Kirkwood Meadow are the best example of this wetland type. Dominant species include sedges (*Carex* sp.), rushes (*Juncus* sp.), scattered patches of corn lily, and willows (*Salix* sp.) (Simpson 1995a).

4.3.3.3.1.3 Seeps and Swales

Seeps and swales are characterized by many of the same wetland plants previously listed, including corn lily, red fireweed, sedges, rushes, and mountain larkspur (*Delphinium glaucum*) but have different sources of hydrology. Seeps are located in groundwater discharge areas. Depending on the volume of water being discharged, the site may either have generally boggy soils or may actually have surface water present. Swales differ from seeps in that they occur in topographic depressions which collect snowmelt runoff (Simpson 1995a).

4.3.3.3.1.4 Open Water

These features are small ponds that have wetland vegetation around the edges. Lemmon's willow (*Salix lemmonii*) is frequently found around the edge of ponds (Simpson 1995a).

4.3.3.3.2 Development Areas

For the purpose of this analysis, private land at Kirkwood was divided into six geographical areas, described below. Each area has a unique combination of proposed land uses and existing wetland and drainage features. In some cases, the analysis area is composed of several Kirkwood subareas because of the similarity in wetland resources or proposed land uses. The wetland descriptions provided below are based on existing reports, including Simpson (1995a; 1995c; 1995e) and Moore Biological Consultants (1997). Acreage of each of the wetland types by development area is shown in Table 4.14.

4.3.3.3.2.1 Kirkwood North Area

This area, located north of SR 88, is generally steep and rocky. Wetlands are of limited distribution and occur adjacent to Kirkwood Creek on the east side of the area. A wetland/pond complex is located in the western portion of the area. Kirkwood North also contains several small drainages and waters of the U.S., including two that flow toward Kirkwood Creek on the east side of the area.

4.3.3.3.2.2 East Meadows Area

The East Meadows area is up-slope from the existing East Meadows subdivision. The topography of the East Meadows area is steep and wetlands are sparse. A seep exists on the lower boundary, and a number of intermittent streams convey runoff downslope toward Kirkwood Meadow (Simpson 1995a; 1995e).

Table 4.14. Acreage of wetlands and waters of the U.S. in Draft Plan Development Areas.

	Intermittent and Perennial Streams	Wet Meadow Wetlands	Seeps and Swales	Open Water/ Pond	Totals
Kirkwood North	1.2[1]	3.4	0.3	0.2	5.1
East Meadows	0.2	0.2	0.1	0	0.5
West Village	1.0	0	0.6	0	1.6
Ski-in/Ski-out & Timber Creek	1.3	0	3.5	0	4.8
East Village [2]	0.5	0.6	0.3	0	1.4
Kirkwood Meadow	5.8[1]	70.4	0.1	0	76.3

Totals	10.01	74.6	4.9	0.2	**89.7**

* Includes Kirkwood Creek.
[2]Includes Juniper Ridge and the service area.
Source: Simpson (1995a; 1995c; 1995e) and Moore Biological Consultants (1997; 2001).

4.3.3.3.2.3 West Village Area

The Village area is located at the south end of Kirkwood Meadow. The West Village portion is located to the west of Kirkwood Creek and mostly south of Kirkwood Meadows Drive. Terrain in this area is relatively flat, extending to the south end of the meadow and including a narrow strip adjacent to the road on the west side of the meadow. Several waters of the U.S., including Kirkwood Creek and intermittent drainages, traverse this area. Crossings have been placed on some of these drainages, including Kirkwood Creek. In addition, there are a few seeps, particularly where the area adjoins Kirkwood Meadow. The Wetland Delineation Report (Simpson 1995a) originally divided the Village into east and west portions, with wetlands in the East Village accounted for under a category then named "Future Projects". For clarification, this category has been renamed East Village, and also includes Juniper Ridge and the service area (see description below).

4.3.3.3.2.4 Ski-In/Ski-Out and Timber Creek Area

The Ski-In/Ski-Out area is located on the west side of Kirkwood Meadow and includes the Ski-In/Ski-Out North and South subareas. This area consists mostly of steep slopes crossed by a number of intermittent streams. Some of these streams maintain flows during the runoff season, while others maintain flows later into the summer and support adjacent wetlands. There are also a number of seeps throughout the area. A relatively large drainage is located to the north of Ski-in/Ski-out North in an area designated as Open Space. In addition to the initial survey of the Ski-in/Ski-out area, a survey of two additional areas called "Expansion Areas 1 and 2," which total approximately 55 acres, was conducted by Moore Biological Consultants (1997). The Timber Creek Village area lies between the Ski-In/Ski-Out areas. It is relatively flat and is crossed by a number of intermittent streams that convey water to Kirkwood Meadow.

4.3.3.3.2.5 East Village (includes Juniper Ridge and Service Areas)

The East Village is separated from the West Village by Kirkwood Creek. Topography in the East Village and adjacent Juniper Ridge is steeper than that of the West Village due to its location at the base of the mountain slopes. Some intermittent drainages and a portion of Kirkwood Meadow occur in these areas.

The service area lies between Timber Creek Village and Kirkwood Meadow, on the east side of Kirkwood Meadows Drive. This area is relatively flat and is crossed by a number of intermittent streams that convey water to Kirkwood Meadow. There is also a seep area near the road, and a wet meadow where a portion of the Kirkwood Meadow wetlands were included within the boundary.

Wetlands in the Juniper Ridge area and the service area are included in section 4.3.3.3.2.2 East Village because they were originally surveyed at the same time and included under the same category of "Future Projects" in the Wetland Delineation Report (Simpson 1995a).

4.3.3.3.2.6 Kirkwood Meadow

Kirkwood Meadow accounts for 70.4 acres of wet meadow wetlands in the Draft Plan area. The Specific Plan (KMR 2001a) classifies Kirkwood Meadow and a small portion of Kirkwood North in a land use category called Meadow and excludes them from development projects, except for necessary infrastructure installations. A grazing plan has been designed for Kirkwood Meadow to provide protection from grazing impacts and is included in Appendix B.

4.3.3.3.2.7 SUP Area

Kirkwood Mountain Resort operates its on-mountain facilities on 2,129 acres of the Eldorado National Forest under a SUP. As mentioned, this area was also included in the survey efforts done in preparation of the Proposed Project.

4.3.3.4Environmental Impacts

4.3.3.4.1 Development Areas

4.3.3.4.1.1 Kirkwood North Area

Single-family/duplex residential housing and multi-family residential and commercial space are planned for this area. Approximately 23 acres would be impacted by development. Of this, approximately 10.5 acres would be revegetated (see Table 4.5 for complete surface disturbance estimates). Given the spatial distribution of the wetlands in this area, most impacts would be avoidable by designing the proposed development to exclude them. The original development design proposed in the Ski In/Ski Out Master Plan for Kirkwood North projected wetland impacts requiring 1.2 acres of wetland mitigation (Design Workshop 1998). However, the development design for this area has since changed. As depicted in Figure 3.8, the elimination of a parking lot on the eastern edge of Kirkwood North has reduced potential impacts to Kirkwood Creek and its surrounding wetlands to approximately 0.5 acres.

4.3.3.4.1.2 East Meadow Area

Approximately 21 acres in this development area would be impacted by temporary construction disturbance. Of this, approximately 9 acres would be revegetated. If developed as shown in the *East Meadows Phase 3 Supplemental EIR* (Simpson 1996a), impacts to wetlands would be limited to approximately 0.02 acres of temporary impact associated with the installation of the sewer line. The sewer line would also cross three intermittent stream channels and would result in temporary impacts to these systems. Development of Sorrel Court as designed would also result in direct disturbance to up to 0.06 acres of waters of the U.S. Additionally, preparation of four building lots (1, 3, 5, and 15) would result in culvert placement or diverting three drainages, but the actual acreage impacted would depend on the placement of homes and driveways within the building envelopes (Simpson 1996a).

4.3.3.4.1.3 West Village Area

Approximately 19 acres in this development area would be impacted temporarily by construction projects. Of this, 8 acres would be revegetated. Given the spatial arrangement of the wetlands and intermittent streams, it should be possible to site the building envelopes so as to avoid impacting these resources. However, road construction and stream crossings could result in some impacts to perennial and intermittent streams.

4.3.3.4.1.4 Ski-In/Ski-Out and Timber Creek Area

Approximately 40 acres in these development areas would be temporarily impacted by construction of residential and commercial projects. Of this, approximately 16.5 acres would be revegetated. Development plans for these areas have been designed to avoid disturbance to wetlands where possible. Construction of a road network to provide access to the residential building sites would likely result in stream crossings. The Ski-In/Ski-Out Master Plan (Design Workshop 1998) presented the original conceptual development plans for these areas. These plans have been altered and the new conceptual plans appear in Figures 3.7a and b. Impacts to wetlands under the original plans would have required an estimated 3.3 acres of wetland mitigation (Design Workshop 1998). Current plans have greatly reduced the amount of wetlands disturbed, particularly by excluding the drainage between Ski-In/Ski-Out North and West Meadows from development. Wetland impacts would occur primarily as a result of road construction crossing seeps and streams.

4.3.3.4.1.5 East Village, Juniper Ridge, and Service Areas

Approximately 32.9 acres in this development area would be temporarily impacted by development

projects. Of this, 10.1 acres would be revegetated. The Ski-In/Ski-Out Master Plan (Design Workshop 1998) also provided the original conceptual development plan for this area. If built as designed, there would be a requirement to mitigate an estimated 0.9 acres of wetlands.

4.3.3.4.1.6 Kirkwood Meadow

Kirkwood meadow is excluded from development projects, except for necessary infrastructure installations. Temporary impacts from utility line installation would disturb less than one acre in the meadow. The August 2001 vegetation survey included private land encompassing Kirkwood Meadow and lower elevations of the surrounding slopes. It was done to determine whether any newly-listed special status plants, which are primarily wetland species, occur within the vicinity of Kirkwood. No wetland special-status plant species were found. Prior surveys in these same areas also did not find any wetland special-status species.

Grazing practices in Kirkwood Meadow would continue under the guidance of the grazing management plan (see Appendix B). This plan utilizes temporary fencing to exclude grazing near Kirkwood Creek and prohibit the use of the creek as a water source.

4.3.3.4.1.7 SUP Area

A survey of on-mountain areas, including MMDP projects, performed in May 2000 (Jones & Stokes 2000) updated previous survey efforts by incorporating newly identified special-status species and by including projects located within the area managed under a special-use permit (SUP). Since all newly added special-status plant species are generally inhabitants of meadows, seeps, drainages, and other wetlands, these habitats were the focus of this latest survey. The survey found no special-status plant species. However, impacts to wetlands in the vicinity of the Cornice Express chairlift could occur. Several towers are in close proximity to the intermittent drainage that passes under and along the lift alignment. While the tower bases are not located in wetlands, appropriate measures should be taken to control sediment transport to prevent placement of fill in the associated riparian habitats, should any new development or disturbance related to development occur in this area (Dittes 2001).

4.3.3.4.2 Level of Significance Before Mitigation

4.3.3.4.2.1 Potential Direct Impact to Waters of the U.S., Including Wetlands

There would potentially be significant direct impacts to waters of the U.S., including wetlands. Although some of the resort's original plans have been altered resulting in a reduction in wetland impacts, significant impacts could occur in Ski-In/Ski-Out North and South, Timber Creek, the service area, Kirkwood North, East Meadows, and Kirkwood Meadow (KMR 2001a, Design Workshop 1998, Simpson 1996a). Direct impacts to streams could occur in the form of stream crossings.

4.3.3.4.2.2 Potential Indirect Impact to Waters of the U.S., Particularly Streams

There would potentially be significant indirect impacts to waters of the U.S., particularly streams. A complete discussion of sedimentation impacts is included in the Water Resources section of this document. Increases in disturbed and impervious surfaces would result in significant impacts to water quality through inputs of sediment and pollutants in runoff.

4.3.3.4.2.3 The Potential for Increased Flooding as a Result of Impacts to Wetlands and Floodplains

The potential for increased flooding resulting from impacts to wetlands and floodplains would be less than significant . The areal extent of disturbance and impervious surfaces would not be great enough to increase the potential for flooding. No significant amount of development or development related impacts would occur within any floodplains.

4.3.3.4.3 Mitigation

4.3.3.4.3.1 Potential Direct Impact to Waters of the U.S., Including Wetlands

Mitigation Measure 4.3.3 (a). The project proponent will negotiate and abide by an acceptable Streambed Alteration Agreement (Fish and Game Code Section 1603) with CDFG prior to construction of any improvements affecting steambeds.

Mitigation Measure 4.3.3 (b). The project proponent will obtain appropriate permits from the COE prior to any placement of fill in wetlands. The applicant will also comply with the terms and conditions specified in any permits obtained from the COE.

Mitigation Measure 4.3.3 (c). During construction of any utility infrastructure within wetlands, the construction contractor will place sidecast materials in upland areas to minimize impacts as a result of temporary storage. These materials will be used to backfill the trench as soon as possible.

Mitigation Measure 4.3.3 (d). Implement Mitigation Measure 4.1 (c).

Mitigation Measure 4.3.3 (e). In the vicinity of wetlands, the construction contractor will restrict construction equipment, vehicles, and the placement of soil stockpiles to upland sites except for implementation of COE-authorized crossings.

Mitigation Measure 4.3.3 (f). The project proponent will review proposed development plans with the county of jurisdiction or the Forest Service, if in the SUP area, and the COE to ensure that specific projects have been designed to avoid any impacts to wetlands or other waters of the U.S. to the maximum extent practicable. In cases where avoidance is not feasible, such as a road crossing of a linear wetland feature, then the impact should be minimized by making the crossing as narrow as possible and crossing at a narrow point in the wetland.

Mitigation Measure 4.3.3 (g). The project proponent will review proposed stream crossings with the respective counties or the Forest Service, if in the SUP area, and the COE and determine, based on the quality of the stream system and adjacent riparian habitat, which site would be appropriate for bridging.

Mitigation Measure 4.3.3 (h). The project proponent will develop and implement a mitigation plan to replace any wetland losses due to the proposed development. The mitigation plans will be reviewed and approved by the COE and the appropriate counties prior to implementation.

4.3.3.4.3.2 Potential Indirect Impacts to Waters of the U.S., Particularly Streams

Mitigation Measure 4.3.3 (i). Implement Mitigation Measure 4.1 (a).

Mitigation Measure 4.3.3 (j). If on private land, the county with jurisdiction will require a minimum 35-foot buffer of undisturbed vegetation between wetlands, and perennial or intermittent streams with riparian vegetation, and disturbed areas (construction sites), or parking lots or other impervious areas that produce runoff. If in the SUP area, minimum setback requirements outlined for riparian conservation areas in the *Sierra Nevada Forest Plan Amendment* will be required. These include setback requirements of 300 feet for perennial streams and meadows, and 150 feet for seasonally flowing streams.

Mitigation Measure 4.3.3 (k). KMR's landscape and revegetation guidelines (KMR1998) will be followed, and revised if necessary, to limit the use of traditional manicured lawns in landscaping; to limit fertilizer use to direct application to plants installed during revegetation efforts; and to limit the use of herbicides, pesticides, and fungicides by individual property owners to direct applications to control exotic species.

4.3.3.4.4 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts to waters of the U.S., including wetlands.

4.3.3.5Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts to waters of the U.S. were identified in this analysis.

4.3.3.6Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area. As any wetland impacts of the Proposed Project would be confined to the Kirkwood area, and any wetland impacts due to the two cited actions would occur outside the permit area, there is very limited potential for cumulative effects.

4.3.4 VEGETATION RESOURCES

This section describes the existing general vegetation types at Kirkwood and the surrounding SUP area and also lists the special-status plant species that potentially occur. Survey results and an analysis of impacts to vegetation that could occur with implementation of the Proposed Project are included. Where potentially significant impacts are possible, mitigation measures are presented. Cumulative effects to vegetation are also identified.

4.3.4.1 Issues

The following issues were identified through the public and agency scoping and resource specialist review:

- Impacts to special-status plant species.
- Effects on vegetation surrounding Kirkwood Lake, and increased off-site use.
- Potential ecological damage to Kirkwood Lake.
- Impacts to vegetation from construction, including introduction of noxious weeds.
- Impacts to vegetation from development north of the highway.
- Impact to vegetation within state right-of-way zones.

4.3.4.2 Methods

This analysis was based on the studies listed below in section 4.3.4.2.4, Existing Studies and Information. Potential impacts were assessed in terms of the total vegetation disturbance. The acreage of disturbance reported in section 4.3.4.4.1 for vegetation in each of the development areas includes temporary construction disturbance, indicating the total area disturbed, and permanent disturbance, or that portion of the total disturbed area which would change from currently vegetated to impervious (see Table 4.5).

4.3.4.2.1 Assumptions

This analysis of potential impacts that would occur with implementation of the Proposed Project was originally based on existing information. Concerns that the initial species surveys were limited because specific areas were surveyed over a 4-year time period, and that within this time frame the list of special-status species changed, led to the need for more recent survey efforts. To remedy this, an amendment to the botanical surveys of the private land at Kirkwood was added. This amended survey incorporated current standards set by the California Department of Fish and Game (CDFG), the California Native Plant Society (CNPS), and the Forest Service, and included all special-status plant species added to the regional list since the initial surveys (Dittes 2001). Surveys of on-mountain vegetation performed in August 2001 and May 2000 included searches for newly added species. Results of these surveys are included below.

The exact location of most building sites and associated site disturbance has not been determined. Site-specific follow-up surveys will be conducted on a project-specific basis before final project approval is given. This will ensure that when the exact location of a building is determined all species on the site are accounted for prior to ground disturbance (see section 4.3.4.4.4, Mitigation).

4.3.4.2.2 Significance Criteria

The criteria for identifying a significant impact to vegetation resources include the following:

- Impacts to federal- or state-listed Threatened or Endangered species.

- Impacts to rare species listed in the *California Native Plant Society's Rare and Endangered Plants of California* (Skinner and Pavlik 1994), especially impacts that could contribute to the listing of such species under the federal or state Endangered Species Act.

- Loss of vegetative cover through disturbance such that other resources would be substantially affected, i.e., water quality, wildlife habitat, visual resources, etc.

4.3.4.2.3 Regulatory Setting

Plant species listed as Threatened or Endangered under the federal or California Endangered Species Act are protected. Under the federal Endangered Species Act (ESA), it is illegal for any person to, among other things, remove any listed species from areas under federal jurisdiction. While protection for federally listed plant species is generally limited to federal land, protection under the California Endangered Species Act (CESA) extends protection to plant species listed as Threatened or Endangered by the state to private as

well as public lands. In many cases, federally listed species are also state listed. Further, CEQA requires project applicants to disclose, consider, and avoid or reduce significant impacts to rare or endangered species (CNPS 1998). Federal and state-listed threatened, endangered, and rare plants are included on List 1 of the CNPS *Inventory of Rare and Endangered Vascular Plants of California*, as are other species which have not yet been listed but that CNPS believes qualify for listing as rare or endangered under CEQA. List 2, 3, and 4 also include rare species. While species on List 2 may be eligible for state listing, those on List 3 and 4 do not qualify for protection at this time. Species on Lists 1, 2, and 3 should be considered under CEQA, and species on Lists 4 merit consideration (CNPS 1998). If a CEQA project analysis determines that there would be a significant impact to an endangered or rare species, feasible mitigation measures or alternatives, if any exist, must be developed to avoid or reduce that impact defined by CEQA as significant to a less-than-significant level (CNPS 1998).

The term “special-status plant species” may be applied to any species that is legally protected under the state and federal Endangered Species Acts or other regulations, and that are considered sufficiently rare by the scientific community to qualify for such listing (Dittes 2001). Categories include:

- Plants listed or proposed for listing as threatened or endangered under the ESA (50 CFR 17.12 [listed plants] and various notices in the Federal Register [proposed species]);
- Plants that are candidates for possible future listing as threatened or endangered under the ESA (61 FR 40: 7596-7613, February 28,1996);
- Plants listed or proposed for listing by the State of California as threatened or endangered under the ESA (14 CCR 670.5);
- Plants listed as rare or endangered under the California Native Plant Protection Act (CDFG Code, Section 1900 et seq.);
- Plants that meet the definitions of rare or endangered under CEQA (CEQA Guidelines, Section 15380);
- Plants considered by the CNPS to be "rare, threatened, or endangered in California" (Lists 1B and 2 in Skinner and Pavlik 1994);
- Plants that are listed by CNPS as plants about which more information is needed to determine their status and plants of limited distribution (Lists 3 and 4 in Skinner and Pavlik 1994), which may be included as special-status species on the basis of local significance or recent biological information; and
- Plants listed as sensitive by Forest Service Region 5 (Forest Service Manual 2670).

Management objectives contained in the *Sierra Nevada Forest Plan Amendment*, are directly applicable for project elements occurring on portions of the SUP area.

4.3.4.2.4 Existing Studies and Information

The following vegetation reports were used to compile the environmental setting description and/or contain the results of sensitive species surveys:

- Botanical Resource Survey Report for the Kirkwood Mountain Resort, Base Area Development (Private Lands) Alpine and Amador Counties, CA. Amendment to Initial Botanical Surveys

Conducted for the Kirkwood Specific Plan (Dittes 2001).

- Special Vascular Plants, Bryophytes, and Lichens List (CDFG 2001b).
- Wetland delineation map, Kirkwood Mountain Resort (Moore Biological Consultants 2001).
- Botanical Resource Survey Report for the Kirkwood Mountain Resort, Amador County, CA (Phase I Proposed Action Project Sites) (Jones & Stokes 2000).
- Botanical and Sensitive Plant Survey: Kirkwood Ski Area/ Alpine County, CA (Western Botanical Service 1997).
- Botanical and Sensitive Plant Survey for East Meadows 3 Project (Meyer 1996a).
- Botanical and sensitive plant survey for Kirkwood Master Plan: Alpine, Amador, and El Dorado Counties (Meyer 1996b).
- *Draft Supplemental Environmental Impact Report: East Meadows 3 Subdivision in Alpine County, CA.* (Simpson 1996a).
- Technical Appendix B-1 for the Draft Supplemental Environmental Impact Report: East Meadows Phase 3 Subdivision (Simpson 1996b).
- Botanical and Sensitive Plant Survey for the Kirkwood Ski Area (Meyer 1995).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d).
- Technical Appendices for the *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995b).
- Botanical and Sensitive Plant Survey for the Proposed Chair Four Up-Grade and the Thimble Peak and Silver Saddle lifts (Western Botanical Services 1994).

4.3.4.3 Environmental Setting

Within the Proposed Project area, nine community types have been described. These include upper montane coniferous forest; whitebark pine-mountain hemlock forest; Jeffery pine/western juniper; upper subalpine sagebrush scrub; subalpine wet meadow; riparian scrub; ski slopes; rock outcrops, talus, and scree; and disturbed/developed. A description of each of these communities follows, with a list of the dominant species that characterize them.

4.3.4.3.1 Upper Montane Coniferous Forest

The upper montane coniferous forest community type occurs on all aspects within the Kirkwood area and over a wide range of elevations. This community begins at the edge of the Kirkwood Meadow and extends uphill beyond Kirkwood's private land boundary and across the SUP area. Dominant tree species in this vegetation type include lodgepole pine (*Pinus contorta* ssp. *murrayana*), western white pine (*Pinus monticola*), red fir (*Abies magnifica*), and mountain hemlock (*Tsuga mertensiana*). Understory shrub species include mountain gooseberry (*Ribes montigenum*), currant (*Ribes cereum*, *R. viscossisimum*), sagebrush (*Artemesia arbuscula*, ssp.), red elderberry (*Sambucus racemosa*), snowberry (*Symphoricarpus*

rotundifolia), pinemat manzanita (*Arctostaphylos nevadensis*), mountain heather (*Phyllodoce breweri*), creambush (*Holodiscus microphyllus*), and spirea (*Spirea densiflora*). Herbaceous understory species include penstemons (*Penstemon heterodoxus* var. *heterodoxus* and *P. speciosus*), phacelia (*Phacelia hydrohylloides*), pennyroyal (*Monardella odoratissima*), valerian (*Valeriana californica*), aster (*Aster* spp.), fleabane (*Erigeron* sp.), horkelia (*Horkelia fusca*), Andersons' thistle (*Cirsium andersonnii*), goldenbush (*Ericameria suffructicosa*), mule's ears (*Wyethia* spp.), groundsmoke (*Gayophytum diffusum* ssp. *parciflorum*), orthocarpus (*Orthocarpus cuspidatus*), horsemint (*Agastache urticifolia*), kellogia (*Kelloggia gallioides*), sweet cicely (*Ozmorhiza chilensis*), and hawkweed (*Hieracium albiflorum*). Common grasses include western needlegrass (*Acnatherum occidentalis*), mountain brome (*Bromus carinatus*), and onion grass (*Melica stricta*).

4.3.4.3.2 Whitebark Pine-Mountain Hemlock Forest

This community type is found at upper elevations and scattered along ridgetops, and intergrades with the upper montane coniferous forest type. Mountain hemlock and western white pine are dominant and often form krumholz along ridges. Pinemat manzanita is the dominant shrub, often found with singlehead goldenbush (*Ericameria suffruticosa*), creambush, and spirea. Common herbacious plants include buckwheats (*Eriogonum umbellatum* var. *nevadense, E. nudum, E. wrightii*), sticky cinquefoil (*Potentilla glandulosa*), and wide-fruited rockcress (*Arabis platysperma*). Common grasses include squirrel-tail (*Elymus elymoides*), California fescue (*Festuca californica*), and bluegrass (*Poa* spp.).

4.3.4.3.3 Jeffery Pine/ Western Juniper

Within the Proposed Project area boundary, the Jeffrey pine (*Pinus jeffreyi*) and western juniper (*Juniperus occidentalis*) community has a limited distribution, occurring on higher sites with western exposure. The understory in this community includes species such as jewelflower (*Streptanthus tortuosus*), liveforever (*Dudleya cymosa*), gay penstemon (*Penstemon laetus*), and American parsley fern (*Cryptogramma acrostrichoides*). Slopes of the higher peaks also have species from the mountain chaparral community, including huckleberry oak (*Quercus vaccinifolia*), bittercherry (*Prunus emarginata*), and snowbush (*Ceanothus cordulatus*).

4.3.4.3.4 Upper Montane/Subalpine Sagebrush Scrub

The upper montane/subalpine scrub occurs on the west side of the Kirkwood basin above a patch of upper montane coniferous forest, and in patches along middle to upper slopes, often below rock outcrops. Soil in these areas is often rocky and thin. Dominant species include several species of sagebrush, goldenbush, lousewort (*Pedicularis semibarbata*), groundsmoke, annual phlox (*Phlox gracilis*), buckwheats, snowbush, and orthocarpus.

4.3.4.3.5 Subalpine Wet Meadow

The largest wetland system in the Kirkwood area is the Kirkwood Meadow. This system includes a number of streams and channels, some with associated riparian areas and wetlands, that convey water from the surrounding mountains to Caples Creek. This type is also associated with groundwater seeps. Subalpine wet meadows are often dominated by grass and grass-like species growing with varying combinations of herbaceous perennials. Common grasses include meadow barley (*Hordeum brachyantherum*), slender hairgrass (*Deschampsia elongata*), pull-up muhly (*Muhlenbergia filiformis*), and spike trisetum (*Trisetum spicatum*). Grass-like species include sedge (*Carex* spp.), and rushes (*Juncus* spp.). Willow (*Salix eastwoodii, S. lemmonii*) may also be present.

Common herbaceous species may include corn lily (*Veratrum californicum*), fireweed (*Epilobium angustifolium* ssp. *circumvagum*), potentillas (*Cinquefoil* spp.), mountain larkspur (*Delphinium glaucum*), arrowhead butterweed (*Senecio triangularis*), angelica (*Angelica breweri*), yampah (*Perideridia gardnerii*), Coulter's daisy (*Erigeron coulteri*), stickseed (*Hackelia velutina*), streamside bluebells (*Mertensia ciliata*),

blue-pod lupine (*Lupinus polyphyllus*), western bistort (*Polygonum bistorta*), California columbine (*Aquilegia formosa*), paintbrush (*Castilleja miniata*), and meadow rue (*Thalictrum fendleri*).

Subalpine wet meadow is considered a sensitive plant community by the CDFG and the Forest Service, and may be subject to jurisdictional regulation under Section 404 of the Clean Water Act.

4.3.4.3.6 Riparian Scrub

This type is associated with the margins of seasonal and perennial drainages, and with seeps and wet meadow margins. Shrubby willows dominate in this community, including Lemmon's willow, Sierra willow, and Scouler's willow (*Salix scouleriana*). Quaking aspen (*Populus tremuloides*) and mountain alder (*Alnus incana* ssp. *tenuifolia*) also occasionally occur here. The herbaceous understory is similar to that of the wet meadow.

Riparian scrub is considered a sensitive plant community by the CDFG and the Forest Service.

4.3.4.3.7 Rock Outcrops, Talus, and Scree

These areas are sparsely vegetated habitats located along the upper slopes and ridges of the study area. Soils are generally poorly developed, well-drained sandy to rocky types. Shrubby species include spirea, white-stemmed goldenbush (*Ericameria discoidea*), western ageratina, and low sagebrush. Other species may include willowherb (*Epilobium obcordatum*), alumroot (*Huechera* sp.), penstemons, and American parsley fern. The more exposed ridgetops may support Wright's buckwheat, sulphur-flowered buckwheat, wooly sunflower (*Eriophyllum lanatum* var. *integrifolium*), pussytoes *(Antennaria media*), and sandwort (*Arenaria* spp.).

4.3.4.3.8 Ski Slopes

Construction of the Kirkwood ski area has resulted in the conversion of forests and meadows to ski slopes. These disturbed areas are vegetated by a community of introduced and native species including intermediate wheatgrass (*Elymus intermedia*), melica (*Melica harfordii*), timothy (*Phleum pratense*), squirreltail, yarrow (*Achillea lanulosa*), pussytoes, wandering daisy (*Erigerion peregrinus*), lupine (*Lupinus lepidus*), peppergrass (*Lepidium densiflorum*), asters, buckwheats, cinquefoils, and sedges.

4.3.4.3.9 Disturbed/Developed

In addition to ski slopes, other areas have been disturbed by human activities including logging, and construction of streets and access roads, ski area facilities, and residential and commercial development. Areas typed as disturbed/developed have often experienced a higher degree of disturbance than ski slopes, and these sites are either unvegetated or vegetated with weedy non-native species, including yellow sweet clover (*Melilotus officianalis*), and peppergrass.

4.3.4.3.10 Threatened, Endangered, Sensitive, and Proposed-Listing Plant Species

Special-status plant species, including federal and state listed or proposed species, rare species, Forest Service Sensitive, or species with otherwise limited distribution, as identified by the CNPS, were initially identified by contacting the USFWS (USFWS 1998), the Forest Service, and consulting the California Natural Diversity Database (CDFG 1998; 2001b; 2001c) and the CNPS's Rare and Endangered Vascular Plants of California (Skinner and Pavlik 1994). Existing studies that had previously analyzed the same geographical area were also reviewed. These studies are listed in section 4.3.4.2.4. Based on these resources, 33 special-status plant species were identified that could potentially occur in the Kirkwood area (Table 4.15), and 25 were identified with the potential to specifically occur in on-mountain (Jones and Stokes 2000).

Since initial botanical surveys of the project area were conducted (Meyer 1995, 1996a, 1996b, Western

Botanical Service 1994 and 1997), several species of vascular plants and two special-status moss species with potential habitat in the study area were added to the regional list of special-status plant species (Dittes 2001).

As noted previously, a number of initial surveys were conducted within the Kirkwood area over a period of 4 years. These surveys identified occurrences of two sensitive plant species. Hidden petal campion (*Silene invisa*) was identified in two development areas on the west side of Kirkwood Meadow (Western Botanical 1997, Meyer 1996b, Simpson 1995b). Fourteen stands ranging in size from 1 to 200 flowering stems were located within and along the edge of the upper montane coniferous forest community type. The Biological Assessment also reports the occurrence of Cusick's speedwell (*Veronica cusickii*) in the Kirkwood area (Western Botanical 1997, Simpson 1995b). Up to 12,000 individuals of this species have been reported.

One population of Whitney's locoweed (*Astragalus whitneyi* var. *lenophyllus*), comprised of approximately 1,000 individuals, was located in the study area (Jones and Stokes 2000). The population is approximately 400 linear feet from the proposed ski patrol hut on Covered Wagon Peak and continues down along the proposed Covered Wagon chairlift alignment from around 9,560 to 9,400 feet. This perennial herb is associated with the rock outcrop and scree habitat. It is on the Eldorado National Forest (ENF) watch list, but is not listed with the CNPS or the CDFG.

Morphological intermediates of alpine dusty maidens (*Chaenactis douglasii* var. *alpina*) and common dusty maidens (*C. douglasii* var. *douglasii*) were also found in the project area (Western Botanical Services 1994; Jones and Stokes 2000). Sites were scattered along the sparsely vegetated rock outcrops and scree slopes in several locations, including the proposed Caples Crest Restaurant site, and along the ridge between the proposed restaurant and Thunder Saddle, between 8,600 to 8,950 feet.

Alpine dusty maidens are known to intergrade at their lower elevation limit (9,300 feet) with the common variety. Morphological characteristics separate the two, with alpine dusty maidens having a scapose to matted habit and 1-2 heads per stem. Plants of this stature were observed, but they appeared to be small individuals in patches of larger, more caulescent plants that had up to six or more flower heads per stem. Alpine dusty maidens are on the ENF Special Interest List and on CNPS's List 2.

The additional special-status plant species added to the list of species potentially occurring in the Kirkwood area include several moonwort ferns (*Botrychium ascendens, B. crenulatum, B. lineare, B. lunaria, B. minganense, B. montanum, B. pinnatum, and B. virginianum*), subalpine fireweed (*Epilobium howellii*), and two species of moss (*Meesia triquetra*, and *M. uliginosa*). No moss surveys had been conducted during the course of previous surveys. None of these additional species were found during recent surveys (Dittes 2001).

No other special-status plant species are known to occur in the Kirkwood area.

Table 4.15. Special-status Plant Species Known From the Region or With Potential to Occur at the Kirkwood Mountain Resort Study Area, Amador, Alpine, and El Dorado County, California. (From Dittes 2001; Meyer 1996; Western Botanical 1997; and Taylor 2002).

Common Name (*Scientific Name*)	**Status[1] Federal/State/CNPS/USFS**	**Distribution**	**Habitat Requirements**	**Occurrer**
Mountain bent grass *Agrostis humilis*	–/–/2/--	Information not currently available.	Information not currently available.	Not enco
Beautiful pussytoes *Antennaria pulchella*	--/--/4/--	Known from Alpine, El Dorado, Fresno, Inyo, Mono, Tulare and Tuolumne Counties; also in Nevada.	Stream margins, snow basins, ridges and meadows in alpine boulder and rock field habitats (9,180-12,130 feet elevation).	Not enco
Carson Range rock-cress *Arabis rigidissima* var. *demota*	–/–/1B/WL LTBMU sensitive species.	Known from Washoe County, Nevada. Two occurrences in California near Martis Peak.	Openings from 7,500-8,500 feet elevation.	Not enco
Whitney's locoweed *Astragalus whitneyi* var. *lenophyllus*	--/--/4/WL ENF special interest species.	Known from scattered locations in northern Sierra Nevada Range.	Open rocky and gravelly slopes and ridges in subalpine to alpine habitats. 8,670-10,000 feet elevation.	Found in Covered
Sierra bolandra *Bolandra californica*	--/--/4/WL	Known from Alpine, Amador, Calaveras, El Dorado, Mariposa, Stanislaus and Tuolumne counties.	Moist rocky crevices and wet cliffs in lower and upper coniferous forest (above 6,550 feet elevation).	Not enco
Moonwort species ***Botrychium ascendens*, *B. crenulatum*, *B. lineare*, *B. lunaria, B.minganense, B. montanum*, *B. pinnatum, and B. virginianum***	SC/--/2/SS ENF sensitive species (in bold).	Known in California from from Butte, El Dorado and Tehama Counties; also in Nevada and Oregon.	Edges of bogs, seeps, wet meadows and other moist habitats in montane coniferous forest (4,900- 11,150 feet elevation).	Not enco
Davy's sedge *Carex davyi*	--/--/4/--	Known from Alpine, Amador, El Dorado, Nevada, Placer, and Tuolumne counties.	Moist meadows in upper coniferous forest (4,900-10,490 feet elevation).	Not enco
Liddon's sedge *Carex petasata*	–/--/2/--	Known from Alpine, Lassen, Mono, and Modoc Counties; also in Oregon.	Dry to wet meadows and grasslands in coniferous forests (1,965-10,450 feet elevation).	Not enco
Alpine dusty maidens *Chaenactis douglasii* var. *alpina*	--/--/2/-- ENF special interest species.	Known in California from Alpine, El Dorado, Inyo, Siskiyou and Tuolumne Counties; also in Nevada and Oregon.	Subalpine to alpine boulder, rock and gravel fields, usually granitic parent material (9,800-11,150 feet elevation).	Not enco intermedi encounte
Fell-fields claytonia *Claytonia megarhiza*	--/--/2/--	Known from Alpine, Mono, Modoc, Mariposa, Nevada and Tuolumne Counties; also in Oregon.	Rocky areas in subalpine coniferous forest and alpine boulder and rock fields (8,520-10,820 feet elevation).	Not enco
Great Basin claytonia *Claytonia umbellata*	--/--/2/--	Known from Alpine, Lassen, Mono, Modoc and Siskiyou Counties; also in Nevada and Oregon.	Talus and rocky ridges and slopes and crevices in alpine boulder and rock fields and subalpine coniferous forest (6,220-11,470 feet elevation).	Not enco
Subalpine cryptantha *Cryptantha crymophila*	--/--/1B/WL	Known from Alpine, El Dorado and Tuolumne counties.	Open rocky to gravelly slopes and ridges in subalpine coniferous forest and alpine areas, volcanic substrates (8,500-10,490 feet elevation).	Not enco
Mountain lady's slipper *Cypripidium montanum*	--/--/4/SS ENF sensitive species.	Known in California from Del Norte, Humboldt, Madera, Mendocino, Modoc, Mariposa, Plumas, Sierra, Siskiyou, San Mateo, Sonoma, Tehama, Trinity and Tuolumne Counties; also in Oregon and Washington.	Moist areas, usually riparian corridors in mixed evergreen and montane coniferous forest (700-7,215 feet elevation).	Not enco

Tahoe draba *Draba asterophora* var. *asterophora*	--/--/1B/SS ENF/LTBMU sensitive species.	Known in California from Alpine, El Dorado, Mono and Tuolumne counties; also in Nevada.	Alpine boulder and rock fields and rocky areas and outcrops in subalpine coniferous forest (above 8,196 feet elevation).	Not enco
Cup Lake draba *Draba asterophora* var. *macrocarpa*	SC/--/1B/SS ENF/LTBMU sensitive species.	Known only from El Dorado County.	Rock crevices in subalpine coniferous forest (above 8,196 feet elevation).	Not enco
Subalpine fireweed *Epilobium howellii*	--/--/1B/SS	Known in California from Fresno, Mono and in Sierra Counties; expected in El Dorado County.	Wet meadows, seeps and other moist habitats in subalpine coniferous forest (2,000-2,700 meters elevation).	Not enco and not k County.
Oregon fireweed *Epilobium oreganum*	--/--/1B/--	Known in California from Del Norte, El Dorado, Humboldt, Mendocino, Shasta, Siskiyou, Tehama and Trinity Counties; also in Oregon.	Bogs, fens streamsides and other mesic habitats in montane coniferous forest (up to 7,200 feet elevation in Jepson Manual).	Not enco
Brown-margined buckwheat *Eriogonum ovalifolium* var. *eximium*	--/--/4/--	Known from Alpine, Eldorado and Nevada counties.	Granitic sandy areas in alpine boulder and rock fields and subalpine coniferous forest (5,900-11,145 feet elevation).	Not enco
Donner Pass buckwheat *Eriogonum umbellatum* var. *torreyanum*	–/–/1B/WL	Known from Sierra, Nevada, and Placer counties. Endemic to Tahoe National Forest.	Rocky meadows, outcrops, unstable soils; metamorphic or volcanic breccia (6,000 - 8,000 feet elevation).	Not enco
Plumas ivesia *Ivesia sericoleuca*	–/–/1B/WL	Information not currently available.	Eastside meadows from 4,500 - 7,500 feet elevation.	Not enco
Center basin rush *Juncus hemiendytus* var. *abjectus*	–/–/4/WL	Information not currently available.	Information not currently available.	Not enco
Long-petaled lewisia *Lewisia longipetala*	–/--/1B/SS	Known from El Dorado, Fresno, Nevada and Placer counties.	Moist rocky areas in subalpine coniferous forest and alpine and boulder rockfields (8,196-9,180 feet elevation).	Not enco
Yosemite Madia *Madia yosemitiana*	--/--/3/--	Known from Amador, Fresno, Mariposa, Tulare and Tuolumne counties.	Grassy slopes and meadows in lower montane coniferous forest (3,934-7,550 feet elevation).	Not enco
Cut-leaved monkeyflower *Mimulus laciniatus*	--/--/4/--	Known from Amador, Butte, Fresno, Madera, Mariposa, Plumas, Tulare and Tuolumne counties.	Moist areas on granitic substrates In lower and upper coniferous forest (higher than 2,950 feet elevation).	Not enco
Sierra podistera *Podistera nevadensis*	--/--/4/--	Known from Alpine, El Dorado, Mono, Placer and Tuolmne counties.	Granitic gravel, scree and creivices above timberline in alpine boulder and rock fields (9,835 -13,114 feet elevation).	Not enco
Kruckeberg's sword-fern *Polystichum kruckebergii*	--/--/4/--	Known from Alpine, Butte, Plumas, San Bernardino, Shasta, Sierra, Siskiyou, and Tuolumne counties; also in Idaho and Oregon.	Generally shaded and moist rocky ledges and cliffs in upper and subalpine coniferous forest (6,880-10,400 feet elevation).	Not enco
Holly fern *Polystichum lonchitis*	--/--/3/--	Known from Alpine, El Dorado, Plumas and Siskiyou counties; also in Arizona, Idaho, Nevada, Oregon and Washington.	Generally shaded and moist granitic or limestone ledges and rock outcrops in subalpine and upper coniferous forests	Not enco

			(5,900-8,525 feet elevation).	
Tahoe yellow cress *Rorippa subumbellata*	C/E/1B/-- LTBMU sensitive species.	Lake Tahoe shores only.	Endemic to sandy beaches of Lake Tahoe. Well-drained sandy substrate.	Not enco
Water bulrush *Scirpus subterminalis*	--/--/2/--	Known in California from Butte, Del Norte, El Dorado, Humboldt, Plumas and Tehama Counties; also in Idaho and Oregon.	Margins of montane lakes and freshwater marshes (2,400-7,380 feet elevation).	Not enco
Hidden petaled campion *Silene invisa*	–/–/4/WL (Delisted from sensitive status in 1999.)	Known on the Plumas and Eldorado National Forests.	Edges of red fir forests; along streams, edges of meadows. Northerly and easterly aspects.	Found in Out deve 1996b).
Tahoe tonestus *Tonestus eximius*	--/--/4/--	Known from Alpine, Amador and Inyo Counties; also in Nevada.	Granitic substrates in alpine habitats and subalpine coniferous forest (8,195-10,820 feet elevation).	Not enco
Cusick's speedwell *Veronica cusickii*	--/--/4/-- Proposed for ENF watch list	Known in California from Alpine, Amador, Madera, Mariposa, Placer, Sierra and Tuolummne Counties; also in Oregon and Washington	Alpine boulder and rock fields, meadows and other openings in subalpine coniferous forest and upper montane coniferous forest (up to 9,840 feet elevation)	Found in Ski Area 1997; Sir

[1] Status- Federal: E- endangered T- threatened C- candidate; State: S1, S2, S3, S4, S5 CNPS: 1B - rare, threatened, or endangered in California and el
or endangered in California but are more common elsewhere; 3 - species about which there is insufficient information to assign them to one of the oth
not rare, threatened, or endangered, but are of limited distribution. USFS: SS- sensitive species WL- watch list (includes species of concern).
ENF- Eldorado National Forest; LTBMU- Lake Tahoe Basin Management Unit.
Source: Western Botanical 1997 (Table 1); CDFG Natural Diversity Database 2001.

4.3.4.4 Environmental Impacts

4.3.4.4.1 Vegetation Communities

Implementation of the Proposed Project would result in general impacts to the existing vegetation communities at Kirkwood. Table 4.5 (in section 4.1) shows the acreage of disturbance in each of the development areas. Based on the analysis of the Proposed Project, a total of approximately 408 acres would be impacted during construction. Approximately 304 acres of the total disturbance would be revegetated once construction is completed. Approximately 104 acres would be converted to impervious surfaces, which include buildings and pavement. Although some of the temporary disturbance would be revegetated, it would alter the native plant communities and increase the risk of noxious weed invasion, and could potentially impact special-status plants.

Vegetation disturbance associated with the Draft Plan primarily consists of clearing areas for building pads or roads. Of the 146 acres of ground disturbed during construction activities of the Draft Plan, 85 acres would be converted to impervious surfaces. The remaining 60 acres would be revegetated. Disturbance area associated with the WWTP upgrade (0.01 acre) is included in disturbance estimates for the Draft Plan.

Vegetation disturbance associated with the MMDP primarily consists of clearing for ski trails. Approximately 200 acres of on-mountain area would be cleared of large vegetation and revegetated into the ski slope vegetation type, which would be composed of native grasses. Installation of snowmaking lines would require an initial disturbance of approximately 14 acres, which would also be revegetated. Construction of multi-use trails would require 18 acres of vegetation clearing that would not be revegetated and would become compacted and considered impervious. On-mountain structures would require clearing of approximately 0.5 acre, of which 0.3 would be converted to impervious surface. Lift installation would disturb 7.1 acres, and would leave approximately 0.5 acre as impervious and the remaining area revegetated like the existing ski slopes.

In the vicinity of the Cornice Express chairlift, several towers are located in close proximity to the intermittent drainage that passes under and along the lift alignment. Should any construction occur in this area, or should construction traffic traverse this area, appropriate measures should be taken to reduce impacts to the associated riparian habitats (Dittes 2001).

Implementation of the Proposed Project would not have any direct effect on the vegetation or ecology of Kirkwood Lake, Caples Lake, or the adjacent wilderness area. However, the potential for noxious weed invasion and spread into these areas is a concern. Also, associated increases in the visitor and resident population could indirectly impact vegetation, through vegetation trampling, wildflower gathering, or other activities associated with increased numbers of people. Impacts to vegetation in state right-of-way zones would be limited to those zones associated with providing access to the Kirkwood North area.

4.3.4.4.2 Threatened, Endangered, Sensitive, and Special-status Species

In addition to general vegetation impacts, special-status plant species that occur in the Kirkwood area could be impacted as well. Since the exact footprints of the proposed elements have not been determined, it is not possible to specifically quantify the extent of such impacts in this analysis. The population of hidden petaled campion occurring in an area proposed for Ski-In/Ski-Out development has a high probability of being impacted. However, potential impacts to this species would not be as severe, as it was delisted from

the California sensitive list to the ENF watch list as a special interest species. Another species, Cusick's speedwell, could also be impacted. This species is listed as level 4 on the CNPS list. Because up to 12,000 individuals of this species were found throughout its habitat range at Kirkwood, project-specific surveys prior to ground-breaking and project redesign, if necessary, should reduce or prevent negative impacts.

Impacts could occur to portions of the Whitney's locoweed population due to construction activities associated with the Covered Wagon chairlift and ski patrol hut. This is a level 4 species on the CNPS list and an ENF special interest species.

Although the dusty maidens found in the project area do not appear to belong to the variety *alpina*, construction of the Caples Crest Restaurant and the Lookout Vista lift may result in direct impacts to individuals.

4.3.4.4.3 Level of Significance Before Mitigation

4.3.4.4.3.1 Vegetation Communities

Impacts to vegetation communities could be significant.

4.3.4.4.3.2 Threatened, Endangered, and Sensitive, and Special-status Species

Impacts to three special-status plant species could be significant. No impacts would occur to any plants listed under the federal or state endangered species acts.

4.3.4.4.4 Mitigation

4.3.4.4.4.1 Vegetation Communities

Mitigation Measure 4.3.4 (a). KMR will follow the landscape and revegetation guidelines (KMR 1998), unless an item is specifically updated by requirements of the noxious weed control plan (see below).

Mitigation Measure 4.3.4 (b). KMR will implement the noxious weed control plan (see Appendix B) prior to construction of any approved elements of the Proposed Project. The plan addresses weed issues of concern through measures such as requiring the use of approved, native seed, weed-free hay, and construction practices such as the cleaning of residual from construction equipment transported from other areas prior to use at Kirkwood. As under Mitigation Measure 4.3.4(a), KMR will utilize current and approved seed mixes and revegetation techniques, outlined in the landscape and revegetation guidelines (KMR 1998), except for specifically updated guidelines, as follows:

- Use of native grasses only is strongly recommended. This would change the seed mix #1 in the landscape and revegetation guidelines by excluding the use of *Dactylis glomerata* (orchard grass).

- As outlined under the ENF Seed, Mulch, and Fertilizer Prescriptions (Forest Service 2000), rice straw, (local) native grass straw, or pine needle mulch (if certified to be from a non-infected area) may be used in place of certified weed-free hay, pending development of the California certification program.

- Use of quick-release, inorganic fertilizers should be avoided, as their use tends to favor establishment of exotic weeds and grasses (Forest Service 2000).

Mitigation Measure 4.3.4 (c). KMR will retain the services of a California Registered Professional Forester to assess forest conditions and meet the requirements for submitting timber harvesting plans.

4.3.4.4.4.2 Threatened, Endangered, and Sensitive, and Special-status Species

Mitigation Measure 4.3.4 (d). KMR will obtain the services of a qualified botanist to conduct preconstruction surveys for special-status plant species if individuals are known to potentially occur in the area of proposed disturbance. A report outlining results of the surveys will be submitted to the respective county where construction is to take place within one month of completion of the survey and prior to construction activities. If sensitive species are found, construction envelopes should be redesigned (if feasible) to avoid the populations of sensitive plants. If federally listed threatened or endangered species are found, the project proponent or land management agency, as appropriate, will enter into consultation with the USFWS.

Mitigation Measure 4.3.4 (e). Implement recommendations to minimize or eliminate impacts to special-status species, as cited in the botanical survey report (Jones and Stokes 2000), which include: using a helicopter lift to transport equipment and supplies, using stakes and flagging to carefully delineate and restrict the construction area, and notifying construction crews of the presence of the sensitive biological resource.

4.3.4.4.5 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts to vegetation.

4.3.4.5 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts to vegetation were identified.

4.3.4.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area. As any vegetation impacts of the Proposed Project would be confined to the Kirkwood area, and any vegetation impacts due to the two cited actions would occur outside the permit area, there is very limited potential for cumulative effects.

4.4 AIR QUALITY

This section discusses potential air quality impacts expected from implementation of the Proposed Project. Sources for potential impacts include traffic, construction activities and the associated increase in trucks, the addition of diesel generators at the wastewater treatment plant, woodburning fireplaces and stoves, and

expansion of the Mountain Utilities (MU) powerplant.

4.4.1 ISSUES

The following air quality issues were identified during scoping:

- Increase in carbon monoxide (CO) from construction vehicles and the additional vehicles associated with buildout populations.

- Increase in particulate matter (PM_{10}) emissions resulting from wood burning fireplaces and stoves, and from diesel-powered generators.

- Increase in sulfur and nitrogen oxides (SO_x and NO_x) from the increased size of the MU powerplant.

- Increase in regional haze from woodburning fireplaces and stoves, construction activities, vehicular traffic, and diesel generators at the MU powerplant and the Kirkwood Meadows Public Utilities District (KMPUD) wastewater treatment facility.

4.4.2 METHODS

This section is based on information contained in Ashworth Leininger Group's (ALG) *Air Quality Modeling Technical Attachment for the Kirkwood Expansion Project* (ALG 1999). Additional information was taken from CEQA findings in the *Final EIR and EA: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d). ALG also performed air quality evaluations for the diesel generator installed in 1999 by KMPUD (ALG 2000), and for the proposed additional KMPUD generator (ALG 2001). This project was conducted in accordance with the applicable regulatory agencies.

The ALG report and memos contained modeling results of the potential air quality impacts from increases in CO, NO_x, PM_{10}, and SO_x levels from the MU powerplant, the KMPUD facility, wood burning, and traffic. Impacts on regional haze were also assessed. More detailed information regarding methods used in this assessment are described below.

4.4.2.1 Significance Criteria

The federal and state Clean Air Acts establish ambient standards for air pollutants to protect human health and welfare (Table 4.16). The federal Clean Air Act (40 CFR 51) also establishes standards for the Prevention of Significant Deterioration (PSD) of air quality (Table 4.17). PSD standards are most stringent for areas designated Class 1, which include the Mokelumne Wilderness near the project site.

Air pollution regulations are administered by the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (ARB), and local Air Pollution Control Districts (APCDs). APCDs, which can encompass one or more counties, enforce local air quality rules, and conduct local air quality planning.

Significance criteria used are the state and federal ambient air quality standards (AAQS). If there is both a national and state AAQS for the same pollutant and average period, then the more stringent of the two is applied. The Great Basin Unified Air Pollution Control District (GBUAPCD) has established cancer risk factors for particulate found in diesel exhaust. *However, Alpine County has determined that the standard (cancer risk of less than or equal to ten in one million) is not intended for use as, and does not provide a useful criterion for determining significance under CEQA. This is because the GBUAPCD standard assumes exposures that are worst-case scenarios and, thus, are extremely unlikely to actually occur. Therefore, the standard is not an appropriate threshold of significance under CEQA. The KMPUD diesel generators were evaluated against the federal and state standards, and the GBUAPCD guidelines were instrumental in mitigation design. The County is including mitigation that will ensure that the Proposed Project's emissions will not exceed the GBUAPCD standard.*

Table 4.16. Federal and state ambient air quality standards.

Pollutant	Averaging Time	Federal Primary Standard	California Standard
Carbon Monoxide (CO)	1-hour	35.0 ppm (40,000[a])	20.0 ppm (23,000)
	8-hour	9.00 ppm (1,000)	9.00 ppm
Nitrogen Dioxide (NO_2)	1-hour	- -	0.25 ppm (470)
	Annual	0.05 ppm (100)	- -
Sulfur Dioxide (SO_2)	1-hour	- -	0.25 ppm (655)
	24-hour	0.14 ppm (365)	0.04 ppm (105)
	Annual	0.03 ppm (80)	- -
PM_{10}	24-hour	150 µg/m^3	50 µg/m^3
	Annual	50 µg/m^3	30 µg/m^3
Ozone (O_3)	1-hour	0.12 ppm (235)	0.09 ppm (180)
Lead (Pb)	Quarterly	1.5	- -

[a] Values in parentheses are in micrograms per cubic meter (µg/m^3).

Table 4.17. PSD increments and significant impact levels (µg/m^3).

Pollutant	Averaging Time	PSD I	PSD II	Significance Level

Sulphur Dioxide (SO_2)	Annual	2	20	1
	24-hour	5	91	5
	3-hour	25	512	25
PM_{10}	Annual	4	17	1
	24-hour	8	30	5
Nitrogen Dioxide (NO_2)	Annual	2.5	25	1
Carbon Monoxide (CO)	8-hour	--	--	500
	1-hour	--	--	2000

4.4.2.2Regulatory Setting

Kirkwood is located within the Mountain Counties and the Great Basin Valley air basins. This region is subject to regulations implemented by the EPA, California ARB, and local APCDs. Regulations enforced by these agencies include emission limitations and equipment mitigation specifications for particular types of activities, emission calculation methods for mobile and stationary sources, and emission dispersion models for assessing the impact of project emissions on ambient air quality and human health.

The project site is located within Alpine, Amador, and El Dorado Counties. Alpine County is within the jurisdiction of the GBUAPCD, which also includes Mono and Inyo Counties. Amador County is within the jurisdiction of the Amador County APCD, while El Dorado County is regulated by the El Dorado County APCD. Amador County APCD and El Dorado County APCD are two of seven APCDs in the Mountain Counties air basin.

All of Alpine County is designated by the state as a non-attainment area for PM_{10} and is either in attainment of or unclassified for the remaining ambient air pollutant standards. All of Amador County is labeled by the state as a non-attainment area for ozone and in attainment or unclassified for other pollutant standards. All of El Dorado County is classified by the state as a non-attainment area for ozone and PM_{10}, and is in attainment for other pollutant standards. A summary of federal and state designations is shown in Table 4.18.

The project area lies in a Class II area with regard to PSD. However, the nearby Mokelumne Wilderness, approximately 0.4 miles to the east (at the closest point), is designated as a Class I area.

Table 4.18. County APCD federal and state air quality attainment status.

	Alpine County		**Amador County**		**El Dorado County**	
	Federal	**State**	**Federal**	**State**	**Federal**	**State**
PM_{10}	U/A	NA	U/A	U	U/A	NA
CO	U/A	U	U/A	U	U/A	U
NO_2	A	A	A	A	A	A

Ozone	U	U	U	NA	U	NA
SO_2	A	A	A	A	A	A

U = Unclassified , NA = Non-attainment, U/A = Unclassified/attainment, A = Attainment

4.4.2.3 Existing Studies and Information

The following documents were used in the analysis of air quality:

- *Air Quality Modeling Technical Attachment for the Kirkwood Expansion Project* (ALG 1999).
- Ashworth Leininger Group memorandum regarding modeling of KMPUD generator, May 16. (ALG 2000).
- Ashworth Leininger Group memorandum regarding modeling of KMPUD generators, May 8. (ALG 2001).
- CEQA findings in *Final EIR and EA for Public Comment: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d).

4.4.3 Environmental Setting

The Kirkwood Valley is oriented north-northwest to south-southeast and is approximately 9,800 feet wide and 6,600 feet long. It is surrounded to the east, south, and west by steep terrain and mountain peaks. Elevations within the area covered by the Draft Plan range from 7,675 to 8,025 feet above mean sea level. The mountainous topography surrounding Kirkwood influences wind direction through the valley and affects distribution of rain and snowfall. While local winds can be quite variable due to topography, they tend to flow north along Kirkwood Creek for the majority of the year. Air movement is also characterized by a complex valley-mountain, diurnal circulation. Inversions are shallow due to the excellent air drainage conditions created by the steep westward sloping valleys at the north end of Kirkwood Meadow. Wind speeds average 2.5 to 5 meters per second while speeds in excess of 65 meters per second have been observed. Winter storms are frequent, bringing an average annual snowfall of approximately 400 inches. Thunderstorms occur on average less than 10 times per year. Summer temperatures range from average daytime highs of 68° F to average nighttime lows of 41° F, while winter temperatures range from average daytime highs of 38° F to average nighttime lows of 25° F (KMR 1998, SECOR 1997a).

A particulate monitoring station *was* located at the southeast end of Kirkwood Meadow, but it *was removed after 2 years of service. It did* not provide a true background value because *of its location* in an area that is directly impacted by emissions from the existing powerplant and wood-burning activity. *However, values which were obtained from it while it was operating are considered to* provide a useful measure of the total concentrations of gaseous pollutants. A monitoring station for ozone and carbon monoxide is located in Jackson in Amador County. This station receives higher concentrations of ozone from the urban valleys of

Sacramento than would be expected to reach the Kirkwood Valley. No air quality monitoring stations are located in Alpine County.

In sections 6.4.3 and 6.4.4 of the Draft Plan (KMR 2001a), electric power generation and alternatives to meet the additional electrical demand associated with the planned development are discussed. Approximately 11 megawatts (MW) will be required at buildout to meet the power demands of anticipated growth. One alternative is based on adding three new diesel engine-powered generators to the existing generating station. Although all of these engines will be controlled using selective catalytic converters (SCR), this alternative results in the largest amount of pollutants being released. Because this alternative represents the most significant impact to air quality, it was selected to be evaluated in this EIR. The other options include distributed generation, which places propane-powered fuel cells near the points where power is needed. The alternatives would contribute less air pollutants to the Kirkwood Valley.

KMPUD installed a 519-horsepower diesel-fueled Caterpillar engine for electrical power generation at the wastewater treatment facility. The preliminary ALG analysis indicated that the emissions from the plant, when combined with background concentrations, could cause an exceedance of the particulate ambient air quality standards. The ALG analysis also indicated that the diesel emissions within the exhaust plume of the KMPUD generator may exceed the GBUAPCD threshold for cancer risk. However, mitigation measures that would reduce particulate emissions to below the GBUAPCD threshold for cancer risk were identified in the ALG analysis. One measure to reduce particulate matter in exhaust, and thus the cancer risk, involved installation of a catalytic soot filter. This was implemented and is currently in use. Emissions from the KMPUD generator, the proposed second generator, and the MU powerplant are discussed below.

4.4.4 Environmental Impacts

4.4.4.1 Increase in Carbon Monoxide

ALG used the California Department of Transportation's CALINE4 (Caltrans 1989) model to evaluate CO impacts from a.m. and p.m. peak traffic volumes at the intersection of SR 88 and Kirkwood Meadows Drive.

Emission factors from traffic were determined on the basis of:

- traffic volumes,
- mix of vehicle types,
- ambient temperature,
- fraction of cold-started vehicles, and
- speed of the traffic on the link evaluated.

The meteorological conditions used for CALINE4 modeling are summarized in Table 4.19. These values were selected after review of the data from the Kirkwood meteorological monitoring station and are representative of worst-case conditions for the times of the day that are being modeled (i.e., between 9 and 10 a.m. and between 4 and 5 p.m.). Wind direction is not specified directly because CALINE4 calculates the direction that produces the worst-case concentrations for the intersection configuration and emissions.

Table 4.19. CALINE4 Meteorological Data.

Parameter	Value
Wind speed	1 meter per second
Wind direction	Worst-case
Wind direction variability (sq)	10 degrees
Stability Class	Neutral
Mixing Height	500 meters
Temperatures - a.m./p.m.	25°F/30°F

The maximum predicted 1-hour CO concentration represents the total impact of all vehicles that would be present at full buildout, not just the additional traffic resulting from the expansion. The maximum total 1-hour CO concentration attributed to traffic is predicted to be 10,000 µg/m^3 (8.6 ppm), which is less than the 1-hour state air quality standard (23,000 µg/m^3).

Modeling of emissions from the MU powerplant and KMPUD generators was by ALG (ALG 2001). Results are shown relative to ambient air quality standards in Table 4.20 and Table 4.21.

Table 4.20. Maximum Short-Term Impacts for Worst-Case Expansion Scenario (Nine Engines, Continuous Full-Load Operation) with Two KMPUD Generators at Continuous Full Load.

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	Ambient Air Quality Standard (µg/m^3)
NO_2[a]	1-hour	190	124	314	470
PM_{10}	24-hour	2.9	38.4	41.3	50
$PM_{2.5}$	24-hour	2.9	NA[b]	NA	65
CO	1-hour	890	10,005	10,895	23,000
	8-hour	285	9,220	9,505	10,000
SO_2	1-hour	137	79[c]	216	655
	24-hour	14.1	28.8[c]	42.9	105

[a] EPA default NO_X-to-NO_2 conversion factor of 0.75 applied.
[b] Background data not available.
[c] Background SO_2 data from Sacramento monitor.
Source: ALG 2001.

Table 4.21. Maximum Annual-Average Impacts for Worst-Case Expansion Scenario (Three Engines, Full-Load Operation) with Two KMPUD Generators at Continuous Full Load.

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	Ambient Air Quality Standard (µg/m^3)
NO_2	Annual	19.9[a]	11.3	31.2	100

PM_{10}	Annual	0.27	13.5	13.8	30
$PM_{2.5}$[b]	Annual	0.27	NA[c]	NA	15
SO_2	Annual	1.47	2.6[d]	4.1	80

[a] EPA default NO_X-to-NO_2 conversion factor of 0.75 applied.
[b] $PM_{2.5}$ impacts assumed to equal PM_{10} impacts.
[c] Background data not available.
[D] Background SO_2 data from Sacramento monitor.
Source: ALG 2001.

In addition to CO from traffic, estimated 1-hour CO concentrations from the MU powerplant and the KMPUD generators total 890 µg/m^3. Combined with background concentrations measured at the monitoring site, hourly CO concentrations at Kirkwood would equal 20,895 µg/m^3, which is less than the 1-hour state air quality standard (23,000 µg/m^3).

4.4.4.2Increase in Particulate Matter Emissions

The ALG model analyzed PM_{10} (particulate matter less than 10 microns in diameter) levels from woodburning stoves and fireplaces, and from existing and proposed diesel-powered generators at the MU powerplant and the KMPUD facility. $PM_{2.5}$ (particulate matter less than 2.5 microns in diameter) was also evaluated. The estimated emissions from wood burning activities used in the model were based on a survey of the Kirkwood community regarding the existing numbers and types of stoves, and the type and amount of wood burned. Worst-case emissions were forecasted based on homes and condominiums in Kirkwood being at or near capacity with emissions evenly split between full and part-time residents. Maximum wood usage was estimated to be *four* and *three* cords per single-family home and condominium, respectively. The winter season was considered to be the 32-week period between early October and mid-May (ALG 1999).

At the time of the study, approximately 231.7 pounds per day of PM_{10} emissions were produced from the 384 existing housing units (151 single-family residences and 233 multi-family units). Combined with buildout of 170 previously sold but vacant residential lots added an additional 82.5 pounds of PM_{10} per day assuming each new unit would include an EPA-compliant wood stove *as a worse-case scenario*. The maximum PM_{10} concentration expected from these new units is predicted to occur in the north-northwest area of Kirkwood. However, the units built in East Meadows and Juniper Ridge were equipped with gas-fired fireplaces, making this additional wood burning particulate emission an over-estimate. Only gas-fired stoves and fireplaces are approved at this time for new development. Total emissions from existing units and buildout of remaining vacant lots totals 314.2 pounds per day. (Existing units as of *November* 2001 include these additional 170 units, totaling 173 single-family residences and 381 multi-family units.)

These wood burning emissions contribute to background daily PM_{10} emissions that ranged from 2 µg/m^3 to 38 µg/m^3 during the extended winter monitoring period measured at the Kirkwood monitoring station. Wood burning fluctuates from day to day, and the potential for the monitoring station to be directly impacted by wood burning and powerplant emissions further confounds monitoring results. Due to this high amount of variability, the more stable summer background 24-hour PM_{10} concentration level of 13.5µg/m^3 was used. Samples from the monitoring site measure 13 µg/m^3 more than half of the days during the period from May to September, when wood burning activity is low. This value is assumed to represent background conditions without wood burning in order to provide a more consistent measure of average background emissions.

Emissions from the expanded powerplant and the KMPUD facility were found to contribute minimally to future PM_{10} concentration levels (2.9 µg/m^3 24-hour average, compared to AAQS of 50 µg/m^3; 0.27 µg/m^3 average annual concentration, compared to an AAQS of 30.0). Emissions from expansion projects will not

exceed the Class I or Class II significant impact levels. *Also, new California standards, currently in draft form, will require retrofitting existing particulate-matter pollutant sources with filters. These new standards will be applicable to the existing MU power plant diesel engines. Compliance will be met through a reduction to 85 percent of current emissions by 2008 (Godden 2002).*

The Mountain Operations Department applies sand to sections of roads at Kirkwood fewer than 10 times per year (Morrow 2002b). Sand is applied as needed to intersections or down-slope areas where ice polish has formed. However, warm daytime temperatures at Kirkwood often dry roads during the day making ice rarely a problem. Most road particulates result from tire chain wear, snow removal, and construction activities. Road sanding alone does not result in a significant impact to air quality.

On-mountain improvements would vary in intensity from grading for lift installation, to selective thinning of trees, to clearing ski trails. These activities could create additional PM emissions associated with entrained dust and construction vehicle use. However, they would not occur during the woodburning season.

Total PM_{10} emissions from existing background levels, using the 13.5 $\mu g/m^3$ value, plus the addition of 170 new woodburning residential units (9.6 $\mu g/m^3$) plus the emissions from the powerplant and KMPUD generators (2.9 $\mu g/m^3$) would equal 26 $\mu g/m^3$, which is less than the state 24-hour PM_{10} concentrations (50 g/m^3). Only assuming worse-case atmospheric conditions coupled with maximum background PM_{10} emissions of 38 $\mu g/m^3$ and installation of woodburning stoves in all of the 170 additional units built since 1999 would a possible exceedance of 50.5 $\mu g/m^3$ occur. As woodburning stoves were not installed in these since-built units and the maximum background PM_{10} emissions from the monitoring station are over-estimated, this situation is highly unlikely to occur.

The first KMPUD generator did not require GBUAPCD permitting because its emissions do not exceed air quality standards. However, addition of a second generator would produce emissions which, when combined with the existing generator, are projected to exceed the emissions threshold and thus require a permit. Prior to the addition of a second generator at the wastewater treatment plant, particulate matter source testing would be conducted on the first generator, with the catalytic soot filter in place. The results would be combined with estimates of emissions from the second generator to assess the potential cancer risk of the two generators combined. Once the second generator was installed, KMPUD would complete source-testing on it to assess its contribution to the potential cancer risk and, if necessary, additional environmental controls, such as soot-filters, would be applied to meet air quality standards and the GBUAPCD performance standard,(currently) a cancer risk of less than or equal to ten in one million.

4.4.4.3Increase in SO_x and NO_x

With implementation of the Proposed Project, the MU powerplant would need to be expanded. It currently employs six diesel-fired generator sets capable of generating a maximum 4.2 MW of electricity. However, because of limits imposed by the switching station, peak capacity of the powerplant was 3.7 MW. Efficiency improvements have increased peak capacity to meet current demand for short periods (<3 hours), but the powerplant will still need to be expanded to meet buildout power demands. MU proposes to add five additional diesel-fired generator sets and retire two of the existing engines. These modifications will increase available power produced by about 240 percent. Criteria of powerplant expansion design incorporated to minimize emissions include (Godden 1999):

- Use of clean diesel fuel to reduce SO_x emissions.
- Use of engines that have low NO_x emissions.
- Selective calalytic reduction in place, to further reduce NO_x by 90 percent.
- Catalyzed soot trap on new diesel engines to reduce PM by 90 percent.

Impacts from the addition of two KMPUD generators were also modeled using the same methodology as for the MU powerplant. These results were added to emissions from the powerplant, as shown in Tables 4.20 and 4.21.

Ground-level concentrations of SO_x and NO_x were calculated for 1-hour and annual NO_2 and 1-hour, 24-hour, and annual SO_2.

To make a determination of whether the powerplant and KMPUD impacts might exceed an AAQS standard, the incremental impacts were added to background concentrations and compared to the standards. Results indicate that no AAQS exceedances would occur when emissions from the powerplant and KMPUD generators are added to background conditions. The Kirkwood monitoring station provides a conservative background value because it is directly impacted by emissions from the existing powerplant. Total concentrations of the gaseous pollutants are still less than the AAQS standards.

The dispersion modeling study (ALG 2001) also demonstrated that significant impact levels would not be exceeded beyond the boundaries of the project area.

4.4.4.4 Regional Haze

Regional haze is considered an air quality-related value (AQRV) and received special consideration in Section 169 of the Clean Air Act. In accordance with the Clean Air Act, the EPA published a regional haze program in April of 1994, designed to protect the visual resources in Class I areas, including national parks and wilderness areas. The nearest Class I area, the Mokelumne Wilderness, is located over a high ridge within 0.5 mile of Kirkwood. Within the Mokelumne Wilderness a decrease of one deciview is considered to be a significant impact (Forest Service 1988). Regional haze is influenced by emissions of NO_x and SO_2 from diesel generators, *particulate matter* from aerial suspension of dust *associated with construction and road sanding activities,* and woodburning fireplaces and stoves.

Based on anticipated levels of PM, NO_x and SO_x emissions and Kirkwood's geographic location relative to the nearby Class I area, regional haze is not expected to reach significant levels in the wilderness area. However, regional haze levels in the Kirkwood Valley will be affected. The experience of many ski areas indicates that the number of uncontrolled fireplaces has a significant influence on the levels of particulate and associated haze.

The results of the dispersion modeling performed by ALG indicate that all ambient air concentrations will be in compliance with regulatory limitations. The Interagency Workgroup on Air Quality Modeling published procedures for determining impacts on regional haze (EPA 1993). By these standards, the change to visibility is below the significance criteria of one deciview if the 24-hour concentration is maintained below 0.18 $\mu g/m^3$. An analysis was performed using the dispersion modeling performed by ALG, assuming a background visual range of over 150 kilometers and a relative humidity of approximately 70 percent. This analysis used 0.06 $\mu g/m^3$ for the worst case 24-hour PM_{10} value. Thus, $N0_3$ concentration is not expected to be exceeded in the Class I area, and haze would not increase.

4.4.4.5 Level of Significance Before Mitigation

4.4.4.5.1 Increase in Carbon Monoxide

Based on ALG's Air Quality Modeling Technical Attachment (ALG 1999), and the KMPUD modeling (ALG 2001) the anticipated level of CO impact would be less than significant.

4.4.4.5.2 Increase in Particulate Matter Emissions

Combined emissions from the MU powerplant and both KMPUD generators would be significant. The

initial *model* analysis of the diesel-fueled engine installed by KMPUD in 1999 indicated that the emissions from this facility *with one generator were just under the air quality standard threshold. For this reason, the first KMPUD generator did not require GBUAPCD permitting.* A soot-scrubber was also installed to further reduce emissions. The proposed second KMPUD generator *is projected to result in an air quality exceedance when combined with emissions from the existing one, and would trigger the GBUAPCD permitting process.*

4.4.4.5.3 Increase in SO_x and NO_x

The level of impact would be less than significant with mitigation already in place, as listed below.

4.4.4.5.4 Regional Haze

Based on the experience of other mountain resort communities, a significant impact on regional haze levels would occur in Kirkwood Valley if wood burning increased. However, only gas-fired fireplaces are permitted in new development, so a significant increase in haze from this source is unlikely. Air suspended dust from road debris and sanding operations could also contribute to haze, *but would not produce a significant impact*. Impacts on the adjacent wilderness area would be less than significant.

4.4.4.6Mitigation

4.4.4.6.1 Increase in Particulate Matter Emissions

Mitigation Measure 4.4 (a). The counties will develop and enact an ordinance to reduce particulate emissions from wood burning within Kirkwood. The ordinance should include the following elements:

- Incentives to eliminate or replace *existing* woodburning devices that do not comply with the EPA Phase II Certification requirement.

- A requirement that all *residences previously approved for the installation of* new woodburning devices be EPA Phase II Certified.

- A requirement that, upon installation of a new EPA Phase II Certified woodburning device, at least one noncompliant woodburning device be eliminated within the Kirkwood area.

- A prohibition on installation of new woodburning devices, including open hearth-style fireplaces, which do not comply with EPA Phase II Certification requirements, except that one noncompliant open hearth-style fireplace will be allowed in the following locations:
  - a common lobby area located in a building containing more than four multi- family units;
  - a common lobby area located within lodges, hotels, motels, bed and breakfast accommodations, or a public recreation/meeting facility;
  - a bar/saloon or restaurant; or
  - outdoors in the Village plaza area.

Mitigation Measure 4.4(aa). Prior to the addition of a second diesel generator at the wastewater treatment plant, particulate matter source testing will be conducted on the first generator to determine its emissions with the catalytic soot filter in place. The results will be combined with estimates of emissions from the second generator and also with emissions produced by generators associated with the MU power plant expansion, to assess the potential cancer risk. Particulate matter source-testing will be conducted on the second generator once it is installed. Additional environmental controls, such as a catalytic soot scrubber on the second generator, will be installed as necessary to meet all current, applicable air quality standards. Any additional generators will need to meet the GBUAPCD performance standard of (currently) a cancer

risk less than or equal to ten in one million.

4.4.4.6.2 Increase in SO_x and NO_x
Mitigation Measure 4.4 (b). MU will continue to operate the power generation plant with the SCR (Selective Catalytic Reduction) system in place as required by the GBUAPCD.

4.4.4.6.3 Regional Haze
Mitigation Measure 4.4 (c). To mitigate regional haze during the winter, EPA-compliant woodburning fireplaces and stoves will be required in all new housing units as described in Mitigation Measure 4.4(a).

Mitigation Measure 4.4 (d). During summer months, the application of dust suppressants will be required in areas where earth-moving activities are being conducted.

Mitigation Measure 4.4(e). Streets will be swept by a vacuum sweeper during periods when road conditions are dry enough to allow the removal of anti-skid materials (i.e., sand) and other deposits which contribute to airborne dust. The streets must be swept from curb to curb, which includes the driving lanes, to maximize the control effectiveness.

4.4.4.7Level of Significance After Mitigation
With the proposed mitigation in place, there would be no significant air quality impacts.

4.4.5 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse air quality impacts were identified.

4.4.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the identified cumulative actions could interact with the Proposed Project to generate increased air quality impacts. Growth and development in South Tahoe and other surrounding communities would occur in separate airsheds, so CO and particulate concentrations would normally not be additive. However, air pollution constituents, including construction generated dust, could combine to contribute cumulatively to regional haze. The more important cumulative effect would occur indirectly as a result of increased traffic and associated air quality impacts (i.e., tailpipe emissions and re-entrained road dust) resulting from more people on the area's highways. In this regard, the second cumulative action, increasing dispersed recreation in the surrounding area, would also come into play.

As noted in the preceding detailed discussion of the air quality setting and projected impacts, vehicular emissions are not a major concern. Further, as noted in section 4.4.4.1, projections of future traffic were incorporated into the modeling of CO concentrations, so the cumulative effect was built into the impact assessment. The modeling indicated that the regulatory standards would not be exceeded. As a result, no significant cumulative air quality impacts are anticipated to result from implementation of the Proposed Project. Nevertheless, efforts to decrease vehicle use, increase mass transit, and provide shuttle services for employees and guests would improve the area's air quality and should be actively pursued.

4.5 CULTURAL RESOURCES

The prehistory, history and ethnography of the Kirkwood area, as well as the cultural resources (prehistoric and historic archaeological sites, historic architectural and engineering remains, and sites of traditional value or religious importance to Native Americans or other ethnic groups) within the Proposed Project area are discussed below. Generally, cultural resources are considered non-renewable resources. Because they are irreplaceable, a number of federal, state, and local laws, regulations, and ordinances have been developed to prevent or reduce the loss of significant or important cultural resources. Typically, such measures call for project avoidance or mitigation of impacts to significant resources through data recovery or *in situ* preservation.

4.5.1 ISSUES

Two comments related to cultural resources were received from members of the public. The comments are essentially identical and relate to the possible use of the area north of SR 88 as an encampment area for those traveling on the Emigrant Trail. One comment expressed concern regarding the potential loss of historical data through project implementation, or by increased human activity after development.

One comment was received from Caltrans regarding a review of the need for cultural resource studies for that portion of the state right-of-way potentially affected by project implementation.

4.5.2 METHODS

The analysis of potential impacts to cultural resources was based on first delineating the geographic area encompassed by the Proposed Project. This geographic area was identified as the project's area of potential effects (APE). For purposes of analysis, the entire APE is assumed to have the potential for ground-disturbing activity and resultant direct impacts, with the exception of Kirkwood Meadow, which is to remain undeveloped except for minor utility line installations. The alternatives analysis includes the same area encompassed by the Proposed Project. Indirect impacts may occur outside of the APE to such resources as the Emigrant Summit Trail as a result of an increase in population at Kirkwood. The potential for such direct and indirect impacts has been addressed below.

As described in section 4.5.2.4, several studies have been conducted within the lands encompassing the Proposed Project. These studies have included reconnaissance or intensive pedestrian archaeological surveys of the project area.

The portion of the Kirkwood ski area under Forest Service special use permit, which encompasses the majority of the proposed projects under the MMDP, was initially surveyed for heritage resources by Brady in 1973. No heritage resources were found. Since then, several project-specific archaeological surveys have been conducted and have remedied an earlier concern that the Brady survey is out-of-date. These studies and their results are included below.

4.5.2.1 Assumptions

As noted above, it has been assumed for purposes of analysis that ground-disturbing activities associated with the Proposed Project could occur anywhere within Kirkwood and the land encompassed by the Forest Service special use permit. Development within Kirkwood Meadow is limited to a few necessary infrastructure installations.

4.5.2.2 Significance Criteria

In considering impact significance for cultural resources under CEQA, the significance or importance of the resource itself must first be determined. Generally, under CEQA, a historical resource (both built-environment and archaeological resources) is considered significant if it meets the criteria for listing on the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR). CEQA also assigns special importance to the physical remains of Native Americans and specifies procedures to be used when human remains are discovered. Impacts to "unique archaeological resources" are also considered significant under CEQA. Unique archaeological resources include archaeological artifacts, objects, or sites. CEQA criteria for determining the historical significance of a cultural resource and associated procedures are outlined under section 4.5.2.3, Regulatory Setting, below.

4.5.2.3 Regulatory Setting

Criteria for inclusion on the CRHR are set forth in the CEQA Guidelines, Section 15064.5, and include:

- Association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- Association with lives of persons important in our past.
- 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.
- Has yielded, or may be likely to yield, information important in prehistory or history.

California State Landmarks are assigned a sequential number as they are identified and compiled, which also identifies its state historical status. Landmarks above number 770 are automatically included in the CRHR while those below number 770 require individual evaluation for inclusion on the CRHR or the NRHP. Criteria for eligibility for the CRHR are very similar to those that qualify a property for the NRHP (detailed below) under the National Historic Preservation Act (NHPA). Note that a property which is eligible for the NRHP is also eligible to the CRHR.

Section 15064.5 of the CEQA Guidelines also assigns special importance to the physical remains of Native Americans and specifies procedures to be used when human remains are discovered. These procedures are spelled out under Public Resources Code (PRC) 5097.98.

Impacts to "unique archaeological resources" are also considered under CEQA, as described under PRC 21083.2. Unique archaeological resources include archaeological artifacts, objects, or sites. These resources must have a high probability of meeting one of the following criteria:

- Contain information needed to answer important scientific questions, and there is a demonstrable public interest in that information.
- Have a special and particular quality, such as being the oldest of its type or the best available example of its type.
- Are directly associated with a scientifically recognized important prehistoric or historic event or person.

A non-unique archaeological resource is an archaeological artifact, object, or site that does not meet the above criteria.

For federal purposes, an historic property is a cultural resource that is significant under the criteria of eligibility for the NRHP, as defined under 36 CFR 60.4. As outlined below, the property must:

- Be associated with important events in our history or prehistory.
- Be associated with an important person or persons.
- Represent the work of a master, or a high level of artistic achievement, or is exemplary of its type.
- Have the potential to yield data important to the study of history or prehistory.

The property must also retain integrity to its historic appearance, period and setting. CEQA/CRHR criteria parallel those of the NRHP, but emphasize significance to California culture and history, and also permit listing of properties that may not qualify for the NRHP, but which have particular significance to the local community.

4.5.2.4Existing Studies and Information

The Kirkwood area was first surveyed by Brady in 1973 for archaeological artifacts and sites. Findings from this study were used for analysis in the Kirkwood EIS of 1973. Subsequent proposed projects warranted surveys of various areas of Kirkwood Meadow (Manning 1985, Hunt 1989 *in* Simpson 1995d), and Kirkwood ski area (Russell 1988), and areas along SR 88 (Rhode 1979, Littlefield 1980 *in* Simpson 1995d). Information from these earlier surveys and results from the following archaeologic studies have been used in this cultural resources analysis for the Kirkwood recirculated, revised EIR.

- *Historic Analysis of the Kirkwood Inn for Kirkwood Mountain Resort* (HMR 2001).

- *Kirkwood Subdivisions Cultural Resource Survey Addendum Kirkwood, California (El Dorado County)* (Lindstrom 2001).

- *Kirkwood Mountain Master Development Plan Phase I Proposed Mountain Facilities and Infrastructure Multiple Use Trails Amador County, California* (Lindstrom 2000).

- *Kirkwood Ski Area Expansion Project Martin Point Chair Lift Amador County, California* (Lindstrom 1999).

- *Kirkwood Ski Area Expansion Project Kirkwood Ski Resort Amador/Alpine County, California Addendum* (Lindstrom 1998).

- *Kirkwood Ski Area Expansion Project Kirkwood Ski Resort Amador/Alpine County, California* (Lindstrom 1995a).

- *Sierra Cellular Chair 6 Project Kirkwood Ski Area Amador County, California* (Lindstrom 1995b).

- *Emigrant Summit Trail: Archaeological Investigation and Historic Research of the Trail from Caples Lake to Maiden's Grave* (Bennyhoff et al.1982).

- *Archaeological Reconnaissance Report of Selected Land - 4,000 Acres, Kirkwood Winter Sports Development, Eldorado National Forest* (Brady 1973).

- *Kirkwood Subdivisions Cultural Resource Survey, Amador, Alpine and El Dorado Counties,*

California (Dougherty 1995, revised 1996).

- *Archaeological Survey for the Proposed Kirkwood Meadows Golf Course, Amador and Alpine Counties, California* (Manning 1985).

- *California Archaeology* (Moratto 1984).

4.5.3 Environmental Setting

4.5.3.1 Prehistory

A number of chronological sequences have been developed for the central Sierra Nevada that characterize and organize certain periods, or archaeological phases, according to site characteristics and human adaptation to the environment. The chronological framework with the most direct relevance to the Kirkwood area is that established by Elston at al. in 1977 as described in Moratto (1984). The sequence is defined by seven phases that span most of the Holocene epoch (post-Ice Age) and are described in Table 4.22.

Table 4.22. Cultural Phases for the Central Sierra Nevada.

Phase	Age
Washo - Late Kings Beach	Historic Contact - A.D. 1200
Early Kings Beach	A.D. 1200 - 500
Late Martis	A.D. 500 - 500 B.C.?
Middle Martis	500 B.C. - 1500 B.C.
Early Martis	1500 - 2000 B.C.
Spooner	2000 - 5000 B.C.
Tahoe Reach	6000 B.C.

While archaeological sites dating from the Spooner Phase to Historic Contact have been found to the north in the Lake Tahoe Basin, archaeological evidence for human occupation in the Kirkwood area is limited, although sites and/or isolated artifacts (projectile points) dating from as far back as the Martis phase (Table 4.22) have been found in the region. The limited archaeological information may, in part, be a reflection of archaeological studies that, until recently, focused on lower elevations and site-specific studies rather than broad regional surveys. The earliest occupants of the Sierra Nevada likely focused on large game as a primary means of subsistence. These populations used larger and heavier projectile points attached to darts that were propelled using a throwing stick (atlatl). These populations are thought to have been highly mobile. There is evidence for ever-increasing specialization among these hunter-gatherers resulting in increased use of staples such as acorns, seeds and deer. The use of milling equipment, including portable and bedrock mortars, for processing seeds and roots denotes this change. Projectile points tend to become smaller over time, possibly marking a transition from the atlatl to the bow and arrow. Settlement patterns also reflect this changing subsistence focus with evidence for longer-term occupation at particular locations.

Preliminary archaeological surveys of the Kirkwood area have been summarized in a cultural resources report prepared for proposed subdivisions at Kirkwood by Dougherty (1995). Information based on 1994 and 1995 records searches conducted at the Central California Information Center (CCIC) and a 1995 search

at the North Central Information Centers of the California Historical Resources Information System are included below.

In 1973, the U.S. Forest Service sponsored an informal archaeological survey of 4,000 acres encompassing the Kirkwood area, including Kirkwood Meadow (Brady 1973). Because the Brady survey is more than 25 years old, it is considered inadequate to provide the level of detail necessary for construction clearances (sensu CCIC, Hatoff 2000). However, the Brady survey does serve as a coarse filter and a suitable guide for assessing large-scale impacts. Subsequent surveys have updated the Brady survey. The Brady survey resulted in the identification of six prehistoric bedrock mortars at a site in the Kirkwood Meadow area recorded as 4-ALP-4 (note: the "4" prefix is outmoded and has been changed to "CA" throughout the system). The site was subsequently revisited in a 1985 pedestrian survey of the meadow. The survey was negative and the site previously identified in 1973 was found to be "highly questionable" with regard to its cultural origin (Manning 1985). As noted in Dougherty (1995), surveys were conducted by Caltrans in 1979 and 1980 along SR 88 at the north end of Kirkwood Meadow. According to the CCIC (1995) both of these surveys were negative for cultural resources.

A 1989 cultural resources survey of proposed riding trails to the north, south and east of SR 88 was completed for the Eldorado National Forest. This survey was negative. Another cultural resources survey resulting in negative findings was conducted in 1988 for a 50-acre land exchange immediately east of Kirkwood (Russell 1988). More recently, surveys were conducted in 1994 (Dougherty and Werner 1994) for water supply lines from Caples Lake and distribution lines along ski runs in support of a snowmaking project, and in 1995 for proposed subdivision expansion on four disjunct parcels totaling approximately 300 acres (Dougherty 1995). A fifth five-acre parcel, originally surveyed in 1991 (Knowles 1991), was resurveyed in 1995 (Dougherty 1995). All of these surveys were negative with the exception of an isolated unshaped mano fragment reported by Dougherty (1995) and two other prehistoric isolates reported by Dougherty and Werner (1994).

In addition to the materials described above, Mr. David Hunt, archeologist with the Amador Ranger District of the Eldorado National Forest, was contacted to solicit any additional information he might have regarding the project area encompassing the Draft Plan. To this end he was provided a map of the Draft Plan which he reviewed, and plotted locations, or approximate locations of sites he had knowledge of in the project area. His review noted site 4-ALP-4 described above and a second site, 05-03-51-509(/H), recorded in 1997 that consists of a prehistoric bedrock milling station, and a 1920s-1960s era trash dump and trash/campsite (Hunt 1999a). One side of this site, which contains the historic campsite, is located on private land at Kirkwood North. Site 4-ALP-4 may not be a cultural artifact according to the Manning (1985) field observations.

4.5.3.2Ethnography

The ethnography of the project area has been summarized in the cultural resources report prepared for the Kirkwood subdivision project (Dougherty 1995). The description that follows is, in part, derived from that discussion. The project area lies within the ethnographic territories of three groups - the Southern Hill Nisenan, the Washo, and the Northern Sierra Miwok. The project area probably represents the southeastern-most extension of Southern Hill Nisenan who are part of the Maidu linguistic family. The Washo, speakers of the Hokan language, are typically regarded as a Great Basin-based group with a nuclear territory focusing on the Lake Tahoe Basin. However, ethnographers have elicited information suggesting the Washo traveled into the western Sierra for resource procurement and trade (D'Azevedo 1986). The northeastern-most extension of Northern Miwok territory also encompasses the project area.

Each of these groups practiced a subsistence-settlement lifeway that resulted in varying degrees of residential mobility. This settlement pattern is interpreted to mean that the project area may have been used

or traversed by any of these groups and was probably not specifically viewed with the notion of ownership by any single group. Given the geographic location of the project area, it was probably most frequently used in late spring and summer for hunting, gathering, and inter-group trade.

The California Native American Heritage Commission (NAHC) was contacted by Archaeological Services, Inc. (ASI) in 1995 for survey information (Dougherty 1995). A review of its Sacred Lands Files and a list of knowledgeable and interested individuals and groups to be contacted were requested. The NAHC reported no record of sacred lands within the project area and no responses were received by the contacted individuals; it is assumed that there are no specific Native American concerns for the project area.

4.5.3.3History

The pattern of Native American transhumance (human seasonal movements to procure seasonally available resources) across this region of the Sierra Nevada was continued by Euroamericans in the 19th century. Following the first Euroamerican incursions into the area by trappers in the late 1830s, the general vicinity was visited by John C. Fremont in 1844 (Bennyhoff et al. 1982). The Emigrant Trail was established in the late 1840s in an attempt to find an easier route into California than that established on the Truckee River to the north. The Emigrant Trail bypasses the proposed project area by running south from Caples Lake, east of Kirkwood, then south to the ridge overlooking the Mokelumne Canyon, and then west-northwest to a point where it intersects modern SR 88. It does cross through the SUP area of ENF land. With the onset of the Gold Rush in 1849, this route became an important artery for the large number of immigrants to California. The Emigrant Trail fell into relative disuse by the late 1850s as alternative routes and improved transportation systems were developed (Bennyhoff et al. 1982). The trail has been designated a National Recreation trail and a National Historic Trail. It is also eligible for the National Register of Historic Places (Forest Service 1995).

The name Kirkwood Meadow is derived from a settler named Zachariah S. Kirkwood who settled the area in the late 1850s - early 1860s. According to Dougherty (1995), he established a summer cattle ranch headquartered at what is now the current location of the Kirkwood Inn. The Kirkwood Inn is listed as California Historic Landmark number 40 and is described as follows:

> Resort, stage station, and post office were originally built by Zack Kirkwood in 1864. When Alpine County was formed from Amador County, the division left the barn and milkhouse in Alpine, while the Alpine-El Dorado line went directly through the barroom of the inn (California Dept. of Parks and Recreation 1979).

The Kirkwood Inn is discussed at some length in the *Kirkwood Subdivisions Cultural Resources Survey* (Dougherty 1995), and in the *Historic Analysis of the Kirkwood Inn for Kirkwood Mountain Resort* (HMR 2001). The construction of Kirkwood Inn as a hostelry and stage depot occurred in 1861 (HMR 2001), about the time the Emigrant Trail was routed along what is now SR 88. Specific information regarding exact dates of construction of various components of Kirkwood Inn seem to be at some variance depending on the reference. While the site was not formally recorded during the ASI survey (Dougherty 1995), they recommended that the site be evaluated by "an historical architect" in order to evaluate its eligibility to the CRHR and NRHP. This evaluation was completed by HMR Architects in 2001. John Thomas of the State Historic Preservation Office reported that the Kirkwood Inn has an "S3" rating which means that it appears to be eligible to the NRHP (and thus, the CRHR), but would require formal evaluation to officially elevate its status (Thomas 1999). The Office of Historic Preservation (OHP) reports that no formal request has been submitted regarding a re-evaluation of the historic status of the Inn (OHP 2001).

Also located in the Kirkwood North area, the Mace Camp has been identified as an area related to the Mace family's grazing practices. The Maces are well-known settlers of Amador County. The site was brought to

the attention of KMR in December 1999 after the publication of the Draft EIR, and during a season when snow cover prevented formal delineation and recording of the site. At the request of KMR, a formal archaeological survey and report was completed by Susan Lindstrom in July 2001. Yellow painted inscriptions of family members' names on a granite outcrop mark the site. The painted rock and an arborglyph are located on Kirkwood land, but a second arborglyph and general camp area are on NFS land. This site is recorded as USFS number 05-035100538.

As previously mentioned, also noted near the Kirkwood North project area is a multi-component site 05-03-51-509(/H), first recorded by the U.S. Forest Service in 1997, consisting of a prehistoric bedrock milling station and a 1920s-1960s era trash dump and campsite (Hunt 1999a). The Alpine Highway (old Highway 88, historic roadway number 05-03-51-507) separates the prehistoric and historic areas (Kennedy 1997). A portion of site 05-03-51-509/H containing the historic campsite is situated in the project area (Hatoff 1999).

Other historic resources noted but not recorded during earlier cultural resources surveys include "an old horseshoe and a piece of a stirrup" found in Kirkwood Meadow during the 1973 reconnaissance of the area (Brady 1973).

4.5.3.4 Additional Surveys

The area encompassing the top of Chair 6 (Cornice Express) was surveyed in 1995 by Lindstrom for development of a cellular tower. No archaeological resources were found. An addendum to the 1995 survey looked for archaeological sites in the vicinity of a proposed electrical line. The new line, proposed to replace an old line, runs between the Chair 3 (Ironhorse) and Chair 4 (Sunrise) transformers and connects to the Sunrise Grill. A 10-acre area encompassing the line was surveyed, and no heritage resources were found (Lindstrom 1998).

Another 200 acres of the SUP area encompassing the once-proposed Martin Point chair lift were surveyed and cleared by Lindstrom in 1999. Although this lift was eliminated from the Proposed Project, the surveying of this area is still relevant and the lower portion of this survey contained a portion of the base area near the proposed Ski-In/Ski-Out development.

An addendum report by Lindstrom from October, 2000 documents surveys of the areas encompassing proposed on-mountain projects. This survey also included a portion of the proposed Ski-In/Ski-Out development that was not surveyed at the time of the previously released EIR (Morrow 2001d). No artifacts, features, or sites were found.

4.5.4 Environmental Impacts

4.5.4.1Prehistoric Resources

Two prehistoric cultural resources, sites 05-03-51-509(/H) and 4-ALP-4, may lie within or near areas slated for development. The portion of site 05-03-51-509(/H) near Kirkwood North that contains a prehistoric milling station is not located on private land and should be avoided during construction. Examination of the 4-ALP-4 site subsequent to its recording (Manning 1985) suggests that this putative bedrock milling station is not cultural and probably should be delisted as a cultural resource. Even if this site does represent a prehistoric bedrock milling location, it is unlikely to qualify for the CRHR or NRHP, since any data it might contain has been preserved through its recording and it is unlikely to yield further information important to prehistory.

An archaeological survey was conducted in 1995 by Susan Lindstrom, Ph.D., on the portion of the project area within the SUP. Specifically, 88 acres encompassing the new Thimble Peak chair lift, the new Caples Express chair lift and ski trail, upgrades to chair lifts 3 and 4, space for a garage at the top of Chair 10, an

alternate snowmaking pipeline alignment near Chair 6, and the Whiskey Slide pipeline. One prehistoric isolated artifact, a chert early stage biface (05-03-51-1), was found at the base area of the proposed Thimble Peak chair lift. It was collected and is curated at the Eldorado National Forest Supervisor's Office. Lindstrom speculates that it may be associated with the sparse lithic scatter (05-03-51-438) located at the base of Chair 4 (Sunrise), which was recorded in previous surveys of the SUP area (Lindstrom 1999). Lindstrom (1995a) concludes that while she found no physical evidence of the Emigrant Trail, the construction of the Thimble Peak chair complex, especially the new road, and the replacement of the Chair 4 towers may directly affect the lithic scatter site (05-03-51-438) and the Trail, and indirectly affect the Trail viewshed.

One prehistoric site (05-03-51-528) containing six prehistoric hunting blinds was found within the Kirkwood ski area boundary near Two Sentinels, but outside of the proposed project area (Lindstrom 1999).

No significant prehistoric cultural resources eligible under NRHP or CRHR criteria, or considered a "unique" archaeological resource under CEQA, have been identified within the lands encompassed by the Proposed Project. It is possible that project implementation could result in the discovery of, and potential damage to, previously unidentified prehistoric cultural resources. If such resources were found to be significant (i.e., historic resources or historic properties) the impacts could be significant.

4.5.4.2Ethnographic Resources

No significant ethnographic cultural resources such as sites listed in the California Native American Heritage Commission's Sacred Lands File, or traditional cultural properties, have been identified within the lands encompassed by the Proposed Project. No impacts to ethnographic resources are anticipated from implementation of the Proposed Project.

4.5.4.3Historic Resources

Due to its link to local history, the Mace Camp, identified within the lands encompassed by the Draft Plan, could be a significant historic archaeological resource according to CEQA criteria (Lindstrom 2001). The current conceptual plan for Kirkwood North indicates a private residential development on this site. Any development of this location in Kirkwood North as proposed in the conceptual plan would significantly impact this resource. It is possible that project implementation could result in the discovery of, and potential damage to, other previously unidentified historic archaeological resources in this area. If such resources were found to be significant (i.e., historic resources or historic properties) the impacts could be significant.

The eastern edge of the historic component of site 05-03-51-509/H, consisting of a 1920-1960 camp, is located on private land.

The Kirkwood Inn, California Historical Landmark number 40, is also a potentially significant resource, but is not on the NRHP or the CRHR (Thomas 1999, OHP 2001). The current setting of the Inn includes several modern developments, including the highway and an adjacent gas station. It does not appear that areas currently identified for new construction associated with housing and other elements would have the potential to affect the integrity or setting of this site, or result in other significant impacts to this resource.

The historic analysis report prepared by HMR Architects (2001) details the construction and condition of the original Kirkwood Inn log building and its additions. The building was found to be structurally sound. The original structure and first addition is considered part of the historic context of the area. The second and third additions, added to the north side, and the latest addition to the west and south have altered the Inn's original appearance, but the original architectural style has remained intact. The building would not be directly affected by implementation of the Draft Plan.

The route of the Emigrant Summit Trail crosses through lower areas of Chair 3 and Chair 4 and is in close proximity to the proposed Thimble Peak lift. A number of markings on trees, grave sites, historic debris scatters and other historic remnants were found along the Emigrant Summit Trail during the intensive survey program conducted in 1982 (Bennyhoff et al. 1982). There would be no direct impacts to any elements of the Emigrant Summit Trail related to implementation of the Proposed Project. There is the potential for indirect impacts to this property related to increased visitation along the Emigrant Trail, as a result of increased visitor/residential use at Kirkwood anticipated by implementation of the Proposed Project.

As reported, Lindstrom (1995a) concludes that while she found no physical evidence from the Emigrant Trail, the construction of the Thimble Peak chair complex, especially the new road, and the replacement of the Chair 4 towers may indirectly affect the Trail viewshed.

4.5.4.3.1 Level of Significance Before Mitigation

4.5.4.3.1.1 Prehistoric Resources

Based on current known conditions, impacts to prehistoric cultural resources would be less than significant. However, should known sites be disturbed during construction or previously undiscovered prehistoric cultural resources be encountered during project implementation, and the resources are evaluated as significant, the unmitigated impact could be significant.

4.5.4.3.1.2 Ethnographic Resources

Based on current known conditions, impacts to ethnographic resources would be less than significant as no traditional cultural properties or sites listed on the Sacred Lands File have been identified within the lands encompassed by the Proposed Project.

4.5.4.3.1.3 Historic Resources

There would be no direct or indirect impacts to the Kirkwood Inn. Impacts to the Mace Camp area could be significant. Impacts to the site 05-03-51-509(/H) would not be considered significant.

There are no known elements of the Emigrant Summit Trail that would be directly affected by development of the Proposed Project. There is the potential for indirect impacts to elements of the Emigrant Summit Trail resulting from increased population in the Kirkwood area as a result of implementation of the Draft Plan, and construction in the Emigrant Valley as proposed in the MMDP. These impacts could be significant if unmitigated.

Should previously undiscovered historic archaeological resources be encountered during project implementation and the resources are evaluated as significant, significant impacts could occur if no mitigation is in place.

Based on the results of cultural resource surveys within lands affected by the Proposed Project, potential direct impacts to cultural resources could be significant. However, as no significant resources were identified in the APE, significant impacts would only occur if the historic status of the Kirkwood Inn changed, or if either this structure or the Mace Camp were directly affected by development activities. Also, should previously undiscovered archaeological sites be discovered during project implementation, they should be subject to evaluation for their eligibility for inclusion on the NRHP as a historic property, the CRHR as a historic resource, or as a unique archaeological resource as currently defined in CEQA.

4.5.4.3.2 Mitigation

Typically, significant impacts to cultural resources that are archaeological and not built-environment features can be reduced to less-than-significant levels through data recovery programs or project redesign

to avoid the resource. Significant impacts to historic built-environment features (such as standing structures) can also usually be reduced to less-than-significant levels through historic research and Historic American Building Survey (HABS) or Historic Architectural and Engineering Record (HAER) recording.

4.5.4.3.2.1 Prehistoric Resources

Mitigation Measure 4.5 (a). Any area ultimately identified for project development should be surveyed for prehistoric cultural resources by a qualified archaeologist prior to ground-disturbing activity.

Mitigation Measure 4.5 (b). If cultural resources are found, and if the resource is determined to be significant under CEQA/CRHR criteria, or is a unique archaeological resource, mitigation through data recovery or other appropriate measures should be devised and carried out by a qualified archaeologist in consultation with all concerned parties.

Mitigation Measure 4.5 (c). If Native American burial sites are found, specific mitigation measures would be determined in consultation with Native American most likely descendants, as identified by the NAHC. Options could include leaving a burial in place if further disturbance can be avoided, or removal and reburial with or without previous archaeological treatment. All such procedures should be conducted within the context of the CEQA Guidelines, Section 15064.5 and the California Public Resources Code, Sections 5097.94, 5097.98 and 5097.99.

Mitigation Measure 4.5 (d). In the event that construction personnel observe previously undiscovered subsurface prehistoric archaeological deposits (e.g., concentrations of bone, ash, charcoal, and/or artifacts) or human bones are encountered in an area subject to development activity, work in the immediate vicinity of the find should be halted and a professional archaeologist consulted, or, in the case of human burials, the County Coroner and the appropriate Native American most likely descendants (identified by the NAHC). If the resource is determined to be historically significant under CEQA/CRHR criteria, mitigative data recovery or other measures should be devised and carried out by a qualified archaeologist in consultation with all concerned parties. In the case of Native American burials, specific mitigation measures would be determined in consultation with Native American most likely descendants. Options could include leaving a burial in place if further disturbance can be avoided, or removal and reburials with or without previous archaeological treatment. All such procedures should be conducted within the context of the CEQA Guidelines, Section 15064.5.

4.5.4.3.2.2 Historic Resources

Mitigation Measure 4.5 (e). Any area ultimately identified for potential project development should be surveyed for historic cultural resources by a qualified archaeologist prior to ground-disturbing activity.

Mitigation Measure 4.5 (f). If historic cultural resources are found, and if the resource is determined to be a historic resource or “unique archaeological resource” under CEQA/CRHR criteria, mitigation through data recovery or other appropriate measures should be devised and carried out by a qualified archaeologist in consultation with all concerned parties. All such procedures should be conducted within the context of CEQA Guidelines Section 15064.5.

Mitigation Measure 4.5 (g). In the event that construction personnel observe previously undiscovered subsurface historic archaeological deposits (e.g., concentrations of historic materials such as ceramics, glass, or other historic materials) in an area subject to development activity, work in the immediate vicinity of the find should be halted and a professional archaeologist consulted. All such procedures should be conducted within the context of CEQA Guidelines Section 15064.5.

Mitigation Measure 4.5 (h). Implementation of any element of the Draft Plan that could affect the integrity

of the Kirkwood Inn setting should be subject to review by Alpine County and El Dorado County. Any future additions should follow the same architectural style. Any future additions must also consider the view to and from the building, especially from the front or highway side. For structural reasons, any new development and related heavy equipment should be distanced from the Kirkwood Inn so as to not place additional stresses on the existing foundation. Review should include development of measures to mitigate indirect impacts to the Kirkwood Inn to a less-than-significant level. Specific mitigation measures to be implemented by KMR will include some or all of the following measures:

- Include use of architecturally compatible materials and design developed with the input of a qualified historical architect, if the new construction affects the visual setting of the Kirkwood Inn and it is determined that its setting contributes to its significance.

- Use of vegetative screening.

- Use of architecturally harmonious materials and sensitive placement of new structures.

- Placement of an appropriate interpretive sign near the Kirkwood Inn explaining the significance of the structure and its place in local and regional history.

Mitigation Measure 4.5 (i). If the Mace Camp in Kirkwood North cannot be removed from proposed development plans or from sale to private developers, then the following protective measures will be undertaken by KMR or the project proponent:

- The archaeological site and a 100-foot buffer area around the site will be excluded from sale to a private individual.

- No structures, other than those necessary to protect the integrity of the site, will be established within the 100-foot protected buffer area.

- With the cooperation of a qualified archaeologist and Eldorado National Forest to determine appropriate design and content, KMR will install a low visibility interpretive sign at the site as an educational and protective measure.

- KMR will monitor the site annually to assure the site is not degraded by vandalism or over use. If degradation occurs, KMR will work with the El Dorado County Cultural Resources Commission and the Eldorado National Forest to establish additional appropriate protective measures for the site.

Indirect impacts to sites on the Emigrant Summit Trail could be mitigated as follows:

Mitigation Measure 4.5 (j). Educational literature will be developed by KMR to educate guests about the fragile and irreplaceable nature of cultural resources and the penalties for violation of state and federal laws related to cultural resources. This informational literature could be in the form of a pamphlet or other handout that could be distributed at the same venues where other Kirkwood materials are distributed.

4.5.4.3.3 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts to cultural resources.

4.5.5 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts related to cultural resources were identified.

4.5.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area. Because the region's prehistoric and historic cultural resource base has already been degraded by development activities, vandalism, and natural causes, each additional impact is cumulatively more significant.

Both of the identified cumulative actions have the potential to interact with the Proposed Project to generate cumulative impacts to cultural resources. Such impacts could result from increased visitor use of the area and the associated increase in recreational activity under the Proposed Project, coupled with effects of regional population growth and increased dispersed recreation. The increases in people at Kirkwood and in the region could draw more people to cultural resource sites. For example, potential cumulative impacts to the Emigrant Trail could result from increased visitation by people at Kirkwood as well as people passing through the area who live at South Tahoe or other surrounding communities. These potential impacts to the Emigrant Trail and other cultural resources of interest in the area would be mitigated through federal agency enforcement on lands under federal jurisdiction, as well as resource interpretation measures aimed at enhancing public appreciation and understanding of the resource and the need for its protection. These measures would reduce the level of impact to a less-than-significant level.

4.6 Land Use

This section describes the effects of the Proposed Project on existing local and regional land uses, and the relationship of the proposed development to county and local land use planning.

4.6.1 ISSUES

The following issues were identified through public and agency scoping and resource specialist review:

- Effects on land use in adjacent areas such as Kirkwood Lake and the Caples Creek roadless area on the Eldorado National Forest (ENF).
- Impact of development north of SR 88.
- Effects of changing open space zoning designations to Ski-In/Ski-Out development.
- Effects of increased housing and development within Kirkwood.
- Cumulative effects of continued development.

4.6.2 METHODS

The land use evaluation included review of applicable county, local, and federal land management/land use planning documents, and contacts with land use planners. Other sources included field reconnaissance and review of aerial photographs and maps. The study area consisted of the private land portions of Kirkwood and adjacent land managed under a special use permit (SUP) issued by the Forest Service, and other areas of concern identified during the scoping process.

4.6.2.1 Assumptions

Information provided in the Specific Plan (KMR 2001a) and other sources of land use information is current for this analysis.

4.6.2.2 Significance Criteria

Impacts would be considered significant if the project includes land uses which are either:

- Inconsistent with adopted land use plans and policies of agencies with land use jurisdiction over the project area;
- Involve incompatible land uses which directly or indirectly affect the physical environment; or
- Are incompatible with existing land use restrictions.

4.6.2.3 Regulatory Setting

The project area is located within Alpine, Amador, and El Dorado Counties. Private land is subject to the provisions of the General Plan adopted by each county. NFS land surrounding the project area is managed under the *Eldorado National Forest Land and Resource Management Plan* (Forest Plan), including the SUP area.

4.6.2.4 Existing Studies and Information

The primary sources of land use information are:

- *Kirkwood Specific Plan* (KMR 1998, 2001).
- *Alpine County General Plan* (Alpine County 1999).
- *Amador County General Plan* (Amador County 1973).
- *El Dorado County General Plan* (El Dorado County 1995).
- *Eldorado National Forest Land and Resource Management Plan* (Forest Service 1988).

In addition, historic land use information is provided in previous KMR planning documents and in several previous EISs and EIRs:

- *Final EIR and EA Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d).
- *Kirkwood Master Plan Amended 1988* (Kirkwood Associates, Inc. 1988).
- *Draft Eldorado National Forest SR 88 Future Recreation Use Determination EIS* (Forest Service 1987).

4.6.3 ENVIRONMENTAL SETTING

4.6.3.1 Existing Regional Land Uses

Kirkwood is located on the boundaries of Alpine, Amador, and El Dorado Counties, California, off SR 88 approximately 35 miles south of Lake Tahoe. Kirkwood includes both private and NFS lands managed under an SUP. The Kirkwood Specific Plan (Draft Plan) (KMR 2001a) addresses the 732 acres of privately held lands within the Kirkwood community. Currently, approximately 69 percent (506 acres) of this area is owned in fee simple by KMR, the master developers of Kirkwood and operators of the Kirkwood ski area, the remaining 31 percent (226 acres) is owned by other persons or entities.

The Kirkwood ski lifts and related on-mountain facilities are located primarily on NFS lands of the ENF and operate under an SUP issued by the Forest Service in 1971 and renewed in 2001 for a new 40-year period. The area managed under the SUP covers 2,300 acres of skiable terrain. KMR operates a total of 10 ski lifts and three surface lifts (rope tow), five of which are entirely on private land, with the remainder wholly or partially on public land. Cross-country trails are located mostly north of SR 88.

The primary regional land uses are recreation, organized camps, open space and wilderness. In addition to Kirkwood, other developments include cabins and a campground at Kirkwood Lake, cabins at the Forest Service Devil's Gate Tract just west of Kirkwood, and resort facilities, cabins, and campgrounds at Caples Lake. Residential and recreational developments are also present at Silver Lake about 3 miles to the southwest, and at Woods Lake about 3 miles to the east of Kirkwood. SR 88 provides the sole access to these recreational areas and is designated as a State Scenic Highway and a National Forest Scenic Byway.

The northwestern edge of the Mokelumne Wilderness is adjacent to the eastern boundary of the SUP area, and extends east and south. This wilderness occupies 104,500 acres on three national forests. It is generally rugged and remote, and use has been light in the past, with most use concentrated on popular trails and campsites easily accessible from SR 88, Kirkwood, and other roads and developed areas. The 17,340-acre Caples Creek area was designated as a RARE II area and was set aside for additional study as potential Wilderness designation in the 1984 California Wilderness Act. RARE (roadless area review and evaluation) is a Forest Service classification for lands being considered for roadless area status. Caples Creek is currently designated as roadless and is located just north of the Kirkwood community and Kirkwood Lake, in the upper reaches of the Silver Fork of the American River. Its primary attractions are the spectacular scenic qualities of the Sierra high country, and its easy access to dispersed recreation use. The Record of Decision for the ENF Forest Plan recommended Wilderness status for 13,694 acres of this area, and management as General Forest for the remainder.

Only minor amounts of resource extraction occur in the area around Kirkwood. The project vicinity is not suitable for commercial logging. Three mining sites are located in the project vicinity (Simpson 1995d), the Twin Lakes rock products mine north of Caples Lake, the Lost Cabin gold and silver mine southeast of Caples Lake at Woods Lake, and a mining claim southeast of Kirkwood Meadow within the ski resort permit area.

4.6.3.2 Existing Kirkwood Land Uses

Existing land uses at Kirkwood include residential, commercial, open space, meadow, recreation, public services, and roads (Table 4.23).

Table 4.23. Existing private land use designations and acreage (2001).

Land Use	Acreage	Percent
Single-Family/Duplex Residential [1]	201.9	28
Multi-Family Residential [1]	25.3	3.5
Multi-Family Residential and Commercial [1],[2]	50.1	7
Open Space/Recreation	201.6	26
Open/Space/Recreation-Facilities allowed [3]	3.8	0.5
Meadow	129.0	18
Public Services[4]/Parking	48.0	7
Internal Local Roads/SR 88 and ROW	72.0	10
Total	**732.0**	**100**

Notes:
[1] Employee housing included in single-family and multi-family designations.
[2] Includes retail shops, restaurants, and administration and mountain operations including ski patrol facilities, ski school and ski rental facilities.
[3] Includes stables, tennis courts, and playground.
[4] Includes the KMPUD treatment facility, KMR vehicle maintenance shop, microwave/telephone facilities, fire equipment, and the Mountain Utilities power generation facility.
Source: KMR 2001a.

Residential land use occupies about 227 acres, or about 31 percent of Kirkwood. As of *November* 2001, there were 173 single-family/duplex homes and 381 multi-family units (includes employee housing units). Only about 5 percent of residences are occupied on a full-time basis, as the majority are second-home or vacation units. Kirkwood Central Reservations and Kirkwood Accommodations operate rental businesses, providing accommodations in condominiums and single-family homes.

Commercial land uses occupy about three acres, mostly at the Village Center, Timber Creek, and north of SR 88. Commercial facilities include lodging, gas station/mini-market, retail shops, restaurants, administration, and a real estate office.

Land use categories including roads and service/parking areas occupy 120 acres (about 16 percent) of Kirkwood. Roads include SR 88 and local roads. SR 88 is a two-lane State Scenic Highway and National Forest Scenic Byway, which provides access from Jackson to the west and South Lake Tahoe to the northeast. It is the principal east-west route for Amador County and northern Alpine County. Kirkwood Meadows Drive is a two-lane, paved road that provides the only public access to Kirkwood. Public services includes water tanks and wastewater treatment facilities, power generation, and telephone facilities. The main parking lots and eastern shoulder of Kirkwood Meadows Drive provide spaces for up to 2,500 cars (day visitors).

Open Space occupies about 201.6 acres (about 25.6 percent) of the Kirkwood area. Recreational facilities are in areas now designated as Open Space/Recreation- Facilities allowed. This land use occupies about four acres and includes tennis courts, and playgrounds. Areas used for dispersed recreation (hiking,

horseback riding, bicycling, and cross-country skiing) are designated as Open Space.

Kirkwood Meadow (land use designation Meadow) is a fairly level area bisected by Kirkwood Creek. Permanent retention of this meadow was stipulated in an agreement signed by KMR and the Forest Service in 1971. Management goals prevent permanent structures or use patterns that would lead to degradation.

4.6.3.3 County Land Use Plans

Private lands of Kirkwood fall within the jurisdiction of three counties - Amador, El Dorado, and Alpine. Kirkwood occupies about 316 acres on the western side of Alpine County. The *Alpine County General Plan* designates Kirkwood as "Planned Development", which allows "any residential, commercial, institutional, and recreational uses arranged and/or designed in an integrated and organized development deemed acceptable to the county." The public lands surrounding Kirkwood are designated as "Recreational Site" and lands around Caples Lake to the east of Kirkwood are designated as "Open Space." SR 88 is identified as a scenic highway.

Kirkwood occupies about 342 acres on the eastern side of Amador County. The *Amador County General Plan* designates Kirkwood as "Special Planning." This classification applies to land uses proposed as planned developments or for which there are other carefully prepared or supervised plans. The NFS lands surrounding Kirkwood are designated as "Open Forest." SR 88 is identified as a scenic highway.

About 72 acres of Kirkwood lying north of SR 88 are in El Dorado County. The *El Dorado County General Plan* designates private lands within Kirkwood as "Adopted Plan," which recognizes areas for which specific land use plans have been prepared and adopted, in this instance the 1988 Kirkwood Master Plan. These plans are adopted and incorporated by reference in the county's General Plan, and the respective land use map associated with the plan is adopted as the General Plan map for that area. NFS lands surrounding Kirkwood are designated as "Natural Resource," which applies to areas that contain economically viable natural resources. SR 88 is designated as a scenic highway. The *El Dorado County General Plan* was invalidated by the Superior Court of California, County of Sacramento. El Dorado County is undertaking a process to correct the deficiencies in the General Plan EIR, which could lead to modifications to the General Plan; however, the revised plan is not likely to include changes in the Kirkwood area (Maurer 1999). El Dorado County expects to have an approved revised General Plan by late 2002.

4.6.3.4 Kirkwood Master Plan

Development of the private lands within Kirkwood is subject to provisions of the Kirkwood Master Plan (KAI 1988), which was adopted by Alpine, Amador and El Dorado Counties. Kirkwood's original Master Plan was prepared in 1971, and amended Master Plans were adopted in 1981 and 1988. The Draft Plan (KMR 2001a), if adopted, would supersede the 1988 Master Plan. The current California Government Code provisions regarding Specific Plans are the successors to prior planning statutes, which allowed Master Plans. The Kirkwood Master Plan is the implementing document which allows development of the Kirkwood Ski Resort in accordance with Alpine County's Planned Development designation, Amador County's Special Planning designation, and El Dorado County's Adopted Plan designation, and other applicable requirements of the respective General Plans and zoning.

KMR's stated overall development concept for the Kirkwood community is to build a year-round destination resort while protecting the natural environment in order to maintain Kirkwood as a unique mountain community. Skiing is the major winter recreational use while non-winter uses include hiking, biking, running, tennis, equestrian activities and other outdoor sports. KMR also plans to service the conference trade and to sponsor cultural events on a year-round basis. The Master Plan authorizes a total of 239 acres of ski mountain development (private lands), 1,413 residential units, 160,000 square feet of commercial development, and a variety of related infrastructure and support services.

The 1988 Master Plan identified three activity centers around the central meadow area - the Village Center, Day Skier Center, and Highway Center. All development was planned to be clustered in the trees on both sides of Kirkwood Meadows Drive, which extends south from SR 88. The Village Center, located at the southern end of the valley, was identified as the primary support base for the ski mountain, which would provide the commercial core, destination skier lodging, and focal point for the entire development. The Day Skier Center, located near the western lift complex, was also to serve as a secondary mountain support base with limited lodging and commercial facilities. This center included two parking areas accommodating approximately 1,500 day skier automobiles and various support facilities and utilities. The Highway Center on the north side of SR 88 included commercial facilities, some lodging, the cross country ski center and stables. Other developments within Kirkwood were planned as low-density single-family and moderate-density condominium development.

Table 4.24 shows a comparison of the zoning designations used in the 1988 Master Plan and the Specific Plan. In the 1988 Plan, there were three residential zoning designations (single-family residential (SR), medium-density condos (CR-M), and high density condos(CR-H)), which occupied 163.8 acres, as well as lodging, commercial, and service and parking zones. The total zoned area was 207.8 acres, leaving 524.2 acres not zoned. Figure 3.4 shows the distribution of zoning designations under the 1988 Master Plan (KAI 1988).

4.6.3.5Eldorado National Forest

The SUP issued by the ENF authorizes KMR to provide alpine recreational opportunities on 2,129 acres of NFS land. The ENF Forest Plan applies to federal lands surrounding the project area. The lands surrounding Kirkwood are classified in several different management units:

- Management Area 11, Existing Winter Sports - ski slopes south and west of Kirkwood.
- Management Area 1, Wilderness - Mokelumne Wilderness, most of the Caples Creek roadless area.
- Management Area 13, Private Sector Recreation - Kirkwood Lake, Devils Gate residences.
- Management Area 12, Potential Winter Sports - one area (Martin Meadows) west of Kirkwood.
- Management Area 8, Roaded Natural - remainder of the NFS lands adjacent to Kirkwood.

Table 4.24. Comparison of 1988 Master Plan and Specific Plan land use designations.

	1988 Master Plan	Specific Plan
Zoning Designation[1]	**Acres**	**Acres**
Single-Family/Duplex Residential (SR)	100.2	201.9
Condominium Medium Density Residential (CR-M)	14.7	NA[1]
Condominium High Density Residential (CR-H)	48.9	NA
Multi-Family (MF) and Multi-Family and Commercial (MF &C)	NA	75.4
Lodging	8.1	NA

Commercial	5.3	NA
Service and Parking (S/P)	30.6[2]	48.0
Roads[3]	0	72.0
Open Space and Recreation (OS/R and OS/R-Facilities allowed)[2]	0	205.4
Meadow[3]	0	129.0
Remaining	524.2[3]	0
Total	**732**	**731.7**

[1] NA - Not applicable because it is either a new zoning category or has been abandoned as a zoning category.
[2] Estimated acres.
[3] Roads, open space and meadow were not given a land use category in 1988.

Source: KMR 2001a.

4.6.4 Environmental Impacts

4.6.4.1 Effects on Adjacent Lands

The Proposed Project would have minor effects on existing land uses of adjacent areas of the ENF, such as Kirkwood Lake and the Caples Creek roadless area. It would be compatible with land use management planning for these areas.

Several project features would result in increased recreational uses of these areas by residents of Kirkwood, including the increase of winter PAOT (persons-at-one-time) to 11,800, summer PAOT to 6,558, and 9,800 for special events, residential and commercial development throughout Kirkwood, and specifically in Kirkwood North. Development of Kirkwood North is identified as Phase 6 (lowest priority) in the Draft Plan, but the actual schedule of construction would be driven by market demand.

Promoting Kirkwood as a year-round resort would greatly increase the summer population and would result in increased recreational use of surrounding NFS lands. KMR plans to develop summertime recreational programs and activities that would keep some of the increased population within Kirkwood. Expanded development of recreational opportunities within the Kirkwood Valley may draw some recreational users from other parts of the ENF, but is more likely to represent an increase in overall use of the forest and result in a significant land use impact.

Specific public concerns were expressed regarding Kirkwood Lake and the Caples Creek roadless area. Kirkwood Lake has 24 recreational residences, a Girl Scout camp, and a public campground, all on NFS lands. It is managed by the ENF for public recreation. The lake and residences are located about 1/4 mile west of Kirkwood North. The southeastern boundary of the Caples Creek roadless area, which is managed as wilderness, is located about 1/4 mile north of Kirkwood North. Parking is limited at Kirkwood Lake, and the larger summer population may result in increased competition for parking spaces. There would be some increase in foot traffic from Kirkwood to Kirkwood Lake, primarily due to development of Kirkwood North and proposed improvements to the trail system at Kirkwood. Although there are no proposed improvements to trails in Kirkwood North, general improvements to the Kirkwood trail system could bring more hikers into this area. Due to its close proximity to the southern boundary of the Caples Creek roadless area, Kirkwood North development would also increase foot traffic into this area. Effects in the Caples Creek area would most likely be limited to increased use of existing trails and would not constitute a

significant impact. However, due to the concentrated area of use around Kirkwood Lake, the already moderate to high level of visitation, and the ecological sensitivity of the area, impacts to Kirkwood Lake would be significant. These resource-specific impacts are discussed in the associated sections of Chapter 4, particularly Water Quality, Aquatic Resources, Wetland Resources, Vegetation Resources, and Recreation.

Increased recreational use at Kirkwood Lake and the Caples Creek roadless area would be consistent with the current management designations in the Forest Plan for the ENF. There are no restrictions in the existing Master Plan or SUP that would limit Kirkwood's summer population, as the summer PAOT of 2,200 used in the 1973 EIS was an estimate for assessing impacts, not a restriction. Development of Kirkwood North is consistent with applicable land use plans. Impacts to land use designations would be less than significant.

Note that while this section of the analysis concludes that since anticipated land uses would remain consistent with qualitative land use classifications assigned by planning agencies, other potentially significant impacts could result from quantitative increases in use. For example, the recreation analysis (section 4.12) concludes that the impact of growing numbers of Kirkwood residents and visitors using popular recreational sites and facilities in the area, particularly those within walking distance, would constitute a significant, unavoidable, adverse impact, as most such nearby sites and facilities are already operating at or near capacity.

4.6.4.2 Development North of SR 88

Kirkwood North is the 75-acre subarea that encompasses all KMR-owned lands north of SR 88. The existing development of this area includes a gas station, the Kirkwood Inn, the Cross-Country Ski Center, horse stables, and the remnants of an old motel. The existing zoning includes commercial, lodging, and moderate and high density condominiums. Much of the area is not zoned, and most of the zoned areas are not developed.

The Draft Plan would change medium density condominiums to 18 single-family residential housing units, reducing the allowable population under the 1988 Master Plan by 63 percent. Multi-family residential and Commercial land use designations would include a total of 20,000 square feet of commercial space. Existing cross-country trails would be protected by easements. The stables would be displaced by development of Kirkwood North and would be relocated. Portions of Kirkwood North would be protected as the land use designation Meadow.

Development of Kirkwood North would cause changes in the existing land use. Currently undeveloped areas would be developed as single-family/duplex residential housing or as multi-family residential and commercial. These changes are similar to those included in the 1988 Master Plan, but they reduce the number of residents and are consistent with Kirkwood's dominant resort land use. Existing recreational facilities and commercial development would not be adversely affected by the additional development. The proposed development of Kirkwood North is compatible with all applicable land use plans.

4.6.4.3 Changing Zoning Designations to Ski-In/Ski-Out

The Draft Plan identifies the areas on either side of Timber Creek Village as Ski-In/Ski-Out North and Ski-In/Ski-Out South. These subareas would be zoned single-family/duplex residential and multi-family residential. The northern edge of Ski-In/Ski-Out North would be separated from the adjacent KMA subdivision by the naturally occurring drainage. This drainage is excluded from development. Most of the land within the proposed Ski-In/Ski-Out subareas was not zoned in the 1988 Master Plan, although portions near Kirkwood Meadows Drive were zoned for parking and high density condominium development. Most of the land in the Ski-In/Ski-Out areas is currently undeveloped, and may be used for dispersed recreation.

Development of these areas would involve a change in the existing land use, from undeveloped to residential. It would eliminate about 105 acres of undeveloped land used for dispersed recreation within Kirkwood, but would not significantly affect the overall availability of lands for dispersed recreation in the vicinity of Kirkwood. The Ski-In/Ski-Out North development may change the views, privacy and perceived quality of the residential environment for residents of existing houses in the nearby Kirkwood Meadow subdivision. However, the Ski-In/Ski-Out developments would be compatible with other existing and proposed land uses at Kirkwood, and with its use as a resort. They would also not conflict with applicable land use plans and policies.

4.6.4.4Effects of Increased Housing and Development within Kirkwood

Compared to existing conditions, both the 1988 Master Plan and the Draft Plan provide for increased residential, commercial, and other developments at Kirkwood. These changes would result in more housing structures, residents, and commercial facilities than are currently present, and less undeveloped land. This would continue the trend of changing the Kirkwood area from a rural area to a developed resort environment. This may be considered adverse by people who value the original rural setting, and was identified as an unavoidable adverse impact in the original approved Kirkwood Master Plan (Roberts 1973). Much of the trend toward resort development has already occurred. The additional development that would occur under the Draft Plan would not alter the overall land use of Kirkwood, is compatible with its purpose as a resort, and is consistent with all applicable land use plans.

4.6.5 Level of Significance Before Mitigation

All the land use impacts discussed above would be less than significant before mitigation.

4.6.6 Mitigation

No mitigation of land use impacts would be necessary.

4.6.7 Level of Significance After Mitigation

All the land use impacts discussed above would be less than significant without mitigation.

4.6.8 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse impacts related to land use were identified.

4.6.9 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of these cumulative actions have the potential to interact with the Proposed Project to generate cumulative land use effects, primarily through increased use of lands adjacent to Kirkwood. Growth and development in South Tahoe and other surrounding communities would fuel the increase in tourism and dispersed recreation in the surrounding area, further increasing the recreational use of these lands. Kirkwood Lake and the Caples Creek roadless area were identified as key concerns. These and other areas surrounding the project area have been assigned primarily recreational and wilderness land use classifications. Up to a point, increases in recreational use would be compatible with such classifications. However, as discussed in the recreation section of this analysis (section 4.12) some popular recreation sites and facilities in the area are currently used at or near capacity, and additional increases would constitute a significant, unavoidable, adverse recreational impact. Such serious recreational impacts could in turn drive significant changes in land use management or even land use classifications, particularly on the ENF.

4.7 Traffic and Circulation

4.7.1 Issues

The following issues were derived from public and agency scoping and resource specialist review.

4.7.1.1 Public Comments

- Effects of increased traffic volumes on state and local roads.
- Adequacy of parking.
- Effects on SR 88 from Kirkwood North development.
- Impacts on access from Kirkwood North to Kirkwood Meadows Drive.
- Impacts on local and regional transportation.
- Effects on traffic of employees commuting to work.
- Adequacy/efficiency of emergency access roads.
- Effects on service levels of SR 88 and Kirkwood Meadows Drive.

4.7.1.2 Agency Comments

- Ultimate SR 88 improvements/configuration at intersection with Kirkwood Meadows Drive.
- Need for left turn channelization and auxiliary lanes on SR 88.
- Traffic circulation.
- Trip generation and distribution with levels of service.

- Future traffic projections.
- Transit alternatives.
- Trip generation and traffic impact fees.
- Cumulative traffic effects.

4.7.2 METHODS

The transportation studies listed in section 4.7.2.4 identified existing traffic levels and patterns in the Kirkwood area which may be affected by the Proposed Project, and projected future traffic levels which may be experienced with implementation of the Proposed Project and alternatives. Information on existing conditions was compiled from existing Caltrans data, traffic counts at the SR 88/Kirkwood Meadows Drive intersection, and the Kirkwood Specific Plan (KMR 2001a). Future traffic levels were calculated from historic data on skier numbers and traffic counts, and from trip generation standards contained in the Institute of Traffic Engineers (ITE) Trip Generation Manual (ITE 1997).

In preparing this Recirculated Revised EIR, current data and information were reviewed to determine the extent to which the technical analysis documented in this section should be updated. This review indicated that the key variables used in this analysis had changed very little. Caltrans figures in 2000 for Average Annual Daily Traffic (AADT), peak month Average Daily Traffic (peak month ADT), and peak hour traffic on SR 88 east of Kirkwood Meadows Drive were slightly lower than the 1997 figures originally used in this analysis. Current figures for SR 88 west of Kirkwood Meadows Drive were slightly higher. Average peak-day skier visits for the 5 years ending in 2001 were just 1 percent higher than for the 3 years ending in 1999, the figure used in this analysis. The projected number of total units planned for development south of SR 88 fell by 2 percent under the current Draft Plan from the number used in the previous analysis. As a result of this review, updated figures in the following analysis were included where appropriate (e.g., current levels of service), but the change is negligible. The detailed technical analysis (e.g., trip generation projections in Appendix A) was not repeated to reflect these changes.

4.7.2.1 Assumptions

As explained in section 4.7.2, differences between current traffic volumes and skier numbers and those used in the original traffic impact analysis are considered negligible.

4.7.2.2 Significance Criteria

CEQA Guidelines state that a project may have a significant effect if it would "cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system." A Level of Service (LOS, defined below) of C is considered the threshold of acceptable average daily traffic on SR 88 in the vicinity of Kirkwood, as stated in the *Amador County Regional Transportation Plan* (Fehr & Peers 1998).

4.7.2.3 Regulatory Setting

Caltrans regulates the state highway system and stipulates design guidelines which must be included in final designs for changes to a state highway.

4.7.2.4 Existing Studies and Information

Information on transportation came from several sources including:

- *Kirkwood Specific Plan* (KMR 2001a).
- Existing CEQA documents, including the *Final EIR and EA for Public Comment: Kirkwood Water*

Rights and Snowmaking Project (Simpson 1995d).

- *Draft Supplemental EIR: East Meadows 3 Subdivision* (Simpson 1996).

- *Amador County Regional Transportation Plan 1996/1997 Update, Final Report* (Fehr & Peers 1998).

- California Department of Transportation (Caltrans) - *Traffic Volumes on the California State Highway System* (1998-2000), and traffic count data (from 1988 and 1999) for the SR 88/Kirkwood Meadows Drive intersection. AADT data from 1998-2000 obtained from Caltrans website (www.dot.ca.gov).

Information was also collected through personal communication with planners from Kirkwood and Amador, Alpine, and El Dorado Counties, and from field investigations.

4.7.3 Environmental Setting

Kirkwood is accessed via SR 88, which is the principal east-west arterial in Amador County and northern Alpine County, and the only through-road in the project vicinity. SR 88 is a year-round, two-lane, designated State Scenic Highway and National Forest Scenic Byway. Although a year-round highway, it can be temporarily closed during major winter storms. At the intersection with Kirkwood Meadows Drive, SR 88 has an eastbound auxiliary lane for traffic turning right into Kirkwood, and a left turn lane for westbound traffic turning into Kirkwood.

Kirkwood Meadows Drive is a two-lane paved roadway, providing the only public access from SR 88 to the ski area base facilities and residential areas within Kirkwood. Several local residential streets are accessed from Kirkwood Meadows Drive, including Dangberg Drive, which provides access to the KMA subdivision. As Kirkwood Meadows Drive loops around the south end of the Village Center and turns north along the east side of Kirkwood Meadow, the road turns into East Meadows Drive. This road provides access to the East Meadows subdivision. An emergency access road connects East Meadows Drive to SR 88, but it is not open to the public during normal conditions.

Caltrans records traffic volumes on state highways. Traffic volumes are expressed in terms of ADT or AADT. ADT is the number of vehicles passing a count location in both directions in a 24-hour period. AADT is the total volume for the year divided by 365 days. The peak month ADT is the average daily traffic for the month of heaviest traffic flow; peak-hour traffic is also measured to show how near capacity the highway operates at peak-hour conditions.

Traffic congestion is typically described using the concept of Level of Service (LOS), in which a letter grade from A to F represents successive levels of congestion from free flow to total breakdown of flow. Table 4.25 describes the six LOS classifications and the specific traffic volumes that correspond to the LOS categories. Table 4.26 shows the existing traffic volume (2000 data), the traffic volume from 1997, and the corresponding LOS for SR 88. As shown in Table 4.26, SR 88 currently has an AADT LOS of B, and a peak month ADT LOS of C. Effects of the Proposed Project on future traffic volumes and LOS are discussed in section 4.7.4.1 below.

Table 4.25. SR 88 Levels of Service.

LOS		Average Daily Traffic
A.	Completely free flow.	Up to 1,200 ADT
B.	Free flow; presence of other vehicles noticeable.	Up to 3,300 ADT
C.	Ability to maneuver and select operating speed is affected.	Up to 6,400 ADT
D.	Unstable flow; speeds and ability to maneuver are severely restricted.	Up to 11,000 ADT
E.	At or near capacity; flow is quite unstable.	Up to 15,500 ADT
F.	Forced flow; roadway service breaks down.	More than 15,500 ADT

Source: Fehr and Peers (1998).

Table 4.26. SR 88 existing traffic volumes and Levels of Service.

Year	Location	Traffic Parameter	Traffic Volume	LOS
2000	West of Kirkwood Meadows Drive	AADT	2,900	B
		peak month ADT[1]	4,250	C
		peak hour	500	--
	East of Kirkwood Meadows Drive	AADT	2,950	B
		peak month ADT	4,250	C
		peak hour	400	--
1997 (data used in original calculations)	West of Kirkwood Meadows Drive	AADT	2,800	B
		peak month ADT	5,000	C
		peak hour	650	--
	East of Kirkwood Meadows Drive	AADT	3,150	B
		peak month ADT	5,500	C
		peak hour	500	--

[1]Peak month on SR 88 in the Kirkwood area occurs during the summer season.
Source: Caltrans (2000); Fehr and Peers (1998).

The existing peak-hour LOS for the Kirkwood Meadows Drive/SR 88 intersection was calculated using data from traffic counts taken in February of 1988 and 1999. The 1988 data is still considered representative of current conditions since peak-day usage during the 1988 counts was 7,243 skiers, while the average peak-day usage for the last 5 years is 7,293 skiers. A traffic count was also taken during February of 1999 over Presidents Day weekend. The percentage of turning movements (e.g., northbound traffic turning right or eastbound traffic turning left) was averaged for all of the traffic count data and used to calculate existing peak-hour LOS. Based on these counts and turning movements, the average peak-hour morning and afternoon LOS at this intersection is B. Past analysis of this intersection (Simpson 1995d, Simpson 1996) had calculated a peak-hour LOS of F. However, improvements to the intersection have been made since those studies were conducted, including an eastbound auxiliary lane and a westbound left-turn lane on SR 88. LOS during non-peak days is A for both morning and afternoon peak-hour traffic.

Turning movement percentages generated from traffic count data show that approximately 55 to 64 percent of traffic at Kirkwood comes from the east, which would include South Lake Tahoe, Markleeville, and the

Minden/Gardnerville area in Nevada. Traffic from these areas also affects the SR 88/SR 89 intersection located about 16 miles east of Kirkwood. Traffic volumes on SR 88 heading toward this location are similar to those at Kirkwood. Caltrans traffic volume data from 2000 show a peak-hour traffic volume of 420 and an AADT volume of 3,000 west of the SR 88/SR 89 intersection. Peak-hour and AADT volumes east of the intersection are 410 and 2,800, respectively. Adequate capacity exists at these volumes for all turning movements and the LOS is B.

Most traffic between Kirkwood and South Lake Tahoe passes through the SR 89/US 50 intersection. A break in the route occurs at this intersection, with the Meyers, southbound junction occurring at mile 8.55 and the South Lake Tahoe, northbound junction occurring at mile 8.56. Caltrans (2000) reports a peak-hour flow of 540 and an AADT of 4,400 at the south(west)-bound SR 89/US 50 junction, but a peak-hour flow of 2,800 and an AADT of 18,000 at the north-bound junction. This intersection presently operates at a LOS of F during the peak period, occurring in the summer season. During the winter, peak traffic at this location is about 70 to 80 percent of summer volumes (Anderson, in Simpson 1996).

In order to alleviate traffic impacts in Amador County associated with new development, county ordinance #14708 states that all residential construction in Amador County is subject to a traffic impact fee to be paid at the time of building permit issuance. Currently, single-family development generates $1,462/unit, multi-family development generates $1,038/unit, and commercial development generates $487/1,000 square feet. These fees, subject to change annually according to the Consumer Price Index, are divided between improvements to regional roads (86 percent) and to county roads (14 percent) (Price 2001).

Alpine County currently spends a portion of its state highway funds within Amador County in order to improve traffic flow to Alpine County. This pooling of highway funds is approved under the three-county Memorandum of Understanding (MOU), which includes Alpine, Amador, and Calaveras counties and aims to improve traffic flow in this region (Turnbeaugh 2001). Passing lanes are currently under construction near Cook Station (mile 41) and Ham Station (mile 45) (Turnbeaugh 2001).

El Dorado County does not have traffic impact fees in place.

A private charter bus provides service between the Kirkwood area and South Lake Tahoe on a daily basis during the peak of the ski season. KMR operates an employee shuttle service that provides service between Kirkwood and South Lake Tahoe, Gardnerville, and Woodfords. *Employees are also encouraged to car pool through a gas-cash program, which reimburses the employee who is driving other scheduled employees to work.* KMR operates an in-valley shuttle service that transports visitors and residents within the Kirkwood area. Approximately 300 day-skiers per day use the *in-valley* bus system.

Currently there are 2,500 parking spaces available on a daily basis for wintertime day visitors, and approximately 10 percent more during the summer when snow is off the ground. Main parking areas include the east side of Kirkwood Meadows Drive, Timber Creek, Chair 7, and Snowkirk. Parking is provided within the residential areas for overnight users. The Kirkwood Master Parking Plan outlines parking procedures at Kirkwood. Outlined in this plan is the KMR policy that, should the number of vehicles entering Kirkwood exceed the number of available parking spaces, visitors are turned away. This situation occurred on March 9, 2002, a record visitation day, when parking was provided for approximately 3,300 vehicles and another 200 were turned away.

4.7.4 Environmental Impacts

4.7.4.1 Effects of increased traffic volumes on state and local roads

The currently permitted maximum persons-at-one-time (PAOT) of 11,800 would not change under the Proposed Project. The number of residential units would increase to 1,503 and commercial space would reach about 194,300 square feet. Summer population would increase to a maximum PAOT of 6,558 (9,800 for special events). An increase in both winter and summer visitors/residents at Kirkwood would increase traffic on SR 88 both east and west of Kirkwood Meadows Drive and at the intersection of SR 88 and Kirkwood Meadows Drive. To estimate the amount of traffic generated by the Proposed Project, a trip generation rate was developed for the winter season based on historic data on skier numbers and associated traffic. ITE trip generation rates (ITE 1997) were used only for summer estimates, as they rely on residential unit counts and commercial square feet and would not account for a significant number of winter season day-users. Appendix A contains the technical traffic memorandum and the supporting data on LOS calculations and trip generation.

Table 4.27 displays estimated future AADT and peak month ADT on SR 88 both east and west of Kirkwood Meadows Drive with and without the Proposed Project. Should traffic volumes increase on SR 88 as predicted without the proposed development, LOS west of Kirkwood Meadows Drive would be C for AADT and D for peak-month ADT. East of Kirkwood Meadows Drive LOS would be D for both AADT and peak month ADT. With the Proposed Project, LOS would be D for all categories both east and west of Kirkwood Meadows Drive. Thus, significant increases in traffic volumes directly related to the Proposed Project, which change the LOS to a level below C, would occur on SR 88 west of Kirkwood. This constitutes a significant impact.

Table 4.27. Future traffic volumes and level of service on SR 88 with and without the Proposed Project.

Reference Condition	Location	Traffic Parameter	Traffic Volume	LOS
Future without Proposed Project (2020)	West of Kirkwood Meadows Drive	AADT	6,225	C
		peak-month ADT	7,560	D
	East of Kirkwood Meadows Drive	AADT	7,000	D
		peak-month ADT	8,500	D
Future (2020) with Proposed Project	West of Kirkwood Meadows Drive	AADT	8,725	D
		peak-month ADT	10,060	D
	East of Kirkwood Meadows Drive	AADT	9,500	D
		peak-month ADT	11,000	D

Source: Fehr and Peers (1998); trip generation analysis for the Draft Plan (Appendix A).

As shown in Table 4.27, without the Proposed Project future AADT on SR 88 would increase by 3,325 vehicles west of Kirkwood, and 4,610 east of Kirkwood. Traffic projections attribute an additional average incremental increase of 2,500 vehicle trips per day to the Proposed Project.

Table 4.28 displays the existing and future skier-generated peak-hour traffic at the SR 88/Kirkwood Meadows Drive intersection.

Table 4.28. Existing and year 2020 skier-generated peak-hour vehicular trips.

No. Skiers	Total		EB-R[2]		WB-L[2]		NB-L[2]		NB-R[2]	
	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.	a.m.	p.m.
7,451	765	1,085	245	10	480	45	10	360	30	670

10,800	1,105	1,570	355	15	695	60	10	520	45	975
Difference	340	485	110	5	215	15	0[1]	160	15	305

[1]Rounding during calculations resulted in zero change for this category.
[2]EB-R- Eastbound, right turn; WB-L- Westbound, left turn; NB-L- Northbound, left turn; NB-R- Northbound, right turn.

As shown in Table 4.28, peak traffic occurs in the afternoon as skiers leave the resort. Peak-hour traffic would increase from the existing 1,085 trips to 1,570 trips when the resort reaches its maximum skiers-at-one time (SAOT) limit of 10,800, for a total increase of 485 trips. However, this estimated increase is a worst-case scenario. The ultimate resident population associated with the proposed development would contain a higher percentage of overnight visitors than day skiers, which are the primary source of peak-hour traffic. The estimated increase of 485 trips could occur as departure times overlap between overnight visitors and day skiers, such as on Sunday afternoons when both day skiers and many of the visitors who have stayed for the weekend were leaving. On most days the increase in peak-hour traffic would be less than 485 trips.

Table 4.29 shows the total peak-hour traffic at the SR 88/Kirkwood Meadows Drive intersection when the background traffic on SR 88 is included. Future traffic projections for SR 88 were based on information contained in the *Amador County Regional Transportation Plan 1996/1997 Update, Final Report* (Fehr and Peers 1998). These volumes were used for the capacity (LOS) analysis for the intersection.

Table 4.29. SR 88/Kirkwood Meadows Drive winter peak-hour traffic and turning movement projections. (a.m./p.m.)

Skiers	Year	EB-T[1]	EB-R[1]	WB-L[1]	WB-T[1]	NB-L[1]	NB-R[1]
7,451	1999	15/45	245/10	480/45	15/70	10/360	30/670
10,800	2020	110/245	355/15	695/60	100/550	10/520	45/975

[1]EB-T- Eastbound, through; EB-R- Eastbound, right turn; WB-L- Westbound, left turn; WB-T-Westbound, through; NB-L-Northbound, left turn; NB-R- Northbound, right turn.
Source: Fehr and Peers 1998.

LOS was calculated for the SR 88/Kirkwood Meadows Drive intersection based on the traffic volumes presented in Table 4.29. The results are shown in Table 4.30.

Table 4.30. SR 88/Kirkwood Meadows Drive Level of Service (a.m./p.m.).

Year	Units	NB-L [1]	NB-R [1]	WB-L [1]	Overall
1999 Winter (non-peak)	5,726 skiers	B/B	A/A	A/A	A/B
1999 Winter (peak)	7,451 skiers	C/B	A/B	B/A	B/B
2020 Winter (peak)	10,800 skiers	F/F-	A/F	C/A	C/F
2020 Summer	1,453 homes[2]	A/E	A/A	A/A	A/B

[1] NB-L- Northbound, left turn; NB-R- Northbound, right turn; WB-L- Westbound, left turn.
[2] Actual number at year 2020 under KMR's 2001 Specific Plan is 1,346.
Source: ITE trip generation rates (1997).

The analysis shows that the LOS during the winter peak-hour at buildout would be C in the morning and F in the afternoon. The main problem is that exiting traffic (northbound traffic on Kirkwood Meadows Drive) would experience substantial delays as vehicles wait for safe gaps in traffic to turn. As mentioned, the peak-hour skier trip generation is a worst-case scenario, and skier-generated traffic would be less than the maximum assumed in the analysis under most circumstances. Also, as shown in Tables 4.28 and 4.29, traffic at peak times would turn onto SR 88 against low east- and westbound volumes. Turning movements onto SR 88 would not be severely impeded by east- and westbound traffic because frequent opportunity for turning movements would occur.

For the summer season, trip generation was calculated using 1997 ITE trip generation rates for recreational homes. The Draft Plan (KMR 2001a) would allow a summer PAOT of 6,558 with 1,417 residential units south of SR 88. This amount is 36 units less than the number proposed in KMR's 1998 Specific Plan. Due to the similarity between numbers, trip generation calculations made using the 1,453 residential units were retained in this analysis and are considered slightly conservative. Peak-hour traffic generated by 1,453 residential units would total approximately 384 trips, with 184 trips into the resort and 200 trips out.

Table 4.28 shows the peak-hour turning movements of vehicles at the SR 88/Kirkwood Meadows Drive intersection. At full buildout, assuming the maximum SAOT, there would be an increase of approximately 305 vehicles leaving Kirkwood in the afternoon and heading towards the South Lake Tahoe, Markleeville, and the Minden/Gardnerville area. This would add to the traffic volume at the SR 88/SR 89 and SR 89/US 50 intersections. Observations indicate that approximately 75-80 percent of vehicles turning east onto SR 88 from Kirkwood would subsequently turn north at the SR 88/SR 89 intersection towards South Lake Tahoe. Most of these vehicles would pass through the SR 89/US 50 intersection at Meyers. These additional vehicles would not be numerous enough to change the overall current LOS at this intersection, and they would primarily contribute to traffic volume during the winter, which is not the most difficult season in terms of the functioning of this intersection. Most of the Kirkwood traffic turns right from northbound SR 89 onto US 50, which is not a critical turning movement. An additional 160 vehicles would turn west on SR 88 when leaving Kirkwood, eventually adding to the traffic volumes at the SR 88/SR 49 intersection near Jackson.

The amount of employee housing provided at Kirkwood would have a marginal impact on area traffic. A requirement to house 50 percent of Kirkwood employees would reduce these impacts relative to a lower requirement. As the number of employees housed outside of Kirkwood increased, the associated round-trip traffic would also increase.

The CEQA Initial Study (in June 2000) for the KMPUD WWTP upgrade (ECO:LOGIC 2000) found that traffic-related impacts would not be significant. A temporary increase in trucks and other construction vehicles would occur during construction of the WWTP improvements. Effects would be minor.

4.7.4.2 Adequacy of Parking

Parking demand at Kirkwood would be the highest during the winter season when skiing activity was at its peak and during summer special events. The Draft Plan would establish minimum parking standards for various land uses. Table 4.31 outlines the required parking spaces associated with land use categories. The number of parking spaces includes both covered and uncovered parking as required by local regulations.

These parking requirements should be sufficient to satisfy the needs of residential units and commercial space.

Table 4.31. Minimum parking requirements.

Land Use	Number of Parking Spaces Required
Residential Uses	
Single-family/duplex	3 spaces/unit
Multi-family	1.5 spaces/unit
Hotel/Motel	0.5 spaces/bedroom
Bed and breakfast	0.5 spaces/bedroom
Employee Housing	1 space/unit
Employee Housing in Youth Hotel or Dormitory	1 space/bedroom
Commercial Uses	
Retail, Customer Services, Food and Beverage, Medical Services, Educational and Child-Care	1 space per 1,000 sq. ft.
Group Assembly	25% of Seating Occupancy
Public Service	0.5 per employee

At buildout, it is assumed that day skiers would use all 2,500 existing parking spaces, assuming a vehicle occupancy averaging 2.5 people/car. (Surveys during the winters of 1998/1999 and 1999/2000 observed a range of 2.1 to 2.9 persons per vehicle, which averaged 2.5.) The actual number of spaces needed for day skiers at buildout would depend on the ratio of destination to day skiers. Assuming current visitation trends (approximately 40 percent destination to 60 percent day skiers, with an average bus occupancy of 300 people per day), it is estimated that day skiers at buildout would require about 2,712 parking spaces, exceeding the existing 2,500 spaces. However, the Draft Plan aims to alter this ratio to approximately 60 percent destination, 40 percent day skiers. If 40 percent of the PAOT required day-use parking (not accounting for visitors traveling by bus), approximately 1,888 spaces would be needed and current parking would be adequate. On the other hand, should day use exceed 53 percent of total allowed PAOT, approximately 6,254 visitors needing 2,502 spaces, available parking would not be sufficient. This would create a significant impact.

Summer special events would also create a high demand for parking. Assuming approximately one-third of the 9,800 PAOT would be day visitors (9,800 minus 6,558), and with vehicle occupancy averaging 2.5 people/car, there would be a need for about 1,300 parking spaces during special events. KMR should be able to accommodate 10 percent more parking during the summer season when snow does not cover the ground. Should the proportion of day visitors at special events be more than 60 percent, parking could become a significant problem during summer special events.

The possibility of an increase in parking demand could be addressed through the construction of a parking structure. Specific development plans for such a structure are not included in the Draft Plan since adding structured parking would only occur in the future if the ratio of destination skiers to day skiers did not increase and other options to improve parking availability were not feasible. If needed, the structure would be built in an existing parking lot, either the north end of Snowkirk or the south end of the Lower Chair 7

lot. The Chair 7 location could additionally ease traffic flow by providing parking before traffic proceeds through the Village area and into Snowkirk, thus reducing the number of vehicles passing through Kirkwood. Placement in the Chair 7 lot would require further study into whether the structure would be compatible with the underlying absorption beds associated with the wastewater treatment system. A parking structure would have the added benefit of reducing site disturbance relative to that of surface expansion of lots.

4.7.4.3Effects of Kirkwood North Development on Traffic

The Draft Plan calls for developing 18 single-family units, 68 multi-family residential units, and 25,800 square feet of commercial space in the area north of SR 88. As shown in Figure *3.8,* there would be one main access road to the residential development and the Nordic ski center and another access for the existing roadside restaurant and gas station. Trip generation was calculated from the ITE trip generation rates for recreational residences and commercial space. Year 2020 peak-hour traffic was calculated to be 219 trips. The overall LOS at the intersection of SR 88 and the Kirkwood North access road would be C for southbound traffic on the Kirkwood North access road, and A for SR 88 traffic. The LOS analysis assumed no separate turn lanes at the intersection.

4.7.4.4Level of Significance Before Mitigation

4.7.4.4.1 Effects of increased traffic volumes on state and local roads

LOS C is the threshold for acceptable traffic on SR 88 in the vicinity of Kirkwood. Actions that caused traffic levels to fall below LOS C would be considered a significant impact. Implementation of the Proposed Project would add 2,500 cars to all modeled projections of year 2020 traffic on SR 88. As indicated in Table 4.27, the only resulting change in projected LOS attributable to the Proposed Project would be the change in AADT from LOS C to D on SR 88 west of Kirkwood Meadows Drive. However, the 2020 AADT without the Proposed Project is approximately 6,225 trips, only 175 trips under the breakpoint from LOS C to LOS D. All other projected service levels (i.e., peak-month ADT west of Kirkwood Meadows Drive, and AADT and peak-month ADT east of Kirkwood Meadows Drive) would be LOS D with or without the Proposed Project.

The change in AADT from LOS C to D west of Kirkwood Meadows Drive exceeds the stated significance criterion for SR 88. While the LOS for other modeled parameters would not be changed by implementation of the Proposed Project, the addition of 2,500 cars to the highway already projected to operate at LOS D is also considered a significant impact.

As indicated in Table 4.26, the SR 88/Kirkwood Meadows Drive intersection is projected to operate at LOS F for northbound traffic (traffic leaving the resort on Kirkwood Meadows Drive) during peak hours on peak days. This would be a significant impact but would typically occur very infrequently. Based on historical skier use figures, the intersection would operate below a LOS C during the afternoon peak hour approximately 12 days out of the year. On most days the intersection would operate satisfactorily. It should be noted that traffic volume on SR 88 through the intersection at that time of day is greater in the west-bound direction. An estimated 65 percent of vehicles exiting Kirkwood are turning right onto SR 88, so the opportunity for the majority of vehicles to turn and travel east would be somewhat alleviated by the fact that through-traffic traveling east is less. However, traffic turning west onto SR 88 would experience greater delays due to the greater amount of west-bound traffic and the increased difficulty in performing left-turn movements.

An increase in the ratio of destination skiers to day skiers, as projected would occur with implementation of the Proposed Project, would alleviate peak-hour northbound traffic flow problems on Kirkwood Meadows Drive. The peak-hour congestion would then occur even more rarely, primarily during periods of overlap such as afternoons on Sunday or holidays, when day skiers and extended-stay visitors were both

leaving Kirkwood.

4.7.4.4.2 Adequacy of parking

Parking shortages would occur if the ratio of destination skiers to day-skiers did not increase as planned or if day skiers totaled more than 53 percent of maximum PAOT. However, this impact would be less than significant if the ratio of destination skiers to day skiers increased as planned. Parking demand during special summer events would depend on the ratio of destination to day visitors as well and could also exceed availability if day visitors exceeded 60 percent of the 9,800 summertime PAOT limit for special events. In light of the uncertainty regarding the ratio of destination to day visitors, impacts to parking could potentially be significant.

4.7.4.4.3 Effects of Kirkwood North development on traffic

The impacts of increased development north of SR 88 on traffic would be less than significant. *Signs currently exist along SR 88 that warn drivers of horse and pedestrian traffic, reducing the safety concern to less than significant.*

4.7.4.5Mitigation

4.7.4.5.1 Effects of increased traffic volumes on state and local roads

Mitigation Measure 4.7 (a). A northbound to westbound left-turn acceleration lane on SR 88 should be created to accommodate left-turn movements. Kirkwood Meadows Drive should be restriped and/or widened to accommodate three 10-foot-wide lanes (minimum), which would include one southbound lane and two northbound lanes (one left-turn, one right-turn). Either restriping additional turn lanes or temporarily placing traffic cones during peak periods to form turn lanes would allow left-turn vehicle storage while allowing right turning vehicles to flow.

Mitigation Measure 4.7 (b). Traffic control during peak periods, either through signalization or manual control, at the SR 88/Kirkwood Meadows Drive intersection would improve the LOS rating to B at buildout (modeling results in Appendix A). KMR will conduct traffic counts and LOS modeling of the intersection *during periods of peak visitation, which could include summer special events,* every 3 years and provide the results to TC-TAC. The frequency of this requirement will be modified by TC-TAC based on the rate of growth in traffic experienced since the last evaluation and that expected in the near future. Signalization or manual control of the intersection will occur if traffic flows meet Caltrans minimum requirements for signalization. Alternatively, KMR may pursue other traffic control measures acceptable to Caltrans and all three counties that would improve the LOS rating of the SR 88/Kirkwood Meadows Drive intersection to LOS B.

Mitigation Measure 4.7 (c). Alpine County will implement a traffic impact mitigation fee for future development within Kirkwood. The fee would be used to mitigate traffic impacts on SR 88 both east and west of Kirkwood (in Amador County) that are partially attributable to Alpine County development. The fee system would be based on a similar mitigation fee program already in place within Amador County, which is applicable to development at Kirkwood within Amador County.

4.7.4.5.2 Adequacy of parking

Mitigation Measure 4.7 (d). KMR will prepare an annual report that includes a detailed analysis of day-visitor parking during peak periods such as the Christmas holiday, Presidents Day weekend and other weekends during the ski season, *peak periods during the summer*, *and special events*, *when more than 4,000 day-use visitors are at the resort.* The study will compare day-visitor parking demand during these periods to day-visitor parking capacity at the resort. The results will be reported to TC-TAC *in June of each year.* If the study shows that the number of day-visitor related vehicles parked within the resort exceeds the amount of parking spaces available for day visitors (approximately 2,500 spaces), TC-TAC will require

KMR to implement a mitigation plan which will include one or more of the following actions:

- Provide additional parking spaces in surface lots or parking structures.
- Implement methods to provide greater efficiency in the use of existing parking lots.
  - Reduce parking demand through greater utilization of mass transit, increased vehicle occupancy, car/van pools or other programs that will result in reduced parking demand during peak periods.
  - Restrict day-visitor use to a level that allows parking demand to be accommodated in existing day-visitor parking areas.

Implementation of the actions under this mitigation measure will mitigate to below a level of significance day-visitor parking capacity environmental effects.

4.7.4.5.3 Effects of Kirkwood North development on traffic

Mitigation Measure 4.7 (e). Caltrans design requirements should be used to develop the final intersection layout.

4.7.4.6Level of Significance After Mitigation

4.7.4.6.1 Effects of increased traffic volumes on state and local roads

Traffic impact fees already in place in Amador County, Alpine County's state highway funds used under its MOU, and the traffic impact mitigation fee suggested above for Alpine County would help fund improvements on SR 88. However, funding at this level would probably not allow the improvements necessary to provide an LOS of C or higher on SR 88 through the year 2020. Increasing traffic volumes would remain a significant impact, but the Proposed Project would make only an incremental contribution.

For the Kirkwood Meadows Drive/SR 88 intersection, the recommended lane mitigation would help relieve congestion for northbound traffic turning onto SR 88 and would reduce the length of time the intersection would operate at LOS F. However, during the peak afternoon hour on peak-use days when the majority of skiers were leaving the resort there could be a significant impact at the intersection for a short period of time. Signalization would reduce this impact to less than significant.

4.7.4.6.2 Adequacy of parking

With effective implementation of the proposed mitigation, impacts to parking would be less than significant.

4.7.4.6.3 Effects of Kirkwood North development on traffic

With effective implementation of the proposed mitigation, the effects of Kirkwood North development on traffic would be less than significant.

4.7.5 Significant, Unavoidable Adverse Impacts

As discussed above, the impact of increasing traffic volumes on SR 88 service levels would likely remain significant without a substantial contribution of state and/or federal funds to complete necessary highway improvements. Without such contributions, this impact would be significant, unavoidable, and adverse.

4.7.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the cited cumulative actions could combine with the Proposed Project to generate cumulative effects, primarily in terms of increased traffic on SR 88. Both growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area would add traffic to the highway. As discussed above, the traffic modeling completed for this analysis incorporated traffic increases not associated with the Proposes Project as a baseline for predicting the impacts of the Proposed Project. In other words, the cumulative effects were built into the analysis of the direct and indirect effects of the project. As noted above (section 4.7.5), this projected net growth in traffic on SR 88 would constitute a significant, unavoidable, adverse impact.

4.8 Visual and Aesthetic Resources

The purpose of this analysis is to identify visual and aesthetic resources potentially affected by the construction, operation, and maintenance of the Proposed Project, and to analyze the potential impacts to these resources. This analysis was conducted in compliance with CEQA requirements and is based on methodology established by the Forest Service Visual Management System (VMS, defined below) (Forest Service 1974).

4.8.1 ISSUES

Key issues related to visual and aesthetic resources raised by the public and agency personnel centered on potential impacts to sensitive landscapes as seen from sensitive viewing areas. Specific issues included:

- Impact on the Kirkwood Lake viewshed resulting from development north of SR 88.
- Impact on the SR 88 viewshed.
- Impact on the Emigrant Trail viewshed resulting from ski area development in Emigrant Valley.
- Impact from viewing locations within Kirkwood, particularly Open Space land use areas.
- Impact of increased traffic volumes.
- Impact on NFS lands relative to established visual quality objectives (VQOs, defined below).
- Impact of nighttime outdoor lighting.
- Cumulative impact on lands adjacent to Kirkwood.
- Impact on the trail viewsheds in the Schneider Ridge/Little Round Top area resulting from development north of SR 88.

4.8.2 METHODS

4.8.2.1 Forest Service Visual Management System (VMS)

The Forest Service's VMS provides a useful framework for managing visual resources on all NFS lands. It was applied in this analysis with some modifications to address private-land impacts. The VMS is incorporated into the management prescriptions, standards, and guidelines of the *Eldorado National Forest Land and Resource Management Plan* (Forest Plan). The VMS incorporates the following management tools:

Visual Quality Objectives (VQOs) - management guidelines for public lands that define how the landscape will be managed, the level of acceptable visual alteration permitted in the area, and under what circumstances visual alteration may occur. Descriptions of specific VQOs are provided below.

Visual Quality Levels (VQLs) - management guidelines for private lands, equivalent to Forest Service VQOs. These are not part of the VMS but have been included for purposes of this analysis.

Existing Visual Condition (EVC) - a measure of a landscape's existing overall visual appearance with regard to naturalness.

Key Observation Points (KOPs) and associated viewsheds - representative viewing points within the project area viewshed.

The Forest Service has conducted a VMS inventory for NFS lands in the project area. VQOs established include:

Retention - Activities that are visually evident to the casual observer are restricted. Changes in the qualities of size, amount, intensity, direction, and pattern should not be evident.

Partial Retention - Activities may repeat form, line, color, or texture common to the characteristic landscape and may also introduce form, line, color, or texture, which are found infrequently or not at all in the characteristic landscape, but changes should remain subordinate to the visual strength of the characteristic landscape.

Modification - Activities may visually dominate the original, characteristic landscape. Activities which are predominately introduction of facilities such as buildings, signs, or roads should borrow naturally established form, line, color, and texture so completely and at such scale that its visual characteristics are compatible with the natural surroundings.

In addition, VQLs, equivalent to the Forest Service VQOs, were mapped for private lands within the project area. KOPs were identified and mapped for both public and private lands. The initial VQL/VQO, KOP, and EVC inventories for the Proposed Project were compiled based on existing information, orthophotographic interpretation, and field verification. The study team reviewed, refined, and revised these data using aerial photographs, topographic maps, and additional field verification.

Because viewing distance affects how change is perceived in a landscape, the VMS utilizes distance zones to segment the landscape being inventoried or evaluated. The three distance zones utilized in the VMS are:

Foreground - This zone is defined by the distance at which details can be perceived. For example, in foreground views the texture of individual boughs of trees is discernible. This zone is usually limited to areas within 0.5 mile of the observer but must be determined on a case-by-case basis, as should any distance zoning.

Middleground - This zone extends from the foreground zone up to 5 miles from the observer. Texture normally is characterized by the masses of trees in stands or uniform tree cover. Individual tree forms are usually only discernable in very open or sparse stands. Alterations in the middleground become much less distinctive.

Background - As the perspective shifts to the background, distance has a modifying and diluting effect on both landscape texture and color. This zone extends from middleground to infinity. In very open or sparse timber stands, textures lose their identity and can be seen as groups or patterns of trees. Shape, however, may remain evident beyond 10 miles, especially if it is inconsistent with other landscape forms. Beyond 10 miles, alteration in landscape character becomes obscure.

Depending on the given viewing location, elements of the Proposed Project would be perceived in all three distance zones.

4.8.2.2Assumptions

The following assumptions were used as the critical physical and perceptual factors in identifying, describing, and mapping visual resources in the project area and in assessing impacts to these resources:

People have visual expectations. Although studies show that peoples' expectations of visual character vary, one factor generally remains constant: people expect a certain landscape character in a given area.

Aesthetic concern varies. The level of aesthetic concern varies among individuals. The people most concerned about aesthetics are those who are in an area because of, or who have a major interest in, its scenic qualities or amenities. This group may include recreation area visitors, travelers, and residents.

View duration is critical. The visual impacts of project activities increase as the duration of view increases.

Number of viewers is important. The visual impacts of project activities generally become more important as the actual or potential number of viewers increases, particularly along travel corridors, developed recreation areas, residential areas, and communities.

Viewing distance is critical. The visual impact of project activities usually increases as viewing distance decreases.

Diverse landscape character is important. All landscapes have a definable character. Those with greater variety or diversity have the greater potential for high scenic value.

Retention of character is desirable. Landscapes with distinctive variety in form, line, color, and/or texture should be retained and perpetuated.

Focus of viewer attention is critical. The dominance and arrangement of elements in the landscape can focus viewers' attention to certain areas. Distinctive features (e.g., unusual land forms, water forms, and enframed views) typically attract attention. The potential for visual impacts is higher in areas that are the focus of viewers' attention.

Visual character can be improved. Landscapes with little or no visual variety may be enhanced by some types of alteration.

4.8.2.3 Significance Criteria

The assessment of impacts on visual and aesthetic resources is based on significance criteria and methodology consistent with the Forest Service's VMS. Alterations to visual and aesthetic resources in the Kirkwood area would stem from expansion of existing facilities and construction of new facilities in previously undisturbed areas. Such alterations would be considered permanent. Construction and operational activities may result in visual contrasts that affect:

- The overall quality of visual and aesthetic resources.
- Visual or aesthetic resources having rare or unique value.
- The view from, or the visual setting of, designated or planned parks, wilderness, or natural areas, travel ways, or other visually sensitive land uses (including residential areas).
- The view from, or the visual setting of, established, designated, or planned recreation, education, preservation, or scientific facilities, high-use areas, or designated view points or vistas.

Assessment of impacts on the quality of the visual environment is based on VQOs/VQLs or the synthesis of scenic quality and visual sensitivity. Each VQO/VQL level describes the degree of acceptable modification in the basic elements (line, form, color, and texture) of the landscape. The measure of impacts on visual and aesthetic resources is defined as visual contrast. The amount of contrast between the Proposed Project and the existing landscape was measured by separating the landscape into its major features (land form, vegetation, and structures), and then predicting the magnitude of project-related change to each feature in terms of the basic visual elements (form, line, color, and texture). Significant impacts are those that would exceed the acceptable degree of change associated with the established VQO/VQL.

4.8.2.4 Regulatory Setting

Several factors guide and limit impacts to Kirkwood's visual and aesthetic resources resulting from development on private and NFS lands. These include: Kirkwood Resort Master Owners Association (KRMOA) *Covenants, Conditions, and Restrictions* (CC&Rs), and *KRMOA Design Guidelines* (KMR 2001b); and the "scenic agreement" between the Forest Service and Kirkwood (Simpson 1995d). Project review or design recommendations under this agreement involve the Kirkwood Property Owners' Association Planning and Architectural Review Committee, TC-TAC, and the Eldorado National Forest.

4.8.2.5Existing Studies and Information

Baseline data was compiled from several sources including existing documents, aerial photography, and topographic maps. The major documents consulted included:

- *Kirkwood Specific Plan* (KMR 2001a).
- *Kirkwood Mountain Resort Mountain Master Development Plan* (MMDP)(SE Group 2001).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA* (Simpson 1995d).
- *Eldorado National Forest Land and Resource Management Plan* (Forest Service1988).

4.8.3 ENVIRONMENTAL SETTING

The project area is located in the Sierra Nevada section of the Cascade-Sierra Mountain physiographic province (Fenneman 1931). It includes viewsheds associated with the Kirkwood Creek watershed, including the Kirkwood Lake area and Kirkwood Meadow, a narrow, 1-mile-long linear basin framed by glacially sculpted volcanic peaks ranging from 8,700 to 9,800 feet in elevation. Kirkwood Meadow rises from 7,700 feet at the lower north end to 7,800 feet at the upper south end.

The project area landscape is characterized by extensive meadows on the valley floor, mixed conifer stands on the valley side slopes, and relatively barren ridge tops and peaks (Figure 4.4). The general impression of the area is one of diverse visual elements and views defined by mountains, ridge lines, and valleys. The project area contains four landscape subtypes: open meadow, forest transition, forested slopes, and alpine ridge lines and peaks. Kirkwood Meadow contains a stream, riparian edges, willows, and flat grasslands. The transition zone to forested areas surrounding the meadow includes drier sites supporting sagebrush and isolated clusters of conifers. The forested slopes above the valley contain prominent rock outcrops rising above heavy tree cover and steep slopes. A more barren alpine zone lies above treeline, with low vegetation, abundant rocky outcrops, and talus slopes. The potential development area north of SR 88 ranges from patches of open meadow along Kirkwood Creek, to forested hilly terrain, to spectacular granite domes rising above the forest canopy.

The Proposed Project development zones are located primarily in forest transition areas of valley side slopes, side-slope/meadow areas, coniferous forests, and areas above treeline. The VQL for private lands at Kirkwood is partial retention. Lands in this class, which include areas adjacent to SR 88 above 7,000 feet, possess features of land form, vegetative patterns, water forms, and rock formations of unusual or outstanding visual quality (Forest Service 1988). The adjacent NFS lands, except for the SUP area, Kirkwood Lake campground, Caples Lake trailhead, Devils Gate recreational residence, and Two Sentinels organized camp, are managed for foreground and middleground retention.

Kirkwood Lake is located on NFS land northwest of Kirkwood North. The 19-acre lake lies in a small basin, visually separated from the existing Kirkwood development. Scenic quality is high due to the water feature and the scenic granite bedrock and tall conifers that surround the lake. Kirkwood Lake is located adjacent to Management Area 13 – Private Sector Developed Recreation, which has a VQO of partial retention. The lake itself is inventoried as retention, but human modification of the landscape is evident, with cabins lining the lake on three sides and other recreational features such as trails and a boat put-in and mooring area on the west edge of the lake. This results in an EVC of modification, therefore, a VQO of modification is acceptable, but an upgrade to partial retention would be preferred whenever possible (Forest

Service 1988).

SR 88 is a State Scenic Highway and Forest Service Scenic Byway. Highway users have direct foreground views of portions of current development (e.g., existing commercial development at Kirkwood North and residential development in the East and West Meadows areas), middleground views of development around Kirkwood Meadow, the Village area, and Kirkwood's on-mountain trails and infrastructure. Average annual traffic (2000) along this largely recreational route is 2,900 to 2,950 vehicles per day (Caltrans 2000).

Two KOPs were established along SR 88, the intersection with Kirkwood Meadows Drive for eastbound traffic, and the crossing of Kirkwood Creek for westbound traffic. Another KOP was established at the western edge of Kirkwood Lake. From the KOP at Kirkwood Meadows Drive/SR 88, the EVC includes disturbed areas of residential development and horse stable facilities, and mostly undisturbed views of Kirkwood Meadow. On-mountain ski area infrastructure and trails are also visible from this intersection.

At the intersection of Kirkwood Creek and SR 88, views include disturbed areas of commercial development on the north side of SR 88. From the west edge of Kirkwood Lake, the EVC ranges from disturbed, for the visible housing and recreation facilities, to mostly undisturbed for the forest areas above the lake.

The EVC for the overall project area ranges from unnoticed disturbance to major disturbance. Kirkwood Meadow ranges from unnoticeable disturbance to disturbed for residential pockets scattered from the Meadow's edge to Kirkwood Meadows Drive. On-mountain ski facilities, including ski runs and lifts, and commercial development at Kirkwood North range from minor disturbance to disturbed. Major disturbed areas of the landscape include Kirkwood base facilities at the Village.

Preservation of the viewshed corridor south from SR 88 is an important issue to both the resort and the Forest Service. A commitment has been made to the conservation of the project area's visual quality by adoption of a Scenic Agreement between these two parties. The Scenic Agreement was adopted as part of the original 1971 ski area special use permit (SUP) (Forest Service 1971). The development objective specified in this portion of the SUP states that ". . . development of the [Kirkwood] area, on both private and government land will be to provide high quality winter and summer recreation facilities for the public while preserving, insofar as it is possible, the outstanding natural beauty and scenic resource . . . all private land under [Kirkwood's] ownership or control will be operated and maintained in a manner consistent with the above objective." The development objective further states that, to the extent possible ". . . development of the land which is visible from SR 88 surrounding Kirkwood will be performed in a manner which will avoid impairment of the scenic view from SR 88." Currently, the noted residential, commercial, and recreational development are visible in foreground and middleground views along SR 88.

The Forest Plan identifies two management areas within the project area. Management Area 11 – Existing Winter Sports Sites, incorporates the vast majority of Kirkwood's SUP area. Management Area 11 emphasizes a VQO of partial retention, but a VQO of modification is also acceptable here due to its existing modified state. However, as explained above, an upgrade to partial retention is preferred when possible.
Figure 4.4. Kirkwood Mountain Resort Visual Setting.

Back of Figure 4.4.

The Emigrant trail, which traverses the southeast portion of Kirkwood's SUP area for approximately 1.8 miles, is administered under Management Area 4 – Special Areas. Management Area 4 emphasizes geological, botanical, archaeological and national trails special areas. These areas are principally managed for recreational use in their natural condition and are intended to be preserved. As a result, this management area has the more restrictive VQO of retention. Existing ski area facilities in the Emigrant Valley fail to comply with VQO. The existing Sunrise Chairlift (Chair 4), installed in 1998, is partially within Management Area 4, and thus overlaps the VQO of retention. The same is true for the Iron Horse chairlift (Chair 3), installed in 1972, and the Sunrise Grill. Thus, an inconsistency currently exists between the resort's facilities and Forest Service visual quality direction.

Wilderness users in the Kirkwood vicinity are a potentially affected group; however, views of the project area from popular backcountry use areas are limited to long-distance views from the Round Top Mountain area. North of SR 88, forest users hiking Little Round Top Trail (17E16), Buck Pasture Trail (17E17), and the Pacific Crest Trail (PC2000) in the Little Round Top area and along Meiss Ridge above Schneider Cow Camp have middleground views of Kirkwood North. These trails are managed for a VQO of partial retention.

4.8.4 Environmental Impacts

4.8.4.1 Project Visibility

Comments related to visual and aesthetic resources received during the scoping period for the Draft Plan focused on perceptions of the collective facilities and actions of the Draft Plan as seen from Kirkwood Lake, SR 88, and within Kirkwood resort.

Public comments regarding visual impacts of the MMDP addressed primarily views from the Emigrant Trail. The MMDP proposes two new chairlifts to service Caples Crest and Thimble Peak; three new surface lifts to serve Red Cliffs, Lookout Vista, and Covered Wagon Peak; and seven upgraded chairlifts. Both the Thimble Peak chairlift and the Covered Wagon surface lift would be located in the Emigrant Valley and would be visible from the historic Emigrant Trail.

4.8.4.2 Light and Glare

The issue of nighttime outdoor light and glare was the second major scoping issue raised. Changes in nighttime illumination would be most evident in areas where no lights presently occur, followed by areas where additional nighttime illumination is proposed.

4.8.4.3 Level of Significance Before Mitigation

4.8.4.3.1 Project Visibility

Views from Kirkwood Lake, particularly from the north and west shorelines and the western portion of the lake, are the most vulnerable to visual change because of the lack of visual screening in the immediate foreground. The single-family/duplex residential zone proposed in Kirkwood North would not draw visual attention and would not create a significant impact to Kirkwood Lake, due to forest and topographic screening. No proposed development is located on north or west facing slopes that are visible from the lake. The most visually exposed area of Kirkwood North is the rocky ridge top located in the north-central portion of the area. This area would be designated as open space and would not be developed. The single-family/duplex residential zone proposed on the lower slopes west of Kirkwood Meadow could draw some visual attention but would not cause significant impacts. Here vegetation screening and forest cover would help block visibility. The EVC in this area includes some minor disturbance. Lights from individual residences would show through the vegetative screen and is discussed in section 4.8.4.3.2 below.

Impacts to travelers along SR 88 from the Kirkwood North multi-family and commercial zone would be significant. The highway's scenic designations make it visually sensitive. Development along the scenic corridor, according to the retention VQO, must not be visually evident or draw visual attention. The EVC along the corridor ranges from unnoticeable disturbance to disturbance, but additional development would have to be less visually evident than existing development to preclude a significant impact. Existing ordinances and guidelines provide direction for project design components such as signs, building materials and colors, and architectural style. Specific project-level proposals should also be reviewed by the counties and would have to meet guidelines of the SR 88 scenic corridor agreement.

Few human disturbances exist in the SR 88 scenic corridor, and much of the existing development, such as Kay Resort, Kit Carson Lodge, and the Kirkwood Inn, has an historic influence and is considered to add a sense of place. This historic element seems to blend well with the natural scenery of NFS lands along SR 88. While exposure to the existing development at Kirkwood North (Kirkwood Inn, the service station, and the cross-country center) is relatively short, the density, scale, lighting, and potential mix of architectural styles proposed for new development would be inconsistent with existing development along SR 88, and would create a significant visual impact to travelers of the highway.

Viewers on Meiss Ridge, north and east of Schneider Cow Camp, would have views of portions of Kirkwood North, although at that distance (approximately 2.8 miles) the development would be subordinate to the surrounding landscape and would meet the required VQO of partial retention.

Periodic monitoring of traffic volumes at the intersection of SR 88 and Kirkwood Meadows Drive is planned in conjunction with the Proposed Project. Given that average annual traffic at this intersection will increase in the near future, assistance is likely to be necessary during peak times to maintain safety and order. This could be in the form of manual direction or a traffic signal. Because there are no traffic signals in the Kirkwood area or anywhere along SR 88 from Woodfords to Jackson, installation of a signal at this intersection would represent the addition of urban infrastructure in an otherwise rural atmosphere and result in a significant impact. A signal would be visually obtrusive, change the driving experience by requiring a stop, and increase the duration of exposure to Kirkwood North. A traffic director stationed at peak times would be preferred from a visual impacts standpoint. Should installation of this signal become necessary, Kirkwood is committed to designing it in the most non-obtrusive way possible.

The possibility of building a parking structure has been discussed as a remedy for increases in parking demand. The need for such a structure would depend on whether or not the number of destination skiers increased relative to day skiers. If built, tentative design ideas include a side-hill style structure with outside ramps. Two potential locations have been identified, either in the Chair 7 lot or the north end of the Snowkirk lot. By building the parking structure into a hill at the Snowkirk location, or the already tiered Chair 7 lot, visual impacts would be reduced. A multi-level structure would be possible without its height exceeding other buildings, so visual impacts would not be significant.

The portion of KMA directly north of proposed single-family residential development in the Ski-In/Ski-Out North subarea would receive additive visual impacts. The existing visual condition as viewed from KMA shows minor to disturbed landscapes, which include portions of ski facilities, service infrastructure, roads, and other housing developments. Further development of the Ski-In/Ski-Out North subarea would result in additional, incremental impacts to the natural appearance of the area ,as well as producing visible light sources during nighttime hours. The impacts would be similar to the existing effect that residential units in Kirkwood Meadows West have on residential units across the valley in East Meadows, and vice versa. The Ski-In/Ski-Out North and South subareas would be surrounded on three sides by existing

development, including Kirkwood Meadows West, and the Mountain and Timber Creek Villages, and would be in an area where the natural landscape has been disturbed by existing ski runs. A buffer will remain between Ski-In/Ski-Out North and the KMA subdivision in order to reduce some visual impacts. The impacts of the proposed Ski-In/Ski-Out development would be consistent with expected views within a growing ski resort community, would not exceed the thresholds of established VQLs, and would therefore be less than significant.

Single-family development in the higher elevation portions of Ski-In/Ski-Out South may cause an additive visual and aesthetic impact. Units constructed higher up the slope would be more visual throughout the valley than development at lower elevations. The change in form, color, and texture compared to the natural landscape would change the focus of viewers attention. While some development is consistent with expected views and would not exceed the established VQL at the resort of partial retention, development that reaches up the mountainside would be more visually obtrusive and would exceed this VQL. The development would not remain subordinate to the visual strength of the landscape and would result in a significant impact.

Other elements of the Draft Plan, such as additional residential and commercial development in the Mountain Village area, would be considered incremental additions to existing facilities and consistent with the expectations of a visitor to the resort. An established development theme would help reduce a mis-matched appearance of development, especially to viewers from SR 88. However, additional development should comply with pertinent VQOs/VQLs in order to constitute a less-than-significant visual and aesthetic impact.

In regard to MMDP elements, computer simulations indicate that the proposed Covered Wagon surface lift would be visible from the Emigrant Trail near the base of the Sunrise chairlift (Chair 4). From this viewpoint, the Covered Wagon surface lift would not meet the VQO of retention for Management Area 4. The visual prominence of the proposed Thimble Peak chairlift from the Emigrant Trail would be somewhat more obtrusive. Thimble Peak is visible from many vantages associated with the Emigrant Trail. The proposed Thimble Peak chairlift would also fail to meet the provisions of retention in Management Area 4. As a result, construction of these elements of the MMDP would exceed the area's VQOs, which would constitute a significant impact. As noted, existing facilities near the Emigrant Trail are also inconsistent with the assigned VQO.

Concerns have been registered regarding the proposed Caples Crest Restaurant. The primary concern is visibility from SR 88, but the restaurant would not be visible from the highway. The main locations from which it would be visible include a 1/4-mile stretch of the Fourth of July trail through the Mokelumne Wilderness, near the Caples Lake Dam when traveling east on SR 88, and within the resort area. Use of dark paint and eliminating glare-producing surfaces would greatly reduce its visibility. Views of the restaurant would be consistent with expected views within a ski resort community. They do not exceed the thresholds of established VQOs, and would therefore be less than significant.

The majority of ski trail construction proposed for the SUP area involves connector trails between existing runs, as well as the widening and reshaping of trails to better accommodate the volume of skiers. Relatively minor amounts of vegetative clearing are associated with proposed lifts and trails, less than 20 acres. Most trails associated with proposed lifts are above treeline or are considered tree skiing. As a result, the impacts of ski trail construction would not exceed the area's desired VQO of partial retention and would be less than significant.

In order to accommodate increased wastewater treatment needs, upgrades to the wastewater treatment

facility are proposed. KMPUD can fit the majority of the upgraded infrastructure in the existing treatment plant, but a 25 x 25 foot addition is proposed for the east or northeast wall of the existing building to contain anaerobic settlement basins. The addition would be constructed to the same height, using similar architecture, and trees have already been planted in this area for vegetative screening. These measures would preclude any significant impact to visual and aesthetic resources.

4.8.4.3.2 Light and Glare

The darkest areas of Kirkwood presently occur in the single-family residential zone at Kirkwood North. From Kirkwood Lake and SR 88, illumination would draw visual attention and result in a significant impact, particularly during snow-cover conditions when the snow enhances illumination. Lights from the development proposed for upper elevations of Ski-In/Ski-Out South would also result in a significant impact, as their position on the slope increases their visibility compared to development at lower elevations. Other proposed development zones of the Draft Plan are near areas where nighttime illumination is already present. Added glow in these zones of development adjacent to existing lit areas would result in less-than-significant impacts to surrounding receptors. Street and yard lights are currently prohibited by design guidelines for Kirkwood development, except where street lights are needed for public safety. These restrictions would also apply to any new development.

Lights associated with proposed operational buildings (ski patrol stations) in the MMDP would not contribute significant impacts to visual quality at Kirkwood as they would be small, intermittently used, and shielded.

The MMDP proposes additional nightlighting for an expanded snowtubing facility. The proposed facility would not operate past 10:00 p.m. and would incorporate a state-of-the-art lighting system which would expand or replace the existing lighting system where needed. The lighting system would ensure adequate coverage while keeping the facility's contribution to overall light pollution to the lowest level possible and would not represent a significant impact.

Lights from the proposed Caples Crest Restaurant would be visible from the resort community, a short duration on SR 88 near Caples Lake Dam, and the Mokelumne Wilderness. However, attaining the VQO of partial retention for Management Area 11 would be achievable through proper design and mitigation measures. Likewise, meeting the VQO of partial retention is achievable for the Red Cliffs, Look Out Vista, Caples Crest Express, Wagon Wheel, and Reut lifts, and all associated trails. Attaining the VQO of retention for the wilderness area may not be possible and result in a significant impact.

Additional trail acreage (developed and naturally open) associated with proposed lifts within the SUP would require commensurate additional nighttime grooming involving equipment with lights. Additional nighttime grooming activities within the SUP would likely represent a noticeable difference over current grooming operations. Incremental increases and/or effects from the grooming operation would be temporary and less than significant.

4.8.4.4Mitigation

4.8.4.4.1 Project visibility

The *National Forest System Landscape Management Handbook* has been utilized as guidance to minimize adverse visual impacts. Three types of mitigation techniques would be used for reducing impacts to visual/aesthetic resources: (1) strategic location, (2) minimization of disturbance, and (3) repetition of the basic landscape elements (form, line, color, texture). These mitigation techniques would be employed to help reduce visual contrast for the project facilities and activities.

All trail clearing, lift installation, and building construction associated with the MMDP would be carried out in strict accordance with Forest Service Standards and Guidelines.

Siting and manipulating the elements of the Proposed Project will be critical so as to not draw visual attention in foreground views, particularly along SR 88. Detailed mitigation plans will capitalize on terrain and existing vegetative screening to protect views from sensitive observation points (e.g., southern edges of the KMA subdivision and the SR 88 corridor).

Mitigation Measure 4.8 (a). At high-visibility locations, such as upper elevations of Ski-In/Ski-Out South, new trees will be grouped and planted strategically to help break up or screen out the visibility of the proposed development. Additional refinements to location will be defined through design review and analysis of specific proposals.

Mitigation Measure 4.8 (b). Proposed development in forested areas will be established with curvilinear, undulating boundaries wherever possible.

Mitigation Measure 4.8 (c). During construction, clearing of land for facilities or activities will emphasize curvilinear boundaries instead of straight lines in natural appearing landscapes.

Mitigation Measure 4.8 (d). Grading will be done in a manner which minimizes erosion, conforms to the natural topography, and mimimizes cuts and fills.

Mitigation Measure 4.8 (e). Clearing of trees and vegetation for the project will be limited to the minimum area required.

Mitigation Measure 4.8 (f). Soil excavated during construction and not used will be backfilled evenly into the cleared area, and will be graded to conform with the terrain and the adjacent landscape.

Mitigation Measure 4.8 (g). Site-specific efforts will be made, such as removing stumps or smoothing soil, to ensure a temporary impact where clearing is required in sensitive or scenic areas.

Mitigation Measure 4.8 (h). Permanent vegetative cover will be established on disturbed areas. Replanting poor or difficult sites will be done if initial efforts fail to ensure the establishment and continued growth of plant material to prevent erosion and sedimentation. Qualified personnel will perform all reseeding and revegetation efforts.

Mitigation Measure 4.8 (i). Native or indigenous plant materials will be selected on the basis of site-specific climatic conditions, soil characteristics, soil moisture regime, and topography, and further selected based on their ability to blend with existing vegetation.

Mitigation Measure 4.8 (j). The seedbed will be modified to provide an optimum environment for seed germination, seedling growth, and survival, as specified in the Kirkwood erosion control ordinance and KRMOA Design Guidelines.

Mitigation Measure 4.8 (k). Landscape design which repeats or blends with the surrounding existing landscape character will be applied in highly visible or sensitive areas to enhance the appearance of project building installation.

Mitigation Measure 4.8 (l). Feathering the edges of the highway ROW in certain areas will be utilized to

repeat vegetation patterns of existing open space edges.

Mitigation Measure 4.8 (m). Natural woody vegetation within 100 to 200 feet of SR 88 in Kirkwood North will be evaluated carefully before removal in order to preserve a visual buffer for this area. Selective removal or pruning of trees in areas with sensitive scenic values (e.g., SR 88 recreation areas and residences) will be done in consultation with the Caltrans landscape architect or county-approved visual resource specialist prior to any tree removal in these areas.

Mitigation Measure 4.8 (n). Trees and other plants for landscaping will be selected based on their ability to blend with existing vegetation. Rip-Rap stabilization material willbe a non-contrasting color.

Mitigation Measure 4.8 (o). Mulch or scatter tree slash debris on cut and fill areas to mask bare soil and maintain a more appropriate texture to areas back from travelways.

Mitigation Measure 4.8 (p). Control planting times to maximize successful revegetation.

Mitigation Measure 4.8 (q). Use natural-looking planting patterns on cut/fill slopes.

Mitigation Measure 4.8 (r). Implement Mitigation Measure 4.1(c).

Mitigation Measure 4.8 (s). Implement Mitigation Measures 4.1 (m) and 4.1 (n).

Mitigation Measure 4.8 (t). Design to take advantage of natural screens (i.e., vegetation, landforms).

Mitigation Measure 4.8 (u). Seed cuts and fills with native grass species that will not have substantial winter or other seasonal color contrasts.

Mitigation Measure 4.8 (v). Visual prominence of development within visually sensitive areas, as viewed from SR 88, will continue to comply with requirements for building colors, construction materials, and architectural design as administered by the Forest Service and TC-TAC, and outlined in KRMOA CC&R's and Design Guidelines (KMR 2001b). Particular attention should be given to any new Kirkwood North development, especially regarding the architectural style and color scheme.

Mitigation Measure 4.8 (w). Structures will be constructed of materials that blend with the landscape character. Lift components willmeet FSM (Forest Service Manual) 2380 policy for color and reflectivity, which is 4.5 on the Munsell neutral value color scale. Building designs (on NFS lands), including color and material, will be submitted to the Forest Service for approval prior to construction.

Mitigation Measure 4.8 (x). The appearance of human-made openings will simulate existing natural openings in the forest such as those which occur in the project area.

Mitigation Measure 4.8 (y). In accordance with FSM 2380, appropriate siting of buildings will be incorporated, as will the use of low-impact materials and colors, on NFS lands.

4.8.4.4.2 Light and Glare

Mitigation Measure 4.8 (z). For working and public gathering areas, lighting levels will be 3.5 foot-candles average horizontal, with a minimum illumination of 1/3 average, a maximum of three times the average.

Mitigation Measure 4.8 (aa). Fixtures will be required to minimize fugitive light into existing residential areas, including East Meadow, KMA subdivision, and other residential locations susceptible to light and glare, by using asymmetrical distribution, light shields, and vegetation.

Mitigation Measure 4.8 (ab). A lighting plan for all new development will be required, as outlined in the KRMOA Design Guidelines, that will be reviewed by the counties when specific project level plans are submitted for review.

4.8.4.5Level of Significance After Mitigation

4.8.4.5.1 Project Visibility

Mitigation measures proposed for the single-family residential zone in Kirkwood North would assure that this development is less visible and results in a less-than-significant impact

Mitigation proposed for the multi-family/commercial zone along SR 88 would aid in reducing visual impacts; however, some significant impacts may still occur between the Kirkwood service station and Kirkwood Meadows Drive. In order to meet a VQL of partial retention, facilities proposed in the viewshed of the Kirkwood Inn and service station area must not be more visually evident than the existing facilities, which would be impossible to achieve. Strict attention to mitigation measure 4.8(v) would greatly reduce the significance of this impact, but a significant impact associated with multi-family and commercial development north of SR 88 could remain.

Development on the higher slopes of Ski-In/Ski-Out South would remain more visible than development at lower elevations, and could remain as a significant visual impact.

Attaining the VQO of partial retention for MMDP projects proposed for areas managed as Management Area 11 would be achievable through proper design and implementation of required mitigation measures. This would avoid any significant impact.

Because the Emigrant Trail is within Management Area 4 – Special Areas and has a more restrictive VQO than the surrounding ski area, a non-significant amendment to the Forest Plan would be necessary in order to bring both existing and proposed facilities into compliance with Forest Plan VQOs. Currently, the Sunrise Express lift (Chair 4) and the Iron Horse lift (Chair 3) cross over the trail and are not consistent with the stated VQO of retention for Management Area 4. The Sunrise Grill is also within the foreground view of the trail. Modifying the VQO for this section of Management Area 4 (9,780 feet, or roughly 2 miles, of the Emigrant Trail) from retention to partial retention would be required to bring both existing and proposed facilities into compliance and avoid any significant impact.

4.8.4.5.2 Light and Glare

Light and glare from development on the higher slopes of Ski-In/Ski-Out South would remain more visible than from development at lower elevations. Lights from residential development in Kirkwood North could still remain visible from Kirkwood Lake and SR 88. Light and glare from Caples Crest Restaurant could remain visible from the wilderness area, affecting the VQO of retention for this area. These impacts would

be reduced by mitigation but could remain significant.

By applying the mitigation measures outlined above, other elements of the Proposed Project would result in less-than-significant impacts associated with light and glare.

4.8.5 Significant, Unavoidable, Adverse Impacts

As discussed above, several impacts would remain significant after mitigation. In regard to project visibility, these include multi-family/commercial zone along SR 88, development on the higher slopes of Ski-In/Ski-Out South, and existing and proposed facilities in the Management Area 4 portion of Emigrant Valley if the ENF Forest Plan is not amended to change the VQO. In regard to light and glare, significant impacts would remain as a result of lighting at Ski-In/Ski-Out South, Kirkwood North, and the Caples Crest Restaurant.

4.8.6 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of these cumulative actions have the potential to interact with the Proposed Project to generate cumulative impacts, primarily by increasing the number of viewers. Overall population growth in the region would result in an increase in the number of people observing the visual changes identified above over time. Dispersed recreational use of surrounding areas is also increasing, as is traffic on SR 88. These increases would add to the number of people experiencing the significant visual impacts identified above. However, most of these impacts would be concentrated in an already developed and relatively isolated valley. If a consistent theme for development is planned, these changes would not be as visually obtrusive and could constitute incremental additions to existing development that already dominates the Kirkwood landscape. As a result, the Proposed Project would draw little more attention to the resort and would not change the view of what is expected for a resort community, and thus would not constitute a significant cumulative impact.

4.9 Noise

Noise is unwanted sound, or sound that is annoying or harmful due to its loudness, pitch, or duration. Prolonged exposure to high noise levels can damage hearing or cause tension that can lead to other adverse health effects. Visitors to relatively rural recreation areas such as Kirkwood are usually expecting a natural, peaceful, and relatively quiet setting. This section describes the noise issues at Kirkwood related to the Proposed Project in the context visitor expectations and of existing noise standards.

4.9.1 Issues

The following issues were identified through public and agency scoping and are addressed in the noise analysis:

- Impacts of traffic noise.
- Impacts of construction noise.
- Impacts of snowmaking activities.

4.9.2 METHODS

Sound pressure is measured in decibels (dB). On the logarithmic dB scale, a 3 dB increase in sound level corresponds to a doubling of sound pressure (Simpson 1995d). The human ear does not hear all frequencies of sound equally well, so sound measurements are often weighted to de-emphasize less audible frequencies. Sound measurements made in this way are described as A-weighted, and the results are reported in A-weighted decibels (dBA). The normal perception of human hearing ranges from 3 dBA to 140 dBA, with a 10 dBA increase in continuous noise levels perceived as a doubling of loudness. A 2-dBA increase is unnoticeable to most people (EIP Associates 1989).

The dB levels described above refer to approximate instantaneous noise levels. Since the sound pressure output for most noise sources varies over time, it is useful to consider average noise levels. The equivalent sound level (L_{eq}) is an average noise level over a specified period of time. The extent to which noise is found annoying depends on the characteristics of the sound and on the perceptions and subjective reactions of the people exposed to the noise. Factors which contribute to annoyance include speech interference and sleep disturbance. Since noise is more annoying during the relatively quiet nighttime hours when people typically relax or sleep, noise standards for planning purposes are often specified in terms of the day-night equivalent noise level (L_{dn}), which assigns a 10-dB penalty to noises occurring during the nighttime hours of 10 p.m. to 7 a.m.

Table 4.32 shows common noise levels measured in dB. Noise impacts at Kirkwood were assessed by comparing future noise levels with Alpine, Amador and El Dorado Counties' compatibility standards (Table 4.33). Project-generated impacts were assessed by calculating increases in existing noise sources and identifying additional future sources of noise associated with the project. A 0- to 3-dB increase is considered insignificant, while a 6-dB increase or more is considered significant with the potential to generate adverse response. The significance of a noise increase in the 4- to 5-dB range is determined relative to the local land use sensitivity (EIP Associates 1989). Land uses typically considered more sensitive to noise impacts are residences, hospitals, and schools.

Table 4.32. Common noise levels.

Physical Description	Noise Level (dB)
Threshold of hearing	0
Quiet rural area at night	22
Suburban area during daytime	50
Gas lawn mower at 100 feet	70
Heavy truck at 50 feet	90
Rock band	110
Physical pain	140

Source: Alpine County 1982; Bronson 1971 *in* Simpson 1995d.

Table 4.33. Existing noise standards by county code for outdoor activity areas.

County	Land Use	Criteria
Alpine County[1]	Urban residential and residential, less than 5-acre density.	60 dBA max. L_{dn}
	Residential, more than 5-acre density.	55 dBA max. L_{dn}
	Institutional (INS) and planned development (CD,TD).	65 dBA max. L_{dn}
	Commercial recreational (CR).	70 dBA max. L_{dn}
Amador County[2]	Residential, low density.	60 L_{dn} or CNEL (dB)
	Residential, multi-family.	65 L_{dn} or CNEL (dB)
	Transient lodging (motels/hotels).	65 L_{dn} or CNEL (dB)
	Schools, libraries, churches, hospitals, nursing homes.	70 L_{dn} or CNEL (dB)
	Playground, neighborhood parks.	70 L_{dn} or CNEL (dB)
	Office buildings, business commercial and professional.	70 L_{dn} or CNEL (dB)
El Dorado County[3]	Transient lodging.	60 L_{dn} or CNEL (dB)
	Churches, meeting halls, hospitals.	60 L_{dn} or CNEL (dB)
	Playgrounds.	70 L_{dn} or CNEL (dB)
	Residential.	60 L_{dn} or CNEL (dB)

Notes:
Ldn: the day-night average noise level.
CNEL: the community noise equivalent level.

[1] Alpine County Code (Section 18,68,090[B]) states that no noise-sensitive developments such as hospitals, clinics, schools, libraries or residences will be allowed within 100 feet of the nearest traffic lane of roadways where speeds of 45 miles per hour may be attained, or within 200 feet of the nearest traffic lane of roadways where speeds in excess of 45 miles per hour may be attained unless or until a use permit has been obtained, which will contain conditions for the reduction of roadway noise effects upon said use.
[2] Amador County General Plan shows "normally acceptable," "conditionally acceptable," "normally unacceptable," and "clearly unacceptable" noise levels. This table only addresses "normally acceptable" levels, and does not address all land use types addressed in the Amador County Noise Element.
[3] From Table 6-1 of the El Dorado County General Plan (Vol. 1) (1996). Not all land use types are addressed in this summary table.
Source: KMR 1998.

4.9.2.1 Assumptions

Noise levels reported in previous studies (Simpson 1995d, 1996) are still appropriate for describing baseline noise levels.

4.9.2.2 Significance Criteria

An impact would be significant if any of the following circumstances occurred due to project implementation:

- Long-term noise increased more than 6 dBA over existing noise (refer to discussion in section 4.9.2).
- Total noise levels exceeded the threshold of 65 dBA for multi-family residential areas, or the threshold of 60 dBA for single-family and duplex residential areas. The L_{dn}/CNEL criterion for new development associated with the Proposed Project are outlined in Table 4.34.

Table 4.34. Kirkwood noise standards for specific land uses/activities.

Land Use/Activity	Noise Level Criterion (L_{dn}/CNEL, dB)[1]
Single-family /duplex residential (SF).	60
Multi-family residential (MF).	65
Commercial (MF & C).	70
Playgrounds; neighborhood parks (OS/R).	70
Schools, libraries, churches.	70

Notes:
[1] Noise levels are exterior measurements, from the centerline of SR 88.
Source: KMR 1998.

Appendix G of the CEQA Guidelines states that a project would normally have a significant effect on the environment if it would "increase substantially the ambient noise levels for adjoining areas."

Exceedance of an adopted noise standard (refer to Table 4.34) would also be considered a significant impact under CEQA. Alpine and El Dorado Counties establish maximum noise standard of 60 dBA L_{dn} at property lines for existing residential uses; Amador County establishes a maximum noise standard of 65 dBA L_{dn} at property lines for existing residential uses. Other standards are discussed in relation to specific impacts.

4.9.2.3 Regulatory Setting

Regulations in Alpine, Amador and El Dorado Counties currently address noise standards for specific types of development, as shown in Table 4.33. In addition, according to policies and objectives developed by KMR, new development will comply with noise standards shown in Table 4.34 (KMR 1998).

4.9.2.4 Existing Studies and Information

The existing information and new data (current traffic counts, impacts, and future projected analysis) collected and used for the impact assessment include:

- *Traffic Technical Memorandum for the Kirkwood Meadows Drive/SR 88 Intersection* (URS Greiner Woodward Clyde 1999).
- *Kirkwood Specific Plan* (KMR 1998, 2001).
- *Draft Supplemental Environmental Impact Report East Meadows 3 Subdivision In Alpine County, CA* (Simpson 1996).
- *Final Environmental Impact Report and Environmental Assessment For Public Comment Kirkwood Water Rights And Snowmaking Project* (Simpson 1995d).
- *Draft Program Environmental Impact Report Westside Specific Plan* (EIP Associates 1989).

4.9.3 Environmental Setting

4.9.3.1 Traffic and Ambient Noise

Kirkwood is situated in a mountain setting that is subjectively characterized as relatively quiet. The

community surrounds a large meadow area situated in a bowl-shaped valley enclosed on three sides (south, east and west by mountains). The main source of noise is valley traffic traveling along SR 88 at the north end of the valley. In 1992, noise levels along SR 88 were addressed as part of the *Alpine County Transportation Noise Study* (Brown-Buntin Associates 1992 *in* KMR 1998). This report estimated noise levels of about 60 dB within 82 feet of the road's centerline, and 65 dB within 38 feet of the centerline. A noise level of 62 dB L_{eq} was measured at Kirkwood 100 feet south of SR 88 during monitoring conducted in 1982 for the Alpine County General Plan. Existing highway traffic would generate a predicted L_{dn} noise level of 60 dB at 100 feet from the road using the 1978 Federal Highway Administration's Highway Noise Model (Simpson 1995d, 1996). SR 88 noise levels would be 45 dB L_{dn} or less at 1,000 feet, the approximate distance of the nearest development boundary to the highway (Simpson 1996).

Other noise sources that are heard during winter months include operation of ski lifts, snowmaking equipment, and snow grooming machinery from on-mountain areas, as well as snow clearing equipment on roads and parking areas within the Kirkwood community. Noise sources are significantly reduced during summer months when snow-related activities are not necessary. Local traffic and construction equipment are the main noise sources during the summer period (KMR 1998). *Loudspeakers are also periodically used at special events throughout the year.*

Ambient noise levels were surveyed at the resort on April 29, 1994. Sound levels were monitored at existing residential receptors during two time periods: once in the early morning (between the hours of 6:30 and 8:00 a.m.) before the ski resort opened, and again during the middle of the day (between 11:30 a.m. and 1:00 p.m.) while the resort was operational. The monitoring was conducted late in the ski season during a time when three of the seven lifts (lifts 5, 7, and 9) were closed throughout the day, so overall resort activities were not at peak levels. The measured levels indicated the order of magnitude of change in ski area noise, but not the maximum ambient levels. Table 4.35 shows results of the ambient noise survey. In the early morning, noise levels were 40 dB or less, and the primary source of noise was bird calls. At midday, noise levels varied from about 40 dB in single-family residential areas to just over 50 dB closer to resort traffic and ski lifts. Of the four sampled locations, increases were measured in the area to the west of Kirkwood Meadow, near Whiskey Towers (East Village area), and near Base Camp (West Village area). These values are typical of a suburban area during daytime, and are well below county standards. Overall, the ambient noise environment was characterized as quiet (Simpson 1995d, 1996).

Table 4.35. Kirkwood ambient noise levels.

Location	Early Morning Noise Level (dB)	Mid-Day Noise Level (dB)
Single-family residences on west side of meadow	37.5[1]	40.2
Single-family residences on east side of meadow	39.2	39.5[1]
Whiskey Towers	40.0	52.4
Base Camp	39.5	47.1

[1] Noise levels dropped below the range of the monitoring instrument during a portion of the sampling period, so actual noise levels are somewhat less than shown here.
Source: Simpson 1995d.

4.9.3.2 Snowmaking Activities

Pursuant to the Alpine County Use Permit, snowmaking activities in the portion of Kirkwood within Alpine County are permitted because potential exceedances of the established noise standard are seasonal and temporary. The established standard depends on land use but could be as low as 60dB in affected areas at Kirkwood. Compressors associated with snowmaking may create exterior noise levels as great as 74.5 dB L_{eq} (up to 80.9 dB L_{dn}) within 150 feet of the compression location. Snow gun noise levels may reach 96.6 dB L_{dn} at the base of lift 5 (Simpson 1995d).

During the first year of snowmaking system operation, KMR mountain operations personnel tested noise levels at various locations around the valley during variable operating conditions and locations. During December 1997, 17 random locations were chosen to test noise levels. In three instances, the 65 dB level was exceeded. However, only once was the 65 dB level observed to be seriously exceeded. The other two times the noise level was observed to be just a few points above 65 dB.

The Amador County Planning Department has concluded that snowmaking is a consistent use of the land for a ski resort operation. Therefore snowmaking activities, and by association snowmaking noise, do not require a county use permit and the noise standards established for Amador County are not applied.

4.9.4 Environmental Impacts

4.9.4.1 Traffic and Ambient Noise

As discussed in section 4.7, traffic is expected to increase on SR 88, Kirkwood Meadows Drive, and the associated intersection with or without the Proposed Project. This increase would result in a minor increase in noise levels.

According to a 1996 report by Simpson Environmental, current peak-hour traffic levels were observed at about 1,000 vehicles per hour exiting the resort when the intersection operates at capacity on peak days (Simpson 1996a). According to a 1999 Traffic Technical Memorandum for the Kirkwood Meadows Drive/SR 88 Intersection, current peak-hour intersection counts were 597/899 (a.m./p.m.)(URS Greiner Woodward Clyde 1999).

At buildout, the projected peak-hour (p.m. worst-case scenario) skier-generated vehicular trips would total 1,570. Compared to current peak-hour (p.m. worst-case scenario) vehicular trips of 1,085, the increase in skier-generated traffic would be less than double by year 2020 (URS Greiner Woodward Clyde 1999; refer to section 4.7.4, Table 4.28). A doubling of traffic numbers would be synonymous with the doubling of energy or sound pressure, corresponding to a 3-dB increase in sound level. Given the measured noise level of 62 dB L_{eq} at 100 feet south of SR 88, the increased noise level (with conservatively doubling traffic by the year 2020) would be estimated at less than 65 dB L_{eq}, Therefore, the projected increase in noise by the year 2020 due to increased traffic on SR 88 would be less than significant for even the nearest residential areas. The highest noise levels found in residential areas during a day of ski area operation, reported in Table 4.35, were measured at just over 52 dB. Given a 3-dB increase with the doubling of traffic by the year 2020, a less than 55 dB L_{eq} projected noise level could not exceed the 60 dB(A) and 65 dB(A) maximum L_{dn} criteria for El Dorado, Alpine, and Amador Counties, respectively. Projected ambient noise level increases due to Kirkwood Meadows Drive traffic would be less than significant.

Noise-sensitive developments in Alpine County, such as hospitals or residences, are required to be sited at least 100 feet from traffic lanes where speeds of 45 miles per hour may be attained, and 200 feet from lanes where speeds greater than 45 miles per hour may be attained (KMR 1998). For new development in proximity to SR 88, KMR would use setback requirements to attenuate noise exposure (KMR 1998). Where

adequate setbacks did not reduce exposure to noise, design techniques such as berms, barriers, and/or landscaping would be used to reduce indoor and outdoor noise exposure to acceptable levels. Sound walls along SR 88 would not be constructed due to potential visual impacts and the Scenic Highway/Byway status of SR 88. Proper site planning and construction techniques, coupled with enforcement of speed limits would aid in alleviating the incremental adverse impact to ambient noise levels that traffic produces.

4.9.4.2 Construction *and Operational* Noise

Equipment used in activities such as installing the proposed access roads and underground utilities, grading building pads, and constructing or altering on-mountain facilities and terrain would temporarily increase noise levels in the project area. Typical construction equipment such as bulldozers, trucks, and backhoes generate noise levels of 85 dBA to 88 dBA L_{eq} at a distance of 50 feet (Simpson 1995d). Noise associated with installing the access roads and underground utilities would be generated during the early phases of the planning period. Thereafter, construction noise would be more localized and sporadic. Construction noise would be annoying to nearby sensitive receptors but would be temporary.

Construction activities would be limited to allowable hours of activity in accordance with the county ordinance that limits the hours of construction activities, and as specified in building permits. Residential/light commercial construction does not generate the noise levels associated with larger construction projects generally found in more urban environments. Also, due to construction phasing, all areas proposed for construction would not be active simultaneously, so the measurable noise levels from equipment would be localized and temporary. In addition, construction managers and KMR employees responsible for construction and maintenance equipment would be informed of the need to use and maintain all equipment in a way that minimizes noise impacts during operation.

Noises emanating from structures due to internal construction activities would be considered normal associated sounds, or would be conditionally permitted by one of the counties if required. An exterior-to-interior noise level reduction of 20 dB would be achieved (with windows in a closed position) by following standard construction practices under the current Uniform Building Code (UBC), as specified in the Draft Plan.

The use of loudspeakers is necessary at special events such as ski races, concerts, or speeches. They are not used often, approximately six times per year, and are not operated at night.

Given the objectives, policies, and actions proposed above, significant noise impacts due to construction activities could be avoided. Impacts would be significant if construction activities occurred outside of allowable time periods.

4.9.4.3 Snowmaking Activities

Snowmaking at Kirkwood involves pumps and compressors at the mountain base area and snow guns on the ski slopes. The noise impacts associated with snowmaking have been previously evaluated pursuant to NEPA and CEQA compliance (Simpson 1995d). Although the noise generated by snowmaking was assessed as potentially exceeding Alpine and Amador County noise standards, both outdoors and within some residential areas, the impacts were considered to be less than significant. Primary reasons were that (1) the noise impacts are considered seasonal temporary (primarily during November and December if natural snow is not adequate to get the ski area open), (2) most people affected by snowmaking noise are expected to be supportive of snowmaking since they would benefit from it, and (3) the noise levels would not have significant public health or safety impacts. A number of mitigation measures were recommended in the *Final EIR and EA for Public Comment Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d), including preparation and implementation of a Snowmaking Noise Management Program, which would be updated annually and developed as needed to account for any substantial noise problems during

the previous year's monitoring and input from homeowners' associations. The KMR Draft Plan includes compliance with all of the mitigation measures included in the Snowmaking Final EIS and Addendum (Simpson 1995d, 1996). Noise from existing snowmaking operations is permitted by Alpine and Amador Counties as a temporary exceedance (Alpine County) and as a use consistent with a ski resort operation (Amador County).

Additional snowmaking activities included in the Proposed Project would increase snow coverage of low-elevation ski terrain, critical trails that return to the community of Kirkwood, and runs that lead to and from Emigrant Valley and the proposed Caples Crest Restaurant. Snowmaking system improvements would expand coverage to an additional 56 acres. As a contributor to ambient noise levels, associated noise impacts would not be significant.

Actual noise levels would depend on the specific location of the snowmaking equipment and the proposed new residential housing units. The Proposed Project does include new multi-family residential development and lodging near the base of the ski runs in areas which would be affected by noise from snowmaking operations. New multi-family housing and commercial space would be located near the lower parts of Chairs 1, 5, 6, 7, 9, 10 and 11. Snowmaking activities would be relatively close to residents of the proposed Ski-In/Ski-Out developments. Their impact would be reduced by guidelines in the Snowmaking Noise Management Program. Noise generated during the operation of the snowmaking system would exceed applicable Alpine and Amador County standards for residential areas in some locations. However, for the three reasons discussed above, noise from existing snowmaking operations is permitted by the counties as a seasonal and temporary exceedance (Alpine County), and as a use consistent with ski resort operation (Amador County).

4.9.4.4 WWTP upgrade

Noise levels would increase as a result of the installation of larger blowers and the diesel generators associated with the WWTP upgrade. To minimize on-site noise, blowers would be located in separate rooms, and O&M personnel would be provided with ear protection. All generators would be housed in sound attenuating covers. Noise impacts associated with the WWTP upgrade would not be significant (ECO:LOGIC 2000).

4.9.4.5 Combined, Simultaneous, Ambient Noise

Combining the projected increase in noise from snowmaking, on-mountain operations, local traffic, and other ambient increases associated with population growth at Kirkwood could result in a larger, combined noise impact than when these activities are considered individually. Several methodological issues make this pooled impact difficult to assess quantitatively. First, noise from different sources is not directly additive; 40 dB from one source does not combine with 10 dB from another to yield 50 dB. The actual calculation is quite complex and dependent on specific, on-site conditions. Second, most sources of noise at Kirkwood, such as snowmaking, avalanche control, snow plowing, and traffic peaks, are sporadic, so it is difficult to predict if and when they would coincide. Third, most types of noise attenuate quite quickly with distance, so cumulative noise impacts depend heavily on the location of the hearer. The following discussion outlines in general terms how noise from various sources might interact at Kirkwood.

Location is probably the major factor determining net noise impacts. As it happens, the two major noise sources, traffic on SR 88 and on-mountain operations, particularly snowmaking, are located at opposite ends of the valley. People in Kirkwood North and the northern extremes of KMA, East and West Meadows would experience most of the projected 3-dB peak-hour traffic noise increase (total projected at 65 dB L_{eq}, as noted above). However, they would be far from the noise of snowmaking on the ski mountain to the south, projected to temporarily exceed the 60–70 dBA max L_{dn} standards established by Alpine and Amador Counties (see section 4.9.4.3 above). In either location, additional noise would be produced at times by

snow removal, local traffic, or construction, but combined noise levels would not exceed standards for more than short periods if at all.

The next important variable would be timing. During periods of peak activity, such as Sunday evenings when weekend visitors are leaving Kirkwood, ambient noise levels associated with traffic and general community commotion could be substantially higher than normal. However, since snowmaking activities and grooming would generally not occur during these peak-activity times, a significant additive impact of all noise sources co-occurring would be unlikely. If, at times, all the noise-producing activities occurred simultaneously, the resultant substantial increase in ambient noise would be due to those noise sources considered temporary and acceptable, and would therefore result in a less than significant impact.

The Draft Plan requires issuance of temporary county permits for exceedances of noise standards for such events as music festivals, provided that use permit conditions aim to avoid negative impacts on residents and visitors. Nevertheless, it is likely that ambient noise levels in the valley during a music festival would temporarily exceed norms due to the amplified music itself as well as the associated traffic, voices, and general commotion.

4.9.4.6Level of Significance Before Mitigation

4.9.4.6.1 Traffic and Ambient Noise
Impacts of traffic and ambient noise would be less than significant.

4.9.4.6.2 Construction and Operational Noise
Impacts of construction noise could be significant if construction activities occurred outside of allowable time periods.

4.9.4.6.3 Snowmaking Activities
Noise from existing snowmaking operations is permitted by Alpine and Amador Counties as a temporary exceedance (Alpine County) and as a use consistent with ski resort operation (Amador County). For these reasons, snowmaking noise impacts would be considered less than significant.

4.9.4.6.4 WWTP upgrade
Noise impacts of the WWTP upgrade would be less than significant.

4.9.4.6.5 Combined, Simultaneous Ambient Noise
Impacts on combined, simultaneous, ambient noise would be less than significant, except in the proximity of operating snowmaking equipment, as noted above.

4.9.4.7Mitigation

4.9.4.7.1 Construction and Operational Noise
Mitigation Measure 4.9 (a). Construction activities which generate or produce noise that can be heard beyond the boundaries of a project site will be limited to the hours of 7 a.m. to 7 p.m. Exceptions are allowed for emergency repairs.

Mitigation Measure 4.9 (aa). Loudspeaker use will continue to be allowed at special events related to ski area operation. Their operation will be limited to between the hours of 7 a.m. and 7 p.m.

4.9.4.7.2 Snowmaking Activities
Mitigation Measure 4.9 (b). KMR will implement the Snowmaking Noise Management Program, which

was adopted when the snowmaking project was approved. This incorporates several features, including restrictions on the type of nozzle, shielding of nozzles, and acceptable time of operation.

4.9.4.8Level of Significance After Mitigation

4.9.4.8.1 Construction and Operational Noise

With the proposed mitigation in place, the impact of construction and operational noise would be less than significant.

4.9.4.8.2 Snowmaking Activities

Even with implementation of the Snowmaking Noise Management Program, noise levels during the operation of the snowmaking system could temporarily exceed applicable Alpine and Amador County standards in some new residential areas. However, as such temporary exceedances have been permitted by Alpine and Amador Counties in the past for the reasons noted above, the noise standards used to determine significance in this analysis have been set aside by the counties in regard to snowmaking activity, so the impacts would be less than significant.

4.9.5 SIGNIFICANT, UNAVOIDABLE, ADVERSE IMPACTS

On the basis of county permitting of snowmaking noise potentially exceeding standards for residential areas, no significant, unavoidable, adverse noise impacts were identified.

4.9.6 CUMULATIVE EFFECTS

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restricts the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of these cumulative actions could potentially interact with the Proposed Project to generate cumulative noise effects, primarily through increased traffic on SR 88. Both growth and development in South Tahoe and other surrounding communities and increasing dispersed recreation in the surrounding area would increase the net traffic noise along SR 88 in Kirkwood. However, projected increases in total SR 88 traffic were incorporated into the modeling reported in the Transportation section of this analysis and thus into the conclusion in section 4.9.4.1 above that the cumulative impact would be less than significant.

4.10 SOCIOECONOMICS

4.10.1 ISSUES

The following socioeconomic issues relative to the Proposed Project were identified during scoping:

- The nature and extent of population changes.
- The adequacy of employee housing.
- That affordable housing should be included as part of the analysis.
- Potential effects of employees commuting to and from the Kirkwood area.

4.10.2 METHODS

The area of influence for this analysis includes the planning area and outlying communities potentially affected by the Draft Plan, the MMDP, and the WWTP upgrade project elements. Existing baseline and projected population figures were based on information from KMR or found in the Draft Plan (KMR 2001a). Existing and projected employment generation by the project were derived from the Draft Plan (KMR 2001a). Residential and employee housing units and types for the existing baseline and projected buildout were derived from the Draft Plan and additional information obtained from KMR. On the basis of this information, potential direct, indirect, and cumulative impacts were determined for the Proposed Project and alternatives. Significance determinations were made by comparing the direct, indirect, and cumulative impacts of the project to these significance criteria. Mitigation measures were developed based on the potential impacts of development and the level of significance of those impacts.

4.10.2.1 Assumptions

Information contained in the Draft Plan (KMR 2001a) provides a reliable baseline source of information with respect to population, employment, and housing.

4.10.2.2 Significance Criteria

Potentially relevant standards for the determination of significance include the following:

- Would the project conflict with population, employment, or housing policies or projections

established by the government agencies having jurisdiction over the project?

- Would the project directly or indirectly cause substantial population growth or concentration beyond current levels?

- Would the project directly or indirectly cause a substantial net loss in the number of jobs in the project area or cause a substantial loss in jobs or income due to changing job opportunities in the community?

- Would the project displace existing residences or otherwise create or exacerbate any housing shortages?

4.10.2.3 Regulatory Setting

Effects analyzed under CEQA must be related to a physical change in the environment (Guidelines Section 15358 [b]). Consequently, economic and social effects are not considered environmental effects in themselves under CEQA, and need only be considered in an EIR if they would lead to an environmental effect (Bass et al. 1996). In practice, the evaluation of economic or social effects is generally treated as optional. Agencies are not required to evaluate economic or social effects, but sometimes do include an analysis of these factors for a proposed project. For these reasons, no regulatory design features with respect to potential socioeconomic impacts have been identified. However, because socioeconomic concerns were raised during scoping, the Lead Agency chose to include an analysis of pertinent issues in this EIR.

4.10.2.4 Existing Studies and Information

Information contained in this section was obtained primarily through Alpine, Amador, and El Dorado Counties; the 1988 Master Plan (KAI 1988); the Draft Plan (KMR 2001a); and KMR representatives.

4.10.3 Environmental Setting

The following discussion and analysis considers project elements proposed in the Kirkwood area associated with the Draft Plan, the MMDP, and the WWTP upgrade.

4.10.3.1 Population and Employment

The Kirkwood planning area is a resort community which consists of the following three population types: (1) full and part-year residents, (2) non-resident guests, and (3) employees providing services for the operation of the resort and the community. The population of the area fluctuates depending on the time of year (i.e., ski season versus off-season) and the recreational opportunities available.

The existing resident population is limited by the number of residential units and the number of persons associated with each unit in the planning area. Table 4.36 displays the maximum number of people accommodated and the year-round population as of November 2001 based on the number of residential units. The maximum population is the most important of the population counts, since it defines the level of infrastructure (e.g., roads, parking, etc.) and facilities (e.g., water and wastewater) required to meet demand. In 2001, the maximum potential occupancy associated with single and multi-family housing was 946 and 1,486, respectively, for a total resident population of 2,432 persons. Employee housing is accounted for in the multi-family housing units. It is estimated by KMR that currently only about 6 percent of residences are occupied on a year-round basis in the planning area, with the majority of homes being second-home vacation units (KMR 2001a). Year-round population defines the need for some services such as schools, social services, a library, and other general county services. Occupancy rates vary widely

depending on the season and weather conditions. The highest occupancy rates occur during the ski season when snowfall is heavy. The maximum occupancies conservatively assume full usage of all units at one time; however, occupancies fluctuate seasonally and daily throughout the year.

Table 4.36. Existing population of Kirkwood Mountain Resort (November 2001).

Housing Type	Maximum Population	Year-Round Population
Single Family/ Duplex	946	57
Multi-family	1,486	89
Total	**2,432**	**146**

The majority of residential units are occupied only on an overnight basis, which includes multiple-night stays, but not for the longer term. This occupancy includes people who stay overnight in Kirkwood and own second homes in the area, rent condominiums from one of three rental companies, or stay at a friend or relative's unit. In addition, some owners rent their units without going through a rental company.

Non-resident guests, or day users, primarily visit during the winter ski season, with some visitation also occurring during the summer months. Total and peak-day skier visitation for the past 10 ski seasons are shown in Table 4.37. Downhill skier visitation has been higher over the past 5 years when compared to the past 10 years, while visitation for cross-country skiers has been the reverse. Currently, the maximum number of skiers at one time (SAOT) allowed on public land is 8,400, which includes non-resident and resident skiers (Forest Service 1973). The highest skier visitation experienced at Kirkwood (prior to November 2001) occurred in the late 1980s and totaled 7,775 (Eichar 1998b). Of those skiers, approximately 22 percent were destination skiers and 78 percent were day skiers. During the 2001-2002 ski season, a day of higher skier visitation was reported, an estimated 8,350 SAOT on March, 9, 2002. This seasons data was not complete at the time of this analysis and is not used in this EIR.

Currently, 2,400 persons is used as the maximum potential wintertime visitation for private land. This is the difference between the 8,400 SAOT for NFS land and the 10,800 SAOT limit for KMR and its SUP area combined. It is assumed that about eight percent of the total population would not use skiing facilities because they would be non-skiing visitors and on-duty employees. The current persons-at-one-time (PAOT) limit for the Kirkwood area is 11,800.

Day users do not stay overnight in the area and include both skiers and non-skiers. The number of day users varies with the season. Non-resident visitation during the summer months is currently low. The main summer activities include hiking, biking, horseback riding, and sightseeing. In the context of the surrounding area, recreational activities at Kirkwood are supplemented by boating, fishing, camping, hunting, and other outdoor recreational opportunities. Current summer visitation numbers are not available.

Table 4.37. Kirkwood Mountain Resort skier visitation (1991-2001).

Season	Annual Downhill Skier Visitation [a]	Downhill Peak Day Visitation [a]	Annual Cross-Country Skier Visitation [b]	Cross-Country Peak Day Usage [b]
1991/92	225,618	5,252	8,462	374
1992/93	203,242	5,324	7,213	337

1993/94	306,641	6,935	8,820	232
1994/95	326,217	7,259	7,466	289
1995/96	319,585	7,153	7,000	300
1996/97	304,761	7,600	6,394	281
1997/98	317,257	7,434	6,299	218
1998/99	290,446	6,757	6,712	232
1999/00	240,302	7,191	5,451	321
2000/01	290,359	6,866	7,123	221
5-yr. Ave.	**288,625**	**7,170**	**6,396**	**255**
10-yr. Ave.	**282,443**	**6,777**	**7,094**	**281**

[a] Values include season pass holders.
[b] Values based on number of ticket sales and excludes season pass holders.
Source: KMR 2001a; Morrow 2001a, 2001b, 2001c.

Table 4.38. Kirkwood area employment numbers for 1999/2000.

Employer	Seasonal Employees	Year-round Employees
KMR	800	125
Non-KMR [a]	31	19
Caples Resort	8	2
Caltrans	18	7
Total	**857**	**153**

[a] Non-KMR employers include: Kirkwood Towers/Whiskey Run Bar & Grill, KMPUD, Kirkwood Accommodations, Kirkwood School, Volcano Telephone, KSEF, Kirkwood Stables, and the Kirkwood Inn.
Source: KMR 2001a.

Table 4.38 shows the current employment numbers for the Kirkwood area. Caples Resort and Caltrans are included to allow analysis of Kirkwood region employment. The current number of seasonal employees for KMR is split between full time and part time. Approximately 50 percent are full-time employees working 30 or more hours per week, while the other 50 percent are working part time. The 800 employees represent the average seasonal employment; the peak employment, realized for about 1 month during the Christmas holiday season, is about 925 employees. The current number of year-round employees working for KMR is 125. The current total numbers of seasonal employees and year-round employees in the Kirkwood area is 857 and 153, respectively, for a total of 1,010.

4.10.3.2 Housing

As a resort community, the Kirkwood area has four primary housing types which include: (1) guest accommodations; (2) residential; (3) housing for resort and community employees; and (4) temporary emergency accommodations for guests and employees of the area in the case of severe winter storms. The highest level of occupancy occurs during the winter months. Current occupancy levels during the summer months are low except during special events such as summer camps, special promotions, or the annual homeowners' meetings during the Fourth of July weekend.

Employee housing is accounted for in the multi-family housing type. As of November 2001, the total number of units at Kirkwood was 554, 381 of which were multi-family units. Table 4.39 identifies the associated population for each of these housing types. Population per unit estimates were derived from information reported by RRC Associates (2001). In this report, a population analysis was calculated for each unit type and its associated occupancy rate. A more detailed description is included in Chapter 3, section 3.5.1.1.

Table 4.39. Existing number of units and associated population.

Unit Type	Number of Units	Associated Population
Single-Family/Duplex Residential	173	946
Multi-Family Residential	381	1,486
Total	**554**	**2,432**

4.10.3.2.1 Guest Accommodations

Short-term occupancy of guest accommodation units approaches 100 percent during peak periods. Occupancy figures vary greatly in accordance with snowfall. Currently, larger condominium units and single-family homes are rarely placed on the market for short-term accommodations, and therefore do not assist in satisfying the demand for overnight accommodations. There are two basic types of visitor housing in the Kirkwood area: (1) owned residences and (2) short-term accommodations rented by visitors.

Those who own residences in the Kirkwood area may use their units exclusively or place them in the rental pool when they are not using them. As discussed, single-family homes and larger condominiums are rarely included in the short-term rental market because those who choose to invest in those types of housing (as second homes or vacation homes) generally do not perceive the extra income provided by short-term rentals as a value (i.e., subject their property to high levels of use and maintenance associated with renting).

The second type of visitor housing is for those occasional visitors who require short-term accommodations. Hotels and lodge facilities exclusively used for short-term rentals have not been economically viable at Kirkwood in the past, as occupancy levels fall below the minimum annual occupancy rate required to be economically feasible. The minimum annual occupancy level is difficult to achieve in the 6-month ski season. However, smaller units such as studio, one-bedroom, and two-bedroom units, bed-and-breakfast units, and youth hostel units (off-season rental only) increase the number of units available for the overnight rental market.

4.10.3.2.2 Residential Housing

The types of year-round residents of Kirkwood are divided into two basic categories, those that live in the area because they are employed at Kirkwood and those who chose to live in Kirkwood but are not locally employed. Several factors influence the mix of these two types.

Some employees currently rent or share the rental of single-family homes or condominiums in Kirkwood. The majority of those sharing a residence are not married and share occupancy because of the economic benefits. There are currently a number of employees who own their own homes in Kirkwood. Most of these homeowners are in the middle-management income level or above.

Other socioeconomic factors have a strong influence on the number of employees who live year-round at Kirkwood. Construction costs in the Kirkwood area are relatively high due to the need to support heavy

snow loads and the remoteness of Kirkwood. As a result, purchasing a house in nearby communities is often more economical. This is especially true for communities at lower elevations such as Minden/Gardnerville, Nevada, or Woodfords/Markleeville or South Lake Tahoe, California.

Schools also influence the year-round residency at Kirkwood. Kirkwood has an elementary school for children through grade 6, but children above the sixth grade are bused to either Markleeville or Minden/Gardnerville. It is expected that a new elementary school would be constructed in Kirkwood when demand dictates and funding is available. The Alpine County Unified School District (ACUSD) does not foresee the need to build a school for students above the sixth grade.

4.10.3.2.3 Employee Housing

The existing employee housing in the Kirkwood area consists primarily of three large employee housing buildings, Renwick, the Youth Hostel, and Red Cliffs. These units require subsidies by KMR for their operation and maintenance. Caretaker units are also considered employee housing. The 1988 Master Plan Employee Housing Ordinance required one employee unit (bedroom) be provided for every 10 guest bedrooms of new development. Employee housing is also provided by non-KMR entities, as included in Table 4.40.

Table 4.40. Kirkwood area employee housing.

Employer	Employees Housed
KMR	170
Non-KMR [a]	1
Caples Resort	1
Caltrans	2
Total	**174**

[a] Non-KMR employers include: Kirkwood Towers/Whiskey Run Bar & Grill, the KMPUD, Kirkwood Accommodations, Kirkwood School, Volcano Telephone, KSEF, Kirkwood Stables, and the Kirkwood Inn.
[B] Some employees of non-KMR employment may also work for KMR, thereby receiving housing through KMR and not their non-KMR employer.
Source: KMR 2001a.

In addition to providing on-site employee housing, KMR is currently operating an employee shuttle service. Commuter vans pick up employees at designated locations in Gardnerville, Woodfords, and the South Lake Tahoe area. The service is provided at no cost to the employee. The number of shuttled employees contributes to the total number of employees being housed by KMR. This has accounted for 45 employees (KMR 1998).

In July of 1997, a survey of KMR employees was conducted to more fully understand housing preferences and to project employee housing needs. The survey focused on the following points:

- Current place of residence.
- Preference for living at Kirkwood or elsewhere.
- Type of housing desired with associated rent structure.
- Reason for choice of residence.
- Family income and other demographic questions.

Since the survey was completed in July, it is recognized that the employees who responded to the survey

were, for the most part, year-round full-time employees. Therefore, the survey may not be representative of the attitudes of seasonal employees. Based on the survey, the primary housing preferences were as follows: 45 percent of KMR employees would choose to reside at Kirkwood, 25 percent would prefer to reside in South Lake Tahoe/Meyers, and 21 percent would choose to live in communities accessed from SR 88 (18 percent in Minden/Gardnerville or Woodfords/ Markleeville and 3 percent in Pine Grove and Sutter Creek). Nine percent of the respondents did not answer the question. The survey also asked respondents to rank the importance of various reasons for determining their preferred place of residence. The top five reasons were, in order of preference: recreation, length of commute, cost of housing, remoteness, and availability of housing.

The largest demand for employee housing occurs between November and April each year. In a February 1995 survey of department heads at KMR, it was found that the preferences of seasonal employees would be for studios and dormitory units. The 1997 survey found that the preferred housing for year-round employees was one- or two-bedroom units as well as single-family homes. The main obstacle for obtaining the desired level of housing was affordability. Although employees preferred the types of housing mentioned above, the rental market rate was simply too high for their budgets. The rental rates for the existing employee complexes are about half of the market rate of nearby communities. Respondents who were unable to meet the market rent demands indicated that shared housing arrangements are currently used, where rent and utilities are split among the occupants. Those who do not live in a shared arrangement and are unable or unwilling to pay current Kirkwood market rates live in one of the nearby communities. Many of the respondents who indicated an ability to live at Kirkwood in market rate housing were from dual-income households.

Affordable housing is an important factor in satisfying housing demand, particularly in a resort community where prevailing wages can generally be moderate and housing costs high. While employees may desire to live in a one-bedroom unit instead of a dormitory unit or studio, their wages may not be adequate to afford such a unit. Consequently, many employees may need to share units or consider dormitory housing for the season.

Wages for the KMR employees are divided into eight categories. Higher salaries are typically paid to year-round employees, depending upon their job description. Table 4.41 displays the monthly income range for each wage category as well as the average number and percentage of employees for each category.

Table 4.41. Wage categories for KMR employees (2001-2002 season).

Monthly Wage Range	Average Number of Employees	Percentage of Employees
Less than $1,212 [a] (under $7/hour)	65 (60 are tipped employees)	8
$1,213 - $1,385 ($7-$8)	230	29
$1,386 - $1,558 ($8-$9)	170	21
$1,559 - $1,732 ($9-$10)	80	10
$1,733 - $1,905 ($10-$11)	80	10
$1,906 - $2,078 ($11-$12)	25	3
Above $2,078 ($12.01and up)	80	10
Salaried	70	9

[a] The incomes shown do not include gratuities received as part of job.

Source: KMR 2002a.

To determine housing affordability, the cost of housing must include the average utility cost due to the high cost of electricity and water at Kirkwood. Propane/electricity costs at Kirkwood average about $50 per month for a one-bedroom or $120 per month for a three-bedroom unit during the winter season. Energy costs for older units which are poorly insulated can reach $250 per month. In addition, water/sewer bills may exceed $75 per month for a one-bedroom unit and $90 per month for a three-bedroom unit. Therefore, expendable income, after paying housing rent and utilities, may be reduced to about 50 percent (33 percent for basic housing costs and 17 percent for utility costs) of average gross income (before taxes) for lower-wage earning employees.

4.10.3.2.4 Temporary Emergency Housing

Two types of situations that lead to the necessity for emergency accommodations in Kirkwood. The first occurs when employees are forced to stay at Kirkwood due to inclement weather and the second when winter storms force closure of the mountain passes and guests must also stay. If employees of KMR are required to remain on the property, KMR makes accommodations through Kirkwood Central Reservations. KMR employees residing at Kirkwood generally provide temporary accommodations for their peers when inclement weather conditions dictate. Other key employees in the valley, such as KMPUD and Mountain Utilities (MU) plant operators, must reside at Kirkwood per the requirements of their employment.

The second type of emergency accommodation demand arises when severe winter conditions result in the closure of both mountain passes leading out of Kirkwood. In these situations, guests and employees are provided accommodations in the Red Cliffs main lodge, the Timber Creek day lodge, or the Youth Hostel. If there are unoccupied rental units, guests are given the option to rent these units. Temporary emergency housing information is further outlined in the Emergency Housing Procedure Plan (KMR 2002b).

4.10.4 Environmental Impacts

4.10.4.1 Population and Employment

Impacts to residents, non-resident guests, and employees in the Kirkwood area would occur as a result of implementation of the Proposed Project. The resident population would increase as residential units increase with the implementation of the Proposed Project. Table 4.42 displays the projected maximum and year-round population in the year 2019/2020. The maximum population would increase from the current population of 2,432 to 5,669 persons (Tables 4.36 and 4.42). This number is less than the ultimate number of persons authorized under the Proposed Project (6,528 persons projected at buildout) due to construction rates. Single-family development would likely not be entirely in place until 2045, but all multi-family is projected to be complete by 2020.

Table 4.42. Population projections for Kirkwood Resort in 2019/2020 under the Proposed Project.

Housing Type	Maximum	Year-Round
Single-Family/ Duplex	1,466	220
Multi-family	4,203	420
Total	**5,669**	**640**

Source: KMR and Draft Plan (KMR 2001a).

The year-round population under the Proposed Project would increase from 140 to 640 persons (Tables 4.36 and 4.42) based on person-per-unit calculations. This estimate uses a higher year-round occupancy figure of 15 percent for single-family/duplex units, 10 percent for multi-family units. Employee units are occupied 50 percent of the year.

The Proposed Project would result in an increase in non-resident guests, drawn to Kirkwood because of the increase in accommodations and residential amenities. This increase would consist mainly of overnight visitors and day users. Implementation of the MMDP would allow a summer PAOT of 6,558, with 9,800 visitors allowed for the duration of approved special events. Special event permit(s) from the appropriate county would be required for such events. These special events are predicted to occur from three-six times during the summer. However, the SAOT would not change from the existing limit of 10,800 for the entire ski area. The winter PAOT (11,800) would also remain unchanged under the Proposed Project .

The Proposed Project aims to increase the ratio of destination to day visitors to 60:40. The number of day users would vary with season due to the recreation opportunities available. The Proposed Project would increase recreational opportunities year-round.

Non-resident visitation during the summer months would increase with the implementation of the Proposed Project. One of the objectives of the Proposed Project would be to create a more uniform, year-round use of the resort. The proposed increase in summer activities in the Kirkwood area would require setting a summer PAOT higher than the 2,200 figure used, but not officially established, by the Forest Service in 1973 to estimate impacts. As noted above, the new summer special event PAOT limit would be 9,800. This increase in summer PAOT would be required to accommodate the maximum overnight population of 6,558 authorized at buildout as well as to accommodate day visitors and/or special event participants and spectators. As summer activities, recreational facilities, special events, and other opportunities are developed in the Kirkwood area, it is anticipated that Kirkwood would attract day visitors that have recreated previously in the Carson Spur and Carson Pass areas and could also attract new visitors to the area. These new visitors in the Kirkwood area could increase use of the surrounding NFS lands as well.

As discussed above, currently during the peak visitation of the ski season, about 925 employees work for KMR, of which about 125 are year-round employees and 800 are seasonal employees. KMR estimates the total number of year-round and seasonal KMR employees at project completion to be 150 and 850, respectively. Therefore, the total number of employees is projected to be 1,000, which is an addition of 75 employees (or 8.1 percent) above the existing employee level.

4.10.4.2 Housing

Impacts to guest accommodations, residential housing, employee housing, and temporary emergency housing would occur with implementation of the Proposed Project. The intent of the Proposed Project is to facilitate development for a more consistent level of use of the resort facilities throughout the year. Implementation of the Proposed Project would increase the number of units for single-family/duplex and multi-family housing (Table 4.43). Table 4.43 identifies the number of persons per unit for each of the housing types. Multi-family units are projected to be fully constructed by 2019/2020; however, single-family/duplex housing are anticipated to be built at 6 units per year until the year 2044/45. The ultimate number of single-family/duplex units would be 425. The total number of units when the development is completed (2044/45) would be 1,503. Actual population calculations based on unit numbers are from the RRC (2001) report. They are shown in Table 4.42 and are further explained in Chapter 3, section 3.5.1.1.

Table 4.43. Number of units and associated occupancy for the Proposed Project at 2019/2020

Unit Type	No. of Units (2019/2020)	Average Persons per Unit [a]
Single-Family/Duplex	268	5.5
Multi-Family	1,078	3.9
Total	**1,346**	**NA**

[a] Source: RRC 2001.

4.10.4.2.1 Guest Accommodations

Additional market rate housing would increase the availability of short-term accommodations. As discussed above, the current development consists primarily of larger condominium units and single-family homes which are seldom placed on the market for short-term accommodations. The Draft Plan suggests that additional summer recreational facilities would improve annual occupancy rates. However, the economic feasibility of traditional hotel/lodging facilities could still be limited; therefore, KMR desires that a viable alternative for short-term accommodations be created.

The number of people that can afford a second or primary home in Kirkwood is limited due to the high cost of construction associated with mountain areas. There are numerous alternative forms of development that address both affordability of units and the limited number of short-term accommodations currently available at Kirkwood. One alternative proposed is shared ownership. Shared ownership occurs when a person owns a portion of the unit (e.g., one-fourth of the whole). Under this arrangement, the developer organizes and manages the schedule of usage (e.g., one week per month). This type of shared ownership may be applied to condominiums or other housing types. The primary motivation is that additional people are able to participate in second-home ownership, while maintaining flexibility in their financial and vacation planning. Due to the above-mentioned aspects of ownership and rental pool availability created by this type of housing, KMR is pursuing shared ownership as one segment of its market to increase the available short-term rental base at Kirkwood.

The highest occupancy levels would continue to be during the winter season. However, the shared form of ownership would tend to ensure that occupancy levels and related services remained more uniform. A more uniform occupancy level at the resort would have a positive effect on servicing the costs of personnel and infrastructure at Kirkwood.

4.10.4.2.2 Residential Housing

Compared to existing conditions, the Proposed Project would substantially increase residential housing in the Kirkwood area. Single-family housing would increase from the current level (173 units) to a total of 268 units in 2019/2020 (155 percent) and ultimately to 425 units in 2044/45 (246 percent). KMR projects that single-family housing would increase at 6 units per year until 425 units are constructed; however, all infrastructure for single-family/duplex housing would be in place by 2019/2020. Multi-family housing would increase from the current level (381 units) to a total of 1,078 units in 2019/2020 (283 percent). However, the current permitted level of 6,558 persons would not be reached according to this projection because the total population associated with these unit numbers is 6,528 persons.

Several socioeconomic factors have a strong influence on the number of year-round resident employees that rent or own homes at Kirkwood. Development of the Village Center would improve the number, level, and variety of services available. However, even at buildout, the level of services that can be provided at Kirkwood would not compete with existing services in nearby communities. It is expected that a number of new business services may be seasonal, and therefore would not cater to the year-round resident.

Schools are another factor that would influence year-round occupancy in Kirkwood. Many families have indicated a desire for their children to be exposed to greater social and recreational diversity than what exists at Kirkwood. Additionally, for employees in the Kirkwood area, the choice is between having the children above the sixth grade commute to school and social/recreational events or having the parent(s) commute to work. Commuting time between Kirkwood and South Lake Tahoe or the Minden/Gardnerville area is between 35 and 60 minutes depending on the actual mileage and the current weather conditions. When considering the ability to attend after-school activities, the benefits of larger schools and the convenience of services, the tendency for the majority of families with school-age children has been to locate in the nearby communities.

The development and affordability of the personal computer has made it possible for more people to work at home (i.e., telecommute). Telecommuting could increase the number of year-round residents in Kirkwood, but given the socioeconomic conditions described above, this technology should not significantly impact the number of year-round residents in Kirkwood.

4.10.4.2.3 Employee Housing

Employee housing requirements under the Proposed Project would increase, in accordance with revisions to the existing Employee Housing Ordinance. At the direction of the Lead Agency, this EIR addresses the impact of requiring provision of housing for up to 50 percent of the community's employees. The Lead Agency's intent is to use this analysis as a basis for developing a defined plan, reflected in a new ordinance, that effectively addresses the need for adequate, affordable, employee housing at Kirkwood and adjacent communities with the involvement of KMR, third-party developers, and county, state, and federal programs.

Successful affordable housing programs in other resort communities include a combination of developer incentives, regulatory compromises, and public/private financing. Successful programs have involved the use of redevelopment funds and density bonuses for developers who provide affordable housing. There is currently no redevelopment agency active in the Kirkwood Valley; therefore, use of redevelopment funds is not currently a viable alternative. However, it may be prudent to create some type of municipal or non-profit entity (housing authority) to aid in the development and procurement of government funds, tax credits, or impact fee waivers for employee housing projects.

A 28-unit youth hostel complex was built to meet some housing needs of seasonal employees. The youth hostel complex gives each individual employee private sleeping quarters with shared kitchen, bathroom, and laundry facilities. All units are allocated to satisfy employee housing requirements and are reserved as employee units.

Employee housing is an allowed use in any residentially designated land use zone in the Draft Plan. Flexibility in the location of employee housing allows the development of employee housing in all areas of the valley. Market conditions generally dictate where and when units are constructed. It is proposed that sites in all three counties be considered for potential locations to site employee housing projects. The most likely location for future employee housing complexes would be within multi-family and multi-family/commercial land use zones. Many successful affordable housing projects occur in mixed-use areas where the cost of affordable housing units is offset by the primary commercial use of the same building. An exception may be employees associated with the Kirkwood Volunteer Fire Department's firehouse. Depending upon design, up to six employees may be provided with accommodations at the firehouse.

The amount of employee housing provided by other ski areas in the region varies from zero to 14 percent. Many of these resorts have more affordable housing units in close proximity to the resort than does Kirkwood due to the fact that they are located on the outskirts of metropolitan areas. Kirkwood is served

by South Lake Tahoe and Minden/Gardnerville, which have a somewhat greater travel distance necessitating unique accommodations.

Variety in the types of employee housing available can be as important as the number of units provided. Full-time employees have a much different housing requirement than seasonal employees. The Draft Plan proposes to provide a variety of employee housing types to address the community's basic needs. As Kirkwood grows into a year-round community, its employees could experience improved annual earnings, which would increase the opportunity for employees to lease or purchase market-rate housing in the area. Therefore, as time passes, the need for various types of employee housing would likely change in order to serve all levels of employees regardless of income. However, as the resort matures, there is also the potential for employee housing difficulties to worsen. In other resort communities, housing prices have accelerated faster than wages, resulting in fewer opportunities for employees. Maintaining a sufficient supply of deed-restricted housing can often be the only way to provide the desired employee opportunities for purchase or rent.

4.10.4.2.4 Temporary Emergency Housing

The strategy for meeting the needs of temporary emergency housing in the Kirkwood area would follow procedures outlined in the Emergency Housing Plan (KMR 2002b). Employees would have their own accommodations, be accommodated through KMR, or stay with their peers. Guests would be allowed to rent available rental units or would be accommodated through the Red Cliffs day lodge and the Timber Creek day lodge. The food and beverage department at Kirkwood is staffed and supplied to maintain service for up to 3 days at normal service levels.

4.10.4.3 Level of Significance Before Mitigation

4.10.4.3.1 Population and Employment

Impacts to population and employment would be less than significant, as an economic or social change alone is not considered a significant environmental effect under CEQA. However, an economic or social change causally related to a physical change may be considered when the significance of the physical change is determined [Guidelines sections 15064(f), 15382]. The socioeconomic changes discussed above could be associated with physical changes in the areas of noise, transportation, and public services. The reader is referred to those sections of this chapter for determinations of significance.

4.10.4.3.2 Housing

Impacts to employee housing could be significant before mitigation. Other housing impacts would be less than significant.

4.10.4.4 Mitigation

4.10.4.4.1 Housing

Mitigation Measure 4.10 (a). Counties will develop and enact an ordinance requiring employee housing to be provided at Kirkwood. The ordinance shall, at a minimum, include the following elements:

- A requirement that up to 50 percent of the number of average peak-season employees be provided with employee housing concurrent with future development of the resort.
- A method of ensuring that the amount of required employee housing will continue to be provided in the future.
- Consideration of possible allowance for a fee to be paid in lieu of constructing employee housing.
- Consideration of possible credit toward the employee housing requirement in exchange for KMR

providing transportation for employees residing outside of the Kirkwood area.

· Consideration of possible credit toward the employee housing requirement for housing units located outside of the Kirkwood area which are reserved by KMR for use by employees within the Kirkwood area.

4.10.4.5 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant socioeconomic impacts.

4.10.4.6 Significant, Unavoidable, Adverse Impacts

No significant, unavoidable, adverse socioeconomic impacts were identified.

4.10.4.7 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Of these two cumulative actions, only the first is relevant to this socioeconomic analysis. The major socioeconomic cumulative effect identified involves the availability of affordable employee housing. Increases in population in the South Lake Tahoe and Minden/Gardnerville areas, and projects underway or planned (e.g., development at Heavenly Ski Resort) that would result in an increased demand for housing in these areas, could result in shortages of affordable housing. Implementation of the Proposed Project would add cumulatively to the demand for affordable housing in these outlying communities. Increased demand could outstrip available housing, driving prices up and adversely impacting the work force. Employees could be forced to seek housing farther from their places of employment, increasing the impacts to them and to the environment (e.g., traffic and air quality) associated with longer commutes.

However, as discussed above, KMR employment is projected to grow by only 75 people (8.1 percent) through buildout. While some non-KMR employment must also be considered, KMR will remain the major employer. With an effective employee housing plan and ordinance in place, a called for in the suggested mitigation above, the incremental impact on housing demand in communities the size of South Tahoe and Minden/Gardnerville will be less than significant.

4.11 HAZARDOUS MATERIALS

Hazardous materials are defined as substances that have the potential to cause damage to the environment and/or cause human illness or mortality. Potential impacts from hazardous materials at Kirkwood would likely be associated with the storage and use of petroleum products, maintenance solvents, cleaning agents, or avalanche-control explosives, or the transportation of wastewater sludge for disposal.

4.11.1 ISSUES

The following issues were identified through public and agency scoping and resource specialist review:

- The storing or transportation of hazardous materials in the Caltrans right-of-way.
- The potential for increased risk of hazardous material releases as a result of the Proposed Project.

4.11.2 METHODS

The methods for assessing the current conditions in terms of hazardous waste are similar to those employed for a Phase I Environmental Site Assessment (ESA). The objective of an ESA is to assess the potential for adverse environmental impacts to a real property from existing or prior process and waste management operations. The scope of a Phase I ESA includes the following principal tasks:

- Visual inspection of the subject and adjacent properties.
- Review of historic information, including aerial photographs, chain of title (if available),

and past and present waste management practices, if any.

- Review of regulatory files maintained by relevant federal, state, and local environmental authorities.

- Interviews with individuals knowledgeable about the subject property.

- Preparation of a final report summarizing the observations and findings compiled as part of the Phase I ESA activities.

Several Phase I ESAs were completed for KMR in 1997 and 1998. These assessments provide a relatively comprehensive overview of the existing hazardous materials situation in the project area. Accordingly, these site assessments were utilized to describe the existing condition for the hazardous materials analysis.

Potential impacts in terms of hazardous materials were assessed based on the potential for the Proposed Project to increase the storage or use of such materials. These could be in the form of more propane tanks for heating, more storage tanks for petroleum products, or an increased storage and use of avalanche-control explosives. Also, an increase in the amount of wastewater treated at buildout would in turn increase the amount of wastewater sludge transported out of Kirkwood to landfills. The analysis was confined to materials utilized, stored or produced in the project area.

4.11.2.1 Assumptions

The observations and findings presented in a Phase I ESA are based on reasonably ascertainable information and are not comprehensive. This analysis is based on the assumption that the Phase I ESAs previously completed for KMR were as complete and accurate.

4.11.2.2 Significance Criteria

CEQA Guidelines state that significance criteria for hazardous materials are based on the potential for materials or operations in the project area to pose a risk to either the environment or human health and safety. The criteria for determining each level of significance are described below:

- Less than significant: Operations with the potential for localized and minor impacts on the environment, but not a significant effect on human health. Examples would be small fuel spills (less than 1 gallon), oil leaks from cars, etc.

- Significant: These consist of operations with the potential for large impacts on the environment and/or human health and safety. These operations could include the storage of fuels in leaking underground storage tanks (LUSTs), the improper storage of avalanche-control explosives, the exposure of workers or visitors to friable asbestos, and the improper disposal of lubricants and/or solvents.

- Significant and unavoidable: These consist of present or future operations which would have a significant impact on the environment and/or human health and safety and are not easily remediated. Examples would be the contamination of groundwater by LUSTs, or the long-term leaking of PCB-containing transformer oils into the soil.

- Beneficial: Any activity which decreases the risk of hazardous materials or operations affecting the environment or human health and safety.

4.11.2.3 Regulatory Setting

Regulatory agencies with jurisdiction over hazardous substance issues include Cal/EPA (Department of Toxic Substance Control and Central Valley Regional Water Quality Control Board (CVRWQCB)), Cal/OSHA, Governor's Office of Emergency Services, local air and sewer agencies, the local fire department, and the local health department. All elements of the proposed expansion must be consistent with the regulations of these organizations.

4.11.2.4 Existing Studies and Information

The following documents were utilized for this analysis:

- *Phase I Environmental Site Assessments completed for Properties at Kirkwood Ski Resort, Kirkwood, California.* (Kleinfelder 1998).
- *Phase I Environmental Site Assessments completed for Properties at Kirkwood Ski Resort, Kirkwood, California.* (Kleinfelder 1997).
- *Draft Environmental Impact Report: East Meadows 3 Subdivision in Alpine County, California.* (Simpson 1996).
- *Phase I Environmental Site Assessment for the Red Cliffs and Timber Creek Lodges, Kirkwood Inn and East Meadows Phase III, Kirkwood Ski Resort, Kirkwood, California.* (Converse Consultants Southwest, Inc. 1996).
- *Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA.* (Simpson 1995d).

4.11.3 Environmental Setting

Hazardous material stored at Kirkwood is largely confined to fuel and explosives. Dewatered sludge is produced from wastewater treatment activities at Kirkwood and transported out of the project area.

4.11.3.1 Fuel, Power Generation, Storage

Fuel for vehicle use and facility heating is stored in both underground and above-ground storage tanks. The number, size and location of these tanks is provided below in Table 4.44.

There are four underground and 12 above-ground fuel storage tanks in the project area. During the process of complying with federal underground storage tank regulations in July 1999, it was found that an underground diesel tank at the power station had leaked petroleum products, including MTBE. The leaking storage tank was immediately taken out of service.

The type and extent of the contamination was characterized using a combination of surface and drill- hole sampling. Both soil and water samples were taken regularly. MTBE was detected, but primary maximum contaminant levels were never exceeded. One water supply well, Well 2, was affected when the alluvial deposits upslope from it were contaminated. The well was taken out of service. Remediation methods and required equipment were designed immediately upon completion of the characterization study. The aggressive cleanup program, consisting of injecting ozone and oxygen into the formation, has resulted in a steady decrease in MTBE and petroleum product in groundwater samples. The entire clean-up process has operated under the jurisdiction and approval of the CVRWQCB and the applicable county agencies. A

more detailed description of the MTBE contamination and current status of the affected well is included under section 4.2, Water Resources.

Table 4.44. Existing storage tanks.

Tank Type	Number	Volume (gallon)	Material stored	Location	Leakage Status	Use Status
Underground	1	12,000	Diesel	Service station north of SR 88.	No	In use.
Underground	2	12,000	Gasoline	Service station north of SR 88.	No	In use.
Above-ground	2	10,000	Diesel	KMR maintenance yard.	No	In use.
Above-ground	1	20,000	Propane	KMR maintenance yard.	No	In use.
Above-ground	1	30,000	Propane	KMR maintenance yard.	No	In use.
Above-ground	1	6,000	Gasoline	KMR maintenance yard.	No	In use.
Above-ground	1	6,000	Diesel	Near Chair 3.	No	Seasonal use (winter only).
Above-ground	1	2,000	Diesel	KMPUD WWTP.	No	In use.
Above-ground	1	30,000	Diesel	MU powerhouse.	No	In use.
Underground	1	500	Diesel	KMPUD WWTP.	No	In use.
Above-ground	2	30,000	Diesel	MU powerhouse.	No	In use.
Above-ground	1	10,000	Ammonia	MU powerhouse.	No	In use.
Above-ground	1	500	Waste oil	KMR maintenance yard.	No	In use.

Source: Eichar 1999b, Morrow 2002.

4.11.3.2 Explosives Storage

The ski area routinely uses explosives for avalanche control. These explosives are stored in locked magazines located near lifts 2 and 9. During the avalanche control season, small amounts of explosives are kept at each ski patrol shack. Only individuals with training in explosives use and avalanche control have access to these explosives.

4.11.3.3 Dewatered Sludge Transportation

Wastewater treatment activities currently require disposal of 20 loads of dewatered sludge annually. It is transported to the landfill in Stockton, California. (See section 4.14, Utilities and Infrastucture for a detailed discussion of sledge disposal.)

4.11.4 Environmental Impacts

4.11.4.1 Fuel Storage and Use

The Proposed Project would develop an additional 1,503 dwelling units with a an authorized maximum overnight population of 6,558 persons. Daily fuel demand associated with the buildout population is

unlikely to greatly impact the number or type of petroleum tanks existing at Kirkwood. However, the WWTP upgrades would require the addition of another 320-kilowatt, diesel-powered generator and an associated 2,000-gallon fuel tank, increasing the total above-ground fuel tanks to 13. This tank would be located above ground on the west side of the wastewater treatment facilities building. Demand for propane fuel would increase with the buildout population and would necessitate either the installation of another propane storage tank, or an increase in the deliveries to the existing tanks. Above-ground tanks are frequently monitored; any leaks from the new diesel and propane tanks would be detected and dealt with before they became a hazard to the environment or human health and safety. While it is unlikely that these additional tanks and/or deliveries could result in significant change in the environmental risks associated with fuel storage, spill or leakage risk still exists and could result in significant impacts to the environment.

The proposed construction of new buildings, the clearing of ski runs, and the placement of lift towers and terminals would necessitate the use of heavy equipment in the project area. This equipment would likely be fueled from trucks which transport the fuel to the construction area. This increases the potential for fuel spills during refueling operations. Typically, these types of spills are small and easily contained. However, if they occur near populated areas or water bodies they can constitute a hazard or environmental risk.

4.11.4.2 Explosives Storage

The Proposed Project would have no impact on the risk associated with explosives stored for avalanche control. The increased trail acreage could necessitate additional avalanche control work, but the increase would not be substantial from what currently occurs at the ski area. The potential for accidents associated with explosive use could also increase, but access to these explosives would continue to be given only to individuals with training in explosives use and avalanche control.

4.11.4.3 Dewatered Sludge Transportation

Implementation of the Proposed Project would increase the amount of dewatered sludge requiring disposal. At buildout, an estimated 40 loads of sludge would be transported annually from Kirkwood to the landfill in Stockton, California. This would double the number of loads transported in 2000 and increase the risk associated with transportation. However the material being transported would not be in a form that readily flows if spilled, and would not pose a substantial environmental or human health risk.

4.11.4.4 Level of Significance Before Mitigation

4.11.4.4.1 Fuel Storage and Use

Due to the risk of fuel spills, impacts of the Proposed Project on fuel storage and use could be significant.

4.11.4.4.2 Explosives Storage

Any increases in explosive use for avalanche control associated with implementation of the Proposed Project would be minor. Explosives would continue to be accessed only by trained personnel. Implementation of the Proposed Project would have a less-than-significant impact on explosives storage.

4.11.4.4.3 Dewatered Sludge Transportation

Due to the nature of the material being transported, the potential impacts of an accident during transportation on the environment and/or human health and safety would not be significant.

4.11.4.5 Mitigation

4.11.4.5.1 Fuel Storage and Use

Mitigation Measure 4.11 (a). Underground storage tanks or other hazardous material storage will not be

sited within the Caltrans right-of-way.

Mitigation Measure 4.11 (b). The Kirkwood Maintenance Shop and MU will maintain spill prevention plans for all hazardous materials. These plans will be reviewed and updated annually, as appropriate, and filed with the appropriate county.

Mitigation Measure 4.11 (c). All existing and proposed fuel tanks will be maintained, operated and tested in accordance with local, state and federal regulations.

Mitigation Measure 4.11 (d). Hazardous materials cleanup and containment supplies will be carried in any vehicle that transports fuel for refueling construction equipment.

Mitigation Measure 4.11 (e). Hazardous materials cleanup and containment supplies will be present at any permanent location where refueling is done.

Mitigation Measure 4.11 (f). KMR, MU, and KMPUD will train all vehicle operators who will be participating in refueling activities in spill prevention and in the use of cleanup materials.

Mitigation Measure 4.11 (g). No motor fuel refueling will be conducted within 100 feet of Kirkwood Creek or any of its perennial tributaries, or within 50 feet of any occupied housing unit.

Mitigation Measure 4.11 (h). In the event that a hazardous material spill of a reportable quantity occurs, the responsible party will immediately notify the Department of Environmental Health of the affected county or counties, the CDFG and any other agencies as required under regulations applicable at the time of the spill. If the spill occurs on NFS land, Kirkwood will also notify the Amador Ranger District.

Mitigation Measure 4.11 (i). KMR and its agents and subcontractors will adhere to the reporting standards outlined in California Hazardous Materials Spill/Release Notification Guidance (Lercari 1999) established by the Governor's Office of Emergency Services.

Mitigation Measure 4.11 (j). KMR, MU, and KMPUD willcomply with Title 22 for submission of business plans, inventory statements, explosive storage, and spill prevention control countermeasure plans, as may be required.

Mitigation Measure 4.11 (k). Future development in portions of Alpine or Amador County where soil or groundwater contamination by petroleum products has been identified will at a minimum require approval from the applicable County Health Department and the CVRWQCB.

4.11.4.6 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts involving hazardous materials.

4.11.5 SIGNIFICANT, UNAVOIDABLE, ADVERSE IMPACTS

No significant, unavoidable, adverse impacts related to hazardous materials were identified.

4.11.6 CUMULATIVE EFFECTS

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the cited cumulative actions have the potential to interact with the Proposed Project to generate cumulative effects via increased traffic on the highways used by trucks hauling sludge from Kirkwood's WWTP. However, as noted above, given the characteristics of the sludge, an accident during transport would pose no risk to the environment or to human health and safety.

4.12 Recreation

Kirkwood Mountain Resort (KMR) provides recreational activities for its year-round and seasonal residents and day visitors. Winter activities such as alpine and cross-country skiing and snowboarding are the main focus of the resort, but summertime activities attract visitors as well. The Proposed Project introduces development plans that would expand both winter and summer recreational opportunities in order to develop Kirkwood as a year-round resort. Potential impacts to the quality or quantity of existing recreational opportunities and activities at Kirkwood and in the surrounding area are discussed relative to implementation of the Proposed Project.

4.12.1 ISSUES

The following issues were derived from public and agency scoping and resource specialist review:

- Effects of increased construction and traffic on recreation.
- Effects of increased population on use of surrounding public lands.
- Effects on Kirkwood Lake, including fishing.

4.12.2 METHODS

This recreation analysis identified existing recreation resources on private and NFS land in and around Kirkwood and addressed issues related to these resources during the public scoping process. Information was compiled from existing maps and literature supplied by public agencies and private entities and from meetings and communications with county and federal planners and resource specialists.

4.12.2.1 Assumptions

Analysis of the summer increase in recreational use is based on the resort reaching 6,558 persons-at-one-time (PAOT) occupancy. Winter recreational use is based on 10,800 skiers-at-one-time (SAOT), and 11,800 PAOT.

4.12.2.2 Significance Criteria

The following factors were considered in evaluating the significance of effects on recreation:

- Project-related changes that would alter or physically affect established, designated, or planned recreation areas.
- Project-related changes that would conflict with adopted policies or goals for recreation management.
- Project-related changes that would affect access to recreation areas.
- Project-related changes that would affect the quality of recreation experiences.
- Project-related changes to currently undeveloped areas on NFS lands.

4.12.2.3 Regulatory Setting

The portion of Kirkwood managed under a Forest Service special use permit (SUP) is administered under Management Area 11- Existing Winter Sports Sites. Management Area 11 provides for operation and maintenance of existing downhill skiing sites that are administered by the Forest Service and operated by private concessionaires.

The *Eldorado National Forest Land and Resource Management Plan* (Forest Plan; Forest Service 1988) indicates that coordination with TC-TAC and other county and state agencies with jurisdiction for development of associated private land helps achieve safe, aesthetically pleasing, well-maintained facilities.

No specific regulations regarding recreation on non-NFS lands were identified or considered relevant to the analysis.

4.12.2.4 Existing Studies and Information

Information on the recreation resource came from several sources including:

- *Kirkwood Specific Plan* (KMR 2001a).
- *Kirkwood Mountain Resort Mountain Master Development Plan* (SE Group 2001).
- *Eldorado National Forest Land and Resource Management Plan* (Forest Service 1988).
- *Final EIR and EA for Public Comment: Kirkwood Water Rights and Snowmaking Project* (Simpson 1995d), and other CEQA documents.
- *East Meadows Phase 3 Subdivision Draft EIR* (Simpson 1996).
- *Kirkwood Ski Resort Ski-In/Ski-Out Master Plan* (Design Workshop 1998).
- Kirkwood Summer Recreation Survey (KMR 1999).

Information was also collected through personal communication with planners from Kirkwood and the three counties and with Forest Service recreation specialists, supplemented with field investigations. The Eldorado National Forest (ENF) area map and vehicle and travel map were also reviewed for the location of existing recreational facilities and recreational management guidelines.

4.12.3 ENVIRONMENTAL SETTING

4.12.3.1 Winter Recreation

KMR operates a ski resort with both downhill and cross-country skiing facilities. Most skiers come from California's Central Valley, the Bay Area, South Lake Tahoe, and northern Nevada. Most of the KMR property and existing facilities are located south of SR 88, including the downhill ski area, lodges, restaurants, shops, and residential areas. A portion of the Kirkwood development occurs north of SR 88. The current master plan under which Kirkwood operates (the 1988 Amended Master Plan) has an ultimate PAOT of 11,800 persons and an ultimate SAOT of 10,800 persons.

During the 2000-2001 ski season KMR reported a total downhill skier visitation of 290,359 persons, and a peak-day usage of 6,866 persons. Over the last 10 years the highest recorded total downhill skier visitation was 326,217 persons in the 1994-1995 season, and the highest downhill peak usage day was 7,600 persons in the 1996-1997 season. A higher peak day was recorded in 2002, but figures for this season had not been compiled for use in this analysis.

4.12.3.1.1 Lifts

Eight lifts and associated mountain support facilities are located either entirely on NFS lands or span both NFS and private lands. Four additional lifts (Hole N' Wall and Bunny chairlifts, and the two surface tows) and support facilities are located entirely on Kirkwood's private lands. The lift network ranges from 1 to 28 years of age and featured only fixed-grip technology until the Cornice chairlift was upgraded with detachable technology in 2000. Kirkwood is unique among the Tahoe area resorts because of its reliance on fixed-grip technology. Therefore, the lift network appears to fall short of fulfilling all guest expectations regarding high-speed, detachable-grip technology, which is available at nearby Lake Tahoe resorts.

The aggregate capacity of Kirkwood's lift system is not balanced with the aggregate capacity of Kirkwood's network of alpine trails. Lift capacity is estimated at 6,500 skiers, but terrain capacity totals 16,172. Very low trail densities are the result, which has become a trademark of Kirkwood, as have long lift lines in critical terrain pods. Even with considerable improvements in lift capacity, trail densities at Kirkwood would remain low relative to industry standards given the resort's extensive terrain.

4.12.3.1.2 Nordic Skiing

The Kirkwood Cross-Country Center (KCCC) trail system consists of approximately 80 kilometers (~50 miles) of groomed trails, which form three distinct trail systems totaling 23 trails. All trails are double-tracked with skating lanes. The Nordic trails system makes use of both public and private lands. The Meadow Trail System is located south of SR 88, the Caples Creek Trail System is north of SR 88 and near the Cross-Country Day Lodge, and the higher-elevation Schneider Trail System is northeast of the Caples Creek system, linked to the Caples Creek system via Agony and Ecstasy trails. KCCC trails are accessed via two, principal points: the Cross-County Center trailhead and the Schneider trailhead. The Cross-Country Center features a retail store, equipment rental and repair, lockers, ticket sales, ski school, and limited food and beverage service.

During the 2000-2001 ski season, cross-country skiers totaled 7,123, with a peak-day of 221 skiers. The highest recorded number of annual Nordic visits occurred in the 1989-1990 season when visitation reached 11,491 and the peak-day use reached 413 persons. The highest cross-country peak-day was 374 skiers in 1991-1992. Cross-country use had shown a declining trend over the last 10 years, averaging 7,094 skiers per season. However, last seasons' total was higher than the past 5 years. Peak-day usage over this same 10-year period has averaged 281 skiers.

4.12.3.1.3 Snowshoeing

Rental snowshoes and trail passes are available at the Cross-Country Center. The purchase of a trail pass affords snowshoers access to the 80 kilometers of touring trails maintained by KCCC personnel.

4.12.3.1.4 Backcountry Ski Touring
KCCC offers guided backcountry tours in the portion of the ENF north and west of Carson Pass. One-, 2-, and 3-day trips are offered in and around the Schneider cow camp area. For multiple day trips, camping usually occurs in the area immediately adjacent to the Schneider barn. KCCC guides provide leadership and ski instruction, as well as winter camping skills.

4.12.3.1.5 Snowmobile Hill Climb
A snowmobile hill climb, held under the Cornice lift (Chair 6) in held annually in the early spring. This event is permitted by the Forest Service through an SUP.

4.12.3.1.6 Winter Special Events
During the ski season, which generally runs from November to May depending on snow conditions, KMR also coordinates and runs special events at Kirkwood. A typical ski season consists of 20-25 events including the Echo Summit to Kirkwood Race and Tour, the Western States Extreme Skiing Competition, the Master's Ski Series, Winter Special Olympics, and snowboarding and Nordic competitions.

4.12.3.2 Summertime Recreation
The summertime private land PAOT is currently 2,200 people. There is currently no identified summertime PAOT for the SUP area. Within the private landholdings at Kirkwood, there are approximately 206 acres of planned, undeveloped open space and 129 acres of meadow. During the summer, this land is open to day hikers, mountain bikers, equestrians, anglers, photographers, and sightseers.

4.12.3.2.1 Biking
Kirkwood's mountain bike park is one of only a few developed parks in the High Sierra. Kirkwood provides mountain bike transport with a pair of lifts the Snowkirk and Flying Carpet chairlifts. Mountain biking is permitted throughout the lower elevations of Kirkwood's SUP area on a network of dirt roads, multiple-use trails, and single-track trails. Kirkwood's biking terrain distribution has been estimated as 3 miles of beginner trails, 6.6 miles of intermediate/advanced intermediate trails, and 3.7 miles of expert trails. Bike rentals, repairs, and accessories are available at the Kirkwood Adventure Center. Lift-served mountain biking is limited to operation on weekends and holidays, mid-June through Labor Day weekend. A road bike event, which originates in Markleeville, passes through the valley during the second week of July. Other than that event, there is little road biking due to limited shoulder space along SR 88.

4.12.3.2.2 Hiking
Numerous scenic trails exist within and adjacent to Kirkwood's SUP area, the most popular being the Emigrant Trail. The Emigrant Trail begins at the Caples Lake Dam, follows the western edge of the lake, and continues south into the Emigrant Valley and Mokelumne Wilderness. The Pacific Crest Trail and others in and through the Carson Pass area access high-elevation portions of the Mokelumne Wilderness southeast of the ski area. A small parking lot approximately .25 mile west of the Caples Lake Dam serves as the trailhead for the Lake Margaret trail into the Caples Creek roadless area to the north of SR 88. The Thunder Mountain trail begins on the south side of SR 88 approximately a mile west of Kirkwood Meadows Drive, terminating at Thunder Mountain above the ski resort. Equestrians affiliated with Kirkwood Stables use several unnamed trails on both private and NFS land. Access to the Mokelumne Wilderness and other primitive areas from Kirkwood is gained via several trails by both horse and foot travel. The extensive network of routes provides a diverse array of treks for day hikers, backpackers, and horseback and pack animal enthusiasts.

At Kirkwood, the Meadow Trail parallels the eastern perimeter of the meadow. An extension of this trail, which would encircle the meadow, is proposed in order to promote enjoyment of this unique habitat while protecting it from unauthorized trail blazing.

Kirkwood's summer activities program features guided, themed hikes throughout the summer. In addition, Kirkwood offers lift-served hiking via the Snowkirk and Flying Carpet chairlifts on weekends and holidays, mid-June through Labor Day weekend. Supplies are available at the Kirkwood Adventure Center and the Kirkwood General Store.

4.12.3.2.3 Equestrian Activities

Kirkwood's equestrian activities are managed by Kirkwood Stables/Lazy K Pack Station (Lazy K holds its own SUP and operates on portions of the Kirkwood SUP). The stables are located on the north side of SR 88, with trails located throughout Kirkwood. In some winter months, horse-drawn sleighs have operated through the Kirkwood Meadow on groomed trails.

4.12.3.2.4 Other Dispersed Summer Recreation Near Kirkwood

KMR recently completed a survey (KMR 1999) of owners and visitors of Kirkwood to determine primary summer activities and use patterns. The most popular activities included hiking, reading, day backpacking, fine dining, and photography. Average length of stay at the resort was 2-3 days, with most visits occurring over the weekend. Locations near Kirkwood most frequently visited by owners/visitors, in descending order included Caples Lake, Silver Lake, South Lake Tahoe, Hope Valley, Kirkwood Lake, and Woods Lake. The survey also recorded the percent of respondents who stated they spend the majority of time within the resort. The results showed an even split, with respondents dividing their time equally within and outside of the resort.

Caples Lake is located about a mile east of Kirkwood. Facilities at Caples Lake include a campground with 35 camping sites, a resort, 13 recreation residences, and two parking lots (a 25-vehicle lot at the Caples Dam trailhead and a 28-vehicle lot at Woods Creek). There is some additional parking adjacent to SR 88. *Lake levels are first maintained for power and consumptive uses, which take precedence over recreational uses. However, recreational use is maintained from May through August.*

East of Caples Lake other recreation areas include Woods Lake, Carson Pass, and Hope Valley. At 8,240 feet, Woods Lake is a small 10-acre lake located in a glaciated basin surrounded by tall lodgepole pines. The ENF operates a campground at the lake, and there is also a trailhead for a popular 3-mile loop hike on the Winnemucca-Round Lake trail. Use at the lake is controlled by available parking and currently operates at or near comfortable carrying capacity. At Carson Pass the ENF operates a summer information station. Parking is available at the information station and just west of the station at a trailhead for the Pacific Crest Trail. The pass is a principal trailhead for the Mokelumne Wilderness to the south and the Meiss Meadows-Upper Truckee River area to the north. Hope Valley is located about 5 miles east of Carson Pass along the West Fork of the Carson River. Fishing is popular on the river in areas accessible to the public. The Toiyabe National Forest operates a small campground in the area.

Caples Creek is located north of SR 88, about 0.25 mile north of KMR property. The Caples Creek roadless area has been identified as an area for further study under the California Wilderness Act. Hiking in the summer months and Nordic skiing in the winter are popular recreational activities.

Kirkwood Lake is located just to the northwest of KMR property. The lake is accessed via a paved, single-lane road off of SR 88 that terminates on the west side of the lake. Recreational residences, allowed on the ENF through a SUP, surround the lake on three sides. The Two Sentinels Girl Scout Camp, which also

operates under a Forest Service SUP, is located on the south side of the lake. There is also a Forest Service campground with 12 camping units. A Forest Service trailcircles the lake. The cabins are located in close proximity to the lakeshore, with the trail running between the cabins and the lake. In places, trail users come within an arm's length of the existing cabins.

Although public day use of the lake is moderate, parking has become somewhat of a limiting factor in the recreational use of the lake. A total of 59 parking spaces at the end of the access road are used by campers, residences, Girl Scout camp visitors, and day users. Of the 59 parking spaces, 14 to 15 spaces are reserved for campground users, and approximately 12 spaces are designated for use by the Girl Scout camp. Access to most of the residences and the Girl Scout camp is by trail or boat.

Silver Lake is located on the south side of SR 88 about 7 miles west of Kirkwood. This subalpine lake has been a popular destination for visitors and summer residents for decades. Facilities include Forest Service campground and picnic areas, organization camps, private resorts, and family campgrounds. Public access to the shoreline is available in several locations; however, the area is heavily used, and parking and the amount of available shoreline for public recreation is at or near capacity.

4.12.4 Environmental Impacts

4.12.4.1 Effects on Recreation at Kirkwood

The Proposed Project would increase both the winter and summer population at Kirkwood. Over the last 10 years, downhill peak-day usage averaged 6,777 skiers (1991-2001 season). Annual use over this same period averaged 282,443 downhill skiers. The Proposed Project would retain the SAOT limitof 10,800, which if achieved would constitute an increase of about 4,023 skiers per day from existing peak conditions. The Mountain Master Development Plan (MMDP; SE Group 2001) outlines the proposed on-mountain improvements, including new and upgraded lifts and terrain, increased snowmaking coverage, and improvements to resort infrastructure, all of which are within the existing SUP boundary. The MMDP is described in detail in Chapter 3 and illustrated in Figure 3.9.

With the installation of five new lifts and the replacement/improvement of seven existing lifts, Kirkwood would substantially increase aggregate out-of-base capacity, bringing it closer to trail capacity, and create lift-served advanced and expert skiing opportunities in areas that are currently difficult to reach. Lift upgrades would also decrease round-trip time on many runs, as lift line length and time spent waiting in line would be shortened. The lift improvements would increase access to some of Kirkwood's more advanced terrain. The proposed Caples Crest Express would improve access to Kirkwood's backside terrain.

Approximately 221 acres of new terrain would be opened under the MMDP, the majority above treeline or naturally-gladed. These terrain upgrades and expansions would increase utilization of the existing ski area. Busy ingress and egress periods would be alleviated and circulation would be improved, resulting in safer conditions for skiers and snowboarders.

Proposed snowmaking would improve early and mid-season conditions on runs that experience heavy skier volumes and in rocky areas where extra snow coverage is needed. Snowmaking capabilities also allow for a more consistent length of season.

The Proposed Project would also change summer recreation opportunities at Kirkwood and, in turn, would change the summer population. Currently, Kirkwood has a maximum summer PAOT limit of 2,200 (on non-NFS lands); however, actual usage has averaged about 274 people the last several seasons. The Draft Plan calls for a summer PAOT limit of 6,558, with a special event limit of 9,800. In order to attract this

level of summer use, the Draft Plan lists many existing and proposed options for recreation, including an expanded trail system, lift-served mountain biking, tennis, and roller blading/roller hockey. A community recreation facility including amenities such as a pool, hot tubs, an exercise room, and an indoor tennis court that was recently added opposite the Red Cliffs employee housing area.

The effects discussed above would be considered positive improvements by the majority of visitors at Kirkwood, especially wintertime visitors attracted to the area for its skiing opportunities. However, some of the effects, such as facilitating access to out-of-bounds areas, could be perceived by a portion of Kirkwood's clientele as a negative effect by degrading the "hike to" skiing experience. Increased use results in more incounters with other skiers and decreased snow quality. A degraded experience may also occur to users, both in winter and summer, who are seeking solitude and a more pristine recreational setting.

Wildlife habitat in Kirkwood Meadow and Kirkwood Creek could be impacted by anglers and other recreationists utilizing these areas. However, a single trail (the Meadow Trail Nature Walk) encircling the meadow and providing a designated crossing is proposed to protect the sensitive meadow ecology and to minimize unauthorized trail blazing. In addition, KMR and KMPUD may construct additional bridges across Kirkwood Creek at appropriate locations. The bridges, with supporting signage and trail management, would deter unauthorized trail blazing and direct hikers, bikers, and horseback riders to use designated trails.

Another negative effect from implementation of the Proposed Project would be the possibility that the increase in visitors would result in a crowded atmosphere. The Proposed Project would result in development of some areas that are currently undeveloped and are used for dispersed recreation. However, the amount of area designated as open space would remain high at Kirkwood (206 acres). For residents and visitors who prefer recreating in an area with a more rural atmosphere than that of a developed resort, the quality of their perceived surroundings may decrease. Some recreational activities, such as birdwatching and wildlife viewing, require a more serene setting. These activities may be negatively impacted by the proposed expansion projects.

Much of the proposed expansion would occur in or near the existing Mountain Village, which already has a developed appearance. The development in the Ski-In/Ski-Out area would be low-density residential and would attempt to retain a natural appearance through the inclusion of paths and open spaces. Further development at Timber Creek would be in an area that already has structures and parking lots. The Kirkwood North area would experience the most change from the existing condition. Its proximity to Kirkwood Lake may increase foot traffic to the lake. Nordic skiers would still access the NFS lands north of KMR's property and be able to experience more primitive, natural conditions on trails leading away from the resort.

Proposed MMDP projects that are located within Emigrant Valley may have a negative effect on the setting of the Emigrant Trail. Other general negative effects to trails would occur if trails became overcrowded or the trails' physical quality became degraded.

4.12.4.2 Effects of increased construction and traffic on recreation

Development activity would result in a temporary increase in construction-related traffic and a long-term increase in daily traffic within Kirkwood at buildout. These effects are further discussed in section 4.7, Traffic and Circulation. Construction would likely ebb and flow during the development period depending on market conditions, with some years experiencing more construction activity than others. While construction could interfere temporarily with recreational activities, these interferences would likely exist as minor inconvieniences such as impeded trailhead access.

The MMDP projects are primarily winter-oriented, and the majority of construction would occur during the off-season. Also, the MMDP projects are located on-mountain and should not affect traffic beyond the extent of construction vehicles temporarily passing through Kirkwood. Construction of MMDP projects would have minor effects on recreation in Kirkwood.

Traffic would increase as more residential units were built and as numbers of residents and visitors increased in the winter and summer. KMR has attempted to design future development to encourage a more pedestrian environment. All day traffic to Kirkwood enters at the SR 88/Kirkwood Meadows Drive intersection and travels down Kirkwood Meadows Drive to the parking lots at Timber Creek or the Mountain Village. Residents have their own parking areas. Once parked, the relatively close proximity of ski lifts, trails, and commercial attractions, and the availability of an in-valley shuttle service, should minimize further vehicle trips by visitors and residents. Traffic on Kirkwood Meadows Drive does not interfere with recreational activities, and the increase in traffic on the paved roads within Kirkwood would not impact existing or future recreational opportunities.

4.12.4.3 Effects of increased population on use of surrounding public lands

The Proposed Project would result in an increase in both winter and summer population at Kirkwood. Concerns were expressed on how this increase may affect recreational use of surrounding public lands. The increased number of skiers in the winter would not be likely to significantly impact surrounding lands since the majority of the increased visitors would be downhill skiers who visit Kirkwood to ski on the developed ski runs at the resort. However, improving access to areas within the ski area may also increase user numbers in the surrounding NFS land, resulting in a negative impact to those skiers desiring an unpopulated, backcountry experience.

Existing Nordic facilities could handle increases in Nordic skiers. Implementation of the Proposed Project would improve cross-country skiing visitation and could actually help improve wintertime use levels on NFS lands, particularly areas north of Kirkwood North and Caples Lake. Improved availability of accomodations and services at Kirkwood would make participating in activities such as cross-country skiing more attractive. Cross-country visitation has been declining at Kirkwood, averaging about 7,094 skiers over the last 10 years, with a peak-day of 374 skiers for the same period. Historic Nordic use numbers equate to approximately 2.5 percent of historic downhill use numbers. If this relationship between downhill and Nordic skier numbers continued, 2.5 percent of the proposed 10,800 SAOT would equal an addition of 270 Nordic skiers, bringing the peak-day use of Nordic skiers up to 551. While this increase is nearly double the existing Nordic visitation, the large area of NFS land available for cross-country skiing would be accomodating. Given the
declining Nordic visitation record at Kirkwood over the past 10 years, this amount of increase is probably not realistic and the effects of the Proposed Project would be negligable to positive. The quality of the recreational experience would remain high.

At fuel occupancy, Kirkwood would reach the summer PAOT limit of 6,558. Based on the survey results summarized in section 4.12.3.2.4, it could be inferred that on average, half of the owners/visitors at the resort would leave the resort to visit one or more of the surrounding recreational sites at least once during an average 2-3-day stay. That could equal about 3,279 people (maximum PAOT of 6,558/2) visiting surrounding recreational attractions. These people would be spread among many different locations over different times and days during the average 2-3 day stay, but the majority may visit the more popular locations listed in section 4.12.3. Considering that most recreation areas near Kirkwood are at carrying capacity during the peak summer season, the increased visitation could have a significant impact on the amount of use those locations receive. Parking availability would be a limiting factor at most popular destinations, moderating the potential effect of the increased demand. However, particular concern exists about increased visitation levels at Kirkwood Lake, which is within walking distance of Kirkwood.

This is a worst-case scenario assuming maximum occupancy. It is unlikely that the resort would reach full occupancy during the summer, except possibly for very high-use weekends such as Labor Day or the Fourth of July. Average occupancy would realistically be less than 50 percent of the 6,558 PAOT maximum, based on the experience of other ski resorts, and even less on weekdays.

Other factors besides KMR influence the increased use of surrounding recreational areas. There has been a general increase in use of all recreational facilities along SR 88 due to factors such as increasing population. This trend will likely continue regardless of the KMR development, and is considered under Cumulative Effects below.

4.12.4.4 Effects on Kirkwood Lake Including Fishing

Kirkwood Lake is located on public land managed by the ENF. Existing uses and facilities include camping, hiking, non-motorized boating, fishing, a Girl Scout camp, recreational residences, and a public campground. On peak summer weekends the area operates near capacity. That is, the public campground is full, many of the residences are occupied, and few parking spaces are available in the parking lot. During off-peak times and weekdays, visitation to the lake is moderate. The Draft Plan includes a summer PAOT of 6,558, with a special event PAOT of 9,800. If achieved, this would be a substantial change from the current summer population, which averages about 274 daily visitors.

As discussed above in the analysis of potential effects to surrounding public lands, for Kirkwood to reach the planned level of use during the summer, KMR would probably need to develop more summer activities at the resort. Although increased recreational and lodging opportunities at the resort would help concentrate activity within Kirkwood, many visitors would visit nearby recreational attractions some time during their stay at Kirkwood. It would be speculative to estimate how many of those visits would be to Kirkwood Lake. However, the results of a KMR summer recreation survey (KMR 1999) showed Kirkwood Lake in the top ten visited locations by owners/visitors of Kirkwood. Available parking would become a limiting factor, but, Kirkwood Lake is within walking distance of Kirkwood, so an increase in use would likely still occur.

Although potentially moderate, the overall increased use of Kirkwood Lake could be noteable, and long-time residents/visitors of Kirkwood Lake may feel that the quality of the recreational environment had been reduced to some degree. The increase in use would deteriorate the lake shore and surrounding vegetation. An increase in the number of anglers may also be experienced, resulting in increased pressure on the existing fishery and a decreased recreational experience. (A more detailed discussion of potential impacts to the Kirkwood Lake fishery can be found in Aquatic Resources, section 4.3.1.) Kirkwood Lake is already near or at its carrying capacity, and the increased use would be significant, especially if maximum summer occupancy were realized.

Further development at KMR is not the only influence on increased use at Kirkwood Lake. There has been an overall increase in recreational use along SR 88, and this trend will likely continue regardless of the KMR development.

4.12.5 Level of Significance Before Mitigation

4.12.5.1 Effects on Recreation at Kirkwood

Expanded recreational opportunities of the Proposed Project would result in a positive effect on recreation. There would also be an associated increase in population at Kirkwood and an increase in the number of users of the recreational areas, but facilities to handle these increases are planned to meet the new demands.

Some users may view the associated increase in users as negative, but this opinion is not considered to be the majority, as most visitors come to Kirkwood for the specific recreational activities that a resort setting provides. Because Kirkwood is a resort, visitors expect that others will also be recreating in the area. The overall effect on recreation at Kirkwood would be beneficial; the specifically cited negative impacts would be less than significant.

4.12.5.2 Effects of Increased Construction and Traffic on Recreation

Impacts on recreation from both construction and traffic imposed by implementation of the Proposed Project would be less than significant.

4.12.5.3 Effects of Increased Population at Kirkwood on Use of Surrounding Public Lands

Impacts from increased winter use of public land in the Kirkwood area would be less than significant. Expanded lift service accessing remote terrain, and as a result increased access to surrounding NFS land, would adversely affect a small segment of Kirkwood's clientele who appreciate the hike-to skiing experience. However, the MMDP proposes to open up a greater portion of the Kirkwood SUP to more users (i.e., guests who would not otherwise hike to reach remote terrain). Also, users may be able to disperse more evenly throughout the available terrain and actually experience fewer encounters with other users. Therefore, the Proposed Project would have a positive effect on the majority of the public.

Increased summertime visitation, especially if maximum summer occupancy were reached, would result in significant impacts to recreational resources in the area surrounding Kirkwood. Facility use and resource degradation at nearby recreation areas would likely occur, especially in the popular areas mentioned in section 4.12.*3.2.4* above. The recreational experience would be affected as trails received more use. While parking is a limiting factor in many areas, some destinations are still accessible by foot (i.e., Kirkwood Lake). Actual average occupancy at Kirkwood during the summer would realistically be less than 50 percent of maximum PAOT, based on experience at other ski resorts. However, any increase in the summertime population at Kirkwood would increase use of surrounding recreation areas and result in a significant impact.

4.12.5.4 Effects on Kirkwood Lake, Including Fishing

Effects on Kirkwood Lake, including fishing, would be significant, especially at maximum summer occupancy (6,558 PAOT).

4.12.6 MITIGATION

4.12.6.1 Effects of Increased Population at Kirkwood on Use of Surrounding Public Lands

Mitigation Measure 4.12 (a). Implement Mitigation Measures 4.3.1 (h) and 4.3.1 (i) as described in the Aquatic Resources section.

Mitigation Measure 4.12 (b) KMR willconduct surveys to identify on/off-site recreation use patterns of residents and guests and report results to TC-TAC and the Forest Service. Such surveys will be conducted every *4* years or as deemed necessary by TC-TAC and the Forest Service. *Results will be reported to these agencies within 60 days. This information will increase TC-TAC and Forest Service knowledge of recreational use patterns in the Kirkwood area and contribute to development of responsive management plans for heavily impacted recreational sites and facilities.*

4.12.6.2 Effects on Kirkwood Lake, Including Fishing

Mitigation Measure 4.12 (c). Implement Mitigation Measures 4.3.1 (h) and 4.3.1 (i), as described in the Aquatic Resources section. *In addition, KMR will work with the Forest Service to develop and implement an instructional/interpretive program to inform Kirkwood visitors about sensitive resource issues at Kirkwood Lake.*

4.12.7 Level of Significance After Mitigation

4.12.7.1 Effects of Increased Population at Kirkwood on Use of Surrounding Public Lands

The impact of crowding at popular recreation destinations on the overall recreational experience, especially at areas within walking distance of Kirkwood, could be significant after mitigation. Impacts would be the greatest on weekends or peak-season times as maximum occupancy is reached.

4.12.7.2 Effects on Kirkwood Lake, Including Fishing

Impacts on Kirkwood Lake, other than the impacts to fishing mitigated as noted above, could be significant.

4.12.8 Significant, Unavoidable, Adverse Impacts

The impact of growing numbers of Kirkwood residents and visitors using popular recreational sites and facilities in the area, particularly those within walking distance, could constitute a significant, unavoidable, adverse impact, as most such nearby sites and facilities are already operating at or near capacity.

4.12.9 Cumulative Effects

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the cited cumulative actions could combine with the Proposed Project to generate cumulative actions, primarily in the area of impacts to nearby recreational sites and facilities. Both growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area would add to the significant, unavoidable, adverse impact to such recreational resources discussed above.

In terms of dispersed winter recreation, the new and improved skier facilities within Kirkwood's SUP would

increase access to terrain that is both within and outside of the existing SUP boundary. This may act cumulatively with increasing winter backcountry use trends to affect recreational experiences as backcountry recreationists' interactions increase and their activities overlap. However, both skiers using the resort area and the majority of skiers accessing terrain outside of the SUP from the resort expect a relatively high amount of interaction among users due to the nature of a resort. Cumulative impacts to skiers accessing remote terrain through the use of resort facilities would be minor.

4.13 PUBLIC SERVICES

4.13.1 ISSUES

The following issues for public services were identified during scoping:

- Concerns about the adequacy of traffic/public law enforcement.
- Concerns about the adequacy of fire protection to the residents of the Kirkwood area.
- Potential impact of proposal on students attending public schools and school facilities.
- Impacts of the Proposed Project on residents and the need for medical services, family service providers, social services, other general county services, and library.
- Effects on snow removal and management.

4.13.2 METHODS

The area of influence used for this analysis includes the planning area and outlying communities potentially affected by the proposed development. Existing baseline and projected public service information was based on information from KMR or in the Draft Plan (KMR 2001a). Potential direct, indirect, and cumulative impacts were determined for the Proposed Project and alternatives. Significance determinations were made by comparing the direct, indirect, and cumulative impacts of the project to the significance criteria. Mitigation measures were developed based on the potential impacts of development and the level of significance of those impacts.

4.13.2.1 Assumptions

Information contained in the Draft Plan provides a reliable baseline source of information with respect to public services.

4.13.2.2 Significance Criteria

Potentially relevant standards for the determination of significance include the following:

- Police/Sheriff: Will the project require additional staff or equipment to maintain acceptable service ratios, response times, or other performance objectives?

- Fire: Will the project require additional staff or equipment to maintain an acceptable level of service (i.e., response time, equipment suitability)?

- Medical: Will the project require additional staff or equipment to maintain an acceptable level of service?

- Schools and Child Care: Will the project increase the population of school-age children in a public school district or child care services which are or will be operating without adequate staff, equipment, or facilities?

- Family Services: Will the project require additional staff to maintain an acceptable level of service?

- Parks and Recreation: Will the project increase use of existing park and recreational facilities, or require the creation of new park and recreational facilities, to comply with locally adopted park and recreational service standards?

4.13.2.3 Regulatory Setting

Effects analyzed under CEQA must be related to a physical change in the environment (Guidelines Section 15358[b]). Consequently, economic and social effects are not considered environmental effects under CEQA, and need only be considered in an EIR if they would lead to an environmental effect (Bass et al. 1996). In practice, the evaluation of economic or social effects is generally treated as optional. Agencies are not required to evaluate economic or social effects, but sometimes do include an analysis of these factors. For these reasons, no regulatory design features with respect to potential public service impacts have been identified. However, because public service concerns were raised during scoping, the Lead Agency chose to include an analysis of pertinent issues in this EIR.

4.13.2.4 Existing Studies and Information

Information contained in this section was obtained primarily through Alpine, Amador, and El Dorado counties; the 1988 Master Plan (KAI 1988); the Draft Plan (KMR 2001a), the Fire Service Master Plan (ABC 1997), and KMR representatives.

4.13.3 Environmental Setting

4.13.3.1 Police/Sheriff Protection

Kirkwood is currently served by Alpine and Amador Counties for police protection, depending upon the county in which the incident occurs. Police protection for any incident along SR 88 is the responsibility of the California Highway Patrol (CHP). Deputy sheriffs from Alpine and Amador Counties patrol the area at various times. The El Dorado and Alpine county sheriffs have a written agreement, wherein an Alpine County deputy sheriff will respond to disturbances north of SR 88 (El Dorado County) in exchange for jail space located at the El Dorado County offices/jail in South Lake Tahoe (Veatch 1996). Sheriffs from both counties are trained emergency medical technicians (EMTs); however, no paramedical services are available outside of the emergency clinic at Kirkwood.

The county general fund is the primary revenue source for the county sheriff departments of Alpine and Amador Counties. An Amador County deputy assigned to patrolling rural areas responds to calls from Kirkwood on Friday through Monday. During the week a deputy from Jackson will respond to emergency calls, or the call is deferred to the weekend patrol if the situation is not a priority. The Alpine County Sheriff's Department has assigned one officer to primarily serve Kirkwood. Office space is provided for this deputy in the Community Services building.

4.13.3.2 Fire Protection

Structural fire protection services are currently being provided at Kirkwood by the Kirkwood Volunteer Fire Department (KVFD) under the direction of the KMPUD. These volunteers are available on a year-round basis. Training meetings are held regularly and include drills and specialized training through the fire chief and outside fire fighting experts. Subjects emphasized have included propane hazards, fire fighting in multi-story structures, and forest fire suppression. The KVFD members are basic life support (BLS) certified.

The KMPUD and KVFD completed a Fire Service Master Plan for the Kirkwood Community (ABC 1997). This plan analyzed the existing conditions at Kirkwood, as they pertain to issues relevant to the fire department. The report identified that the District was understaffed for the service level demanded and the physical accommodations for the district were unsatisfactory (ABC 1997). A timeline for capital improvements and expenditures, as well as recruitment of paid and volunteer staff was also developed. The new Community Services Building and Fire House is a direct result of the recommendations of this plan.

Backup for the KVFD is provided by a number of different agencies depending on the situation and the number of firefighters required. Assistance may come from Amador Fire *Protection District (FPD)*, *Alpine County FPD, or* Lake Valley Fire District.

The Forest Service provides wildland fire response in the Kirkwood vicinity from its Lumberyard station, about 16 miles west of Kirkwood on SR 88. The second responding station is the joint California Department of Forestry and the Forest Service station located at Dewdrop, about 27 miles west of Kirkwood. This station is seasonally staffed by the Forest Service in the summer.

Fire services are funded through a fire assessment fee and a fire impact fee. KMPUD has established the Fire Protection Service Charge, Ordinance 93-1, an annual fee to cover equipment, insurance, personnel costs, and to initiate a fund for expansion. The fire impact fee is levied on all new development within Alpine and Amador Counties in Kirkwood. In Alpine County, this fee is collected at the time a building permit is approved by the Alpine County Building Department (Ordinance 539-92). In Amador County, KMPUD collects this fee directly (Ordinance 1319). In El Dorado County no such fees have been levied because the county has not established an ordinance to do so. This fee may be established when private landholdings in El Dorado County are developed. In addition to these funding sources, KMPUD is apportioned approximately 20 percent of the tax base allocation from the three counties within the district boundaries.

Fire prevention has been continually emphasized during the development of Kirkwood. Buildings are currently being constructed according to the Uniform Building Code (UBC) and must comply with KMPUD Ordinance No. 93-1. This ordinance includes building and landscape standards for constructing fire- resistant structures. The installation and use of fire prevention and detection systems is also required for new development. The Kirkwood Village Fire and *Life* Safety plan was created to insure the safety of guests and staff from fire and to protect property specifically in the Village area. Details of this plan are included in section 4.13.4.2 below.

4.13.3.3 Medical Services

The nearest hospital to Kirkwood is Barton Memorial Hospital in South Lake Tahoe, about 38 miles northeast of Kirkwood via SR 88, SR 89, and US 50. Two additional hospitals serve Kirkwood: Washoe Medical Center and St. Mary's Hospital, both located in Reno, Nevada, about 76 miles away.

As discussed above, the KVFD volunteers are BLS-certified and the sheriffs from both counties are EMTs. KMR contracts with Barton Memorial Hospital to operate an immediate care medical center clinic in the

Red Cliffs Lodge. During the ski season, the clinic is staffed with a registered nurse, x-ray technician, and doctor from 8:30 a.m. to 4:30 p.m. An average of 800 patients are treated yearly at the clinic, primarily for orthopedic injuries. Of these, about eight are referred to the hospital each month. During the non-ski season, the emergency medical clinic is not operated at Kirkwood.

During the ski season, a clearing is maintained near the medical clinic for helicopter landings in the event that a seriously injured visitor/resident needs immediate hospital care. During inclement weather, an ambulance from Pine Grove in Amador County is usually dispatched. In some cases, ambulances may also be dispatched from South Lake Tahoe or Jackson. Ambulance response time is fairly long (can be as much as 1.5 hours) due to the distance from dispatch locations, as well as road and weather conditions. If necessary, a helicopter may land (at Barton Hospital) and transport the injured party to another hospital. Up to 10 medical helicopters land at Kirkwood each year. Helicopter care flight services are provided by Remsa in Reno, Nevada, or by other providers depending on their availability. The average response time from Reno is approximately 25 to 30 minutes. Transport time from Kirkwood to a hospital is dependent upon the destination of the helicopter, whether it is Reno, Lake Tahoe, or in an extreme case, UC Davis Medical Center. About 60 to 70 percent of the flights take patients to Barton Memorial Hospital, and 25 to 30 percent of the flights take patients to Washoe Medical Center or St. Mary's Hospital. Occasionally, a helicopter will take a patient from Kirkwood to a hospital in the Stockton or Sacramento, California area.

At the present time, medical services are adequate for the needs of residents and the visitors of Kirkwood. The existing medical facility and service is provided and subsidized by KMR as a requirement of the special use permit, and is not intended to fully meet community medical needs. In addition, medical emergencies within the west village area can be responded to using the underground garage.

4.13.3.4 Schools and Child Care

School facilities for Kirkwood area residents of Amador and Alpine Counties are provided by the Alpine County Unified School District (ACUSD). The ACUSD currently leases half of the bottom floor of the Sun Meadows IV condominium in Kirkwood for a school used by students of grades K-6. Rent for this facility is currently paid by KMR. This school is considered a necessary small school, and one teacher is provided for all grade levels. For grades 7 and 8, students attend Diamond Valley Elementary School in Markleeville. Grade 9 students attend Pau-Wa-Lu Middle School and grades 10 through 12 students attend Douglas High School in Nevada.

The ACUSD has been deeded a six-acre parcel at the west edge of Kirkwood Meadow near Loop Road, just north of the KMPUD in Amador County. When demand dictates and the funds become available, this location would house a new school facility, however, this site needs to be evaluated and certified by the State of California for its suitability before ACUSD could construct a school. The largest obstacle to developing a school facility that meets all applicable state regulations is funding. Currently, the ACUSD cannot afford to build a school at Kirkwood because of the high costs associated with meeting all state building code (UBC) regulations for school facilities. Unless major state construction funds become available, ACUSD will continue to lease space at Kirkwood at no or minimal cost, or place some type of portable structure at the school site deeded to the ACUSD (Parsons 1996). An average of five older students (grades 7-12) attend school at either Diamond Valley in Markleeville, or Douglas High School.

The continued use of the existing school space in Sun Meadows IV is dependent upon approval of 100 percent of the homeowners within the Homeowners Association of Sun Meadows III and IV Condominiums. In the event this approval is not obtained, the school would need to be relocated to another leased space or children would need to be bussed to the Diamond Valley Elementary School in Markleeville, about 30 miles east of Kirkwood. In the event of severe winter weather conditions Carson Pass may be

closed, leaving children unable to get to school or home. Bussing is not the preferred system by the ACUSD, especially for younger children from kindergarten through the sixth grade.

Child care services are currently offered in Kirkwood during the ski season on a full- or half-day basis. The typical ages for children in the child care facility is between 2 and 3 years. The facility is currently licensed for a 15-child maximum. Typically, the facility cares for 15 children on the weekends and from four to eight on week days. The current mix of children is about 60 percent from day skiers, 20 percent from destination skiers, and 20 percent from Kirkwood area employees. The current staff consists of one manager and two employees on the weekend and one manager and one employee during the week. The facility manages for an adult-to-child ratio of one to six.

The Alpine County Library provides a mobile library service. At some point in the future, Kirkwood may develop a permanent library facility, possibly in conjunction with the school or a community center.

4.13.3.5 Family Services

Family services such as social services, family counseling, shelters, etc. do not currently exist in the Kirkwood area. Persons desiring such assistance are required to travel outside the Kirkwood area to communities such as Markleeville or South Tahoe. The principal funding sources are intergovernmental revenues provided by state and federal governments. A small portion of costs is covered by county general funds.

4.13.3.6 Parks and Recreation

The nature of the Kirkwood area is recreation. There are currently about 2,600 skiable acres located on both private land owned by KMR and NFS lands, including 80 kilometers of groomed cross-country trails. Within the private landholdings of Kirkwood, there are about 172 acres of planned, undeveloped open space and about 132 acres of meadow. During the summer months, these areas are open for day hiking, mountain biking, fishing, photography, and sightseeing. Numerous hiking and riding trails are located on both public and private land in the Kirkwood vicinity.

In addition to winter skiing activities, other special recreational events are held throughout the year. These events, such as a snowmobile hillclimb or a triathalon, require permitting by the Forest Service under a special use permit.

Horseback riding is currently available through Kirkwood Stables in the summer months. The stables are located on the north side of SR 88, with trails running throughout the Kirkwood area. In the winter months, horse-drawn sleighs take riders through Kirkwood Meadow on groomed trails.

Four public tennis courts are available during the summer months for the general use of Kirkwood residents and guests. There are two additional tennis courts in the East Meadows subdivision for the exclusive use of East Meadows Homeowners Association members.

The Kirkwood Recreation Center, owned and operated by Kirkwood Resort Master Owners Association, will provide other public recreational opportunities at Kirkwood.

4.13.3.7 Snow Removal

Snow removal along Kirkwood Meadow Drive and the Village Plaza has been the responsibility of Kirkwood Resort Master Owners Association. The association may also contract snow removal services for other homeowners associations (HOAs) at Kirkwood. KMPUD is also considering providing snow removal services in the private streets and associated parking bays in Kirkwood. In the event that an

individual HOA chooses not to contract with Kirkwood Resort Master Owners Association, it is up to that individual association to contract with another entity for snow removal services. No funding for snow removal is provided by Alpine, Amador, or El Dorado Counties for the Kirkwood community.

4.13.3.8 Telecommunications

Telephone service is provided to Kirkwood by Volcano Telephone Company of Pioneer, California. Service is provided through a fiber optic line connecting Kirkwood with Volcano Telephone Company in Pioneer. Service within Kirkwood is provided via underground cable. Cable programs are transmitted through Volcano Telephone Company's fiber optic line from Pioneer. Distribution lines are buried in road rights-of-way and other easements as necessary.

4.13.4 Environmental Impacts

4.13.4.1 Police/Sheriff Protection

Implementation of the Proposed Project would increase the need for police/sheriff protection in the Kirkwood area. It is the preference of the Alpine County Sheriff's Office to have two full-time deputies at Kirkwood at the time buildout is complete (Veatch 1996). It is projected that two full-time deputies would be needed within 20 years after construction begins. Alpine and Amador Counties would provide the funding for these deputies. Housing for local deputies may need to be provided. The new Community Services Facility provides office space for the sheriff from Alpine County. Significant impacts to residents and guests of the Kirkwood community could occur without the addition of adequate police protection.

4.13.4.2 Fire Protection

With the development of the Proposed Project, adequate fire protection would continue to be a primary concern. Buildings would be constructed in accordance with the UBC and would comply with KMPUD Ordinance 93-1. *Fire prevention guidelines outlined in the KMPUD Fire Service Master Plan (ABC 1997) would continued to be implemented.*

The Proposed Project would incorporate the Kirkwood Village Fire and *Life* Safety Plan. The objective of the Kirkwood Village Fire and *Life* Safety Plan is to ensure the safety of the guests and staff from fire while protecting property. To accomplish this objective, KMR would prevent fire from occurring through a management-supported fire prevention plan. If unwanted fire does occur, the goal is to limit the spread of that fire, and to protect the building occupants from the effect of the fire. This would be accomplished by the five following measures: (1) installation of automatic fire sprinkler protection, (2) installation of automatic fire detection, (3) building construction, (4) building separation, and (5) strategic placement of on-site fire suppression resources. Other emergencies, such as medical emergencies, could be responded to through the underground garage, which provides vehicle access to buildings in the Village area.

Automatic fire sprinkler protection is a proven technology that protects both property and people by suppressing fire in its initial stages. It is commonly accepted that automatic fire sprinklers are 98 percent effective. Failures are usually due to water supply shutoff. To prevent this, valves will be locked in the open position, or monitored to eliminate failure mode. Automatic detection and alarm systems compliment the sprinkler protection, warning occupants in the early stages of a fire, and therefore allowing time for evacuation. *Requirements of the fire sprinkler and detection systems are included in the KMPUD Fire Service Master Plan, referenced above.*

Issues addressed in the UBC include using building construction methods which will ensure fire-resistive evacuation routes through corridors and enclosed stairs to the exterior. Also, buildings would meet a minimum of 1-hour fire-resistive construction to provide time for sprinkler activation and evacuation. Class

II wet standpipe, as defined in the UBC, would be provided in each building in the protected stairway so that occupants, staff, and the fire department would have readily available water for suppression purposes. This measure would provide redundant protection for the sprinklers.

The proposed buildings would be separated from each other by the distances required by the UBC to further ensure that even in the remote event of sprinkler failure and fire department response failure, the fire would not spread beyond the area in which it starts.

On-site fire suppression resources will be provided. At least two locations would be created and supplied with equipment for the responding fire department. The equipment would be stored adjacent to fire hydrants and an access route clear of obstructions. Equipment would include hose, ladders, water pressure regulators, axes, and other equipment deemed essential by the fire chief. This on-site equipment would compensate for the lack of vehicle access in the winter.

The need for additional paid firefighters is outlined in the Fire Service Master Plan. The new Community Services Facility will provide additional space for the KVFD and associated equipment. Fire protection services provided by the KVFD would be supplemented on request with backup from Amador FPD, and Alpine County, Lake Valley Fire District.

The potential for significant impacts to residents and visiting guests due to inadequate fire protection could result without adherence to the UBC and the implementation of adequate fire and safety plans. Also, without adequate fire protection staff to meet the level of service demanded, significant impacts to the Kirkwood community could occur.

4.13.4.3 Medical Services

As discussed above, the existing medical facility and service provided and subsidized by KMR as a requirement of the special use permit with the Forest Service would continue, and is not intended to offer services to meet all community needs. As residential and ski area development proceeds, the level of medical services required by the community would need to be monitored. Depending on the size and demographics of the resident community, the need for medical services would vary. The largest issue surrounding expanded medical services to the Kirkwood community would be funding for personnel and possibly capital improvements for a facility. It is anticipated that funding for future community medical services would be born from local taxes. Due to the remoteness of the Kirkwood area, the level of medical services would likely need to expand as the need for such services grows. The situation may arise where increased medical services may be necessary but the construction of a new facility may not be required.

4.13.4.4 Schools and Child Care

At full buildout, it is estimated that 46 elementary school age (grades K-6) and 38 post elementary school age (grades 7-12) students may reside in Kirkwood, as indicated in Table 4.45. This projection is consistent with the current situation in Kirkwood and allows for an increase in the percentage of school-age children as it relates to the level of development. The current level of development provides overnight accommodations for about 1,700 people. Of this total, there are 17 school-age children; 12 attend the Kirkwood Elementary School and the remaining 5 attend schools at either Diamond Valley in Markleeville, or Douglas High School. As a resort community, only a small percentage of the 6,558-person maximum population would be year-round residents. As a result of the relatively small percentage of year-round residents, the number of school children would be expected to remain small when compared with the maximum population allowed in Kirkwood.

Table 4.45. Estimated school children at project completion for full-time residents. [a]

Unit Type	No. of Units [b]	Grades K-6	Grades 7-8	Grades 9-12	Children Total
Single-Family	42	17	4	8	29
Multi-Family	109	29	9	17	55
Total	**151**	**46**	**13**	**25**	**84**

[a] Student yield factors for single-family units were as follows: Grades K-6: 0.40 students per unit; grades 7-8: 0.10 students per unit; and grades 9-12: 0.20 students per unit. Student yield factors for multi-family units were as follows: Grades K-6: 0.27 students per unit; grades 7-8: 0.08 students per unit; and grades 9-12: 0.16 students per unit. Due to the resort nature of Kirkwood, it was assumed that no more than 15 percent of future single-family and 10 percent of future multi-family units would be occupied year-round.

[b] Number of units are the number of units (10 percent) anticipated to be occupied year-round by families with school-aged children.

Facilities to support the projected growth in student numbers would be required. In discussions regarding the future of educational activities at Kirkwood, ACUSD Superintendent Dr. Jim Parsons has indicated his willingness to work with KMR and the community to maintain an in-valley school serving kindergarten through sixth-grade students. Possibly one or two additional elementary school teachers would be needed to staff the school at Kirkwood. Funds for these additional teachers would be provided by the State of California through the necessary small school program.

A school complex joined with recreational facilities to be used by the school and the Kirkwood community would be a viable possibility. The proposed location for elementary school facilities would be the six-acre parcel at the edge of Kirkwood Meadow near Loop Road that has been deeded to ACUSD. As discussed above, this site would have to be certified by the State of California.

However, the desirability of constructing school facilities in Kirkwood for children beyond grade 6 is low for the foreseeable future. It is estimated that there would be approximately 38 secondary school-aged children at buildout. With such limited enrollment, a school for children beyond grade 6 at Kirkwood could not provide the variety of educational and social opportunities available in secondary schools of larger nearby communities.

Under the Proposed Project, child care services would be expanded. Expansion of child care facilities would require an expanded facility, renewal of the license, and additional employees (Eichar 1999d).

Without adequate facilities for elementary school children and child care services, impacts to residents with younger children could be significant. Likewise, without bussing or some form of organized transportation for older students (7^{th} -12^{th} grade) to surrounding communities, impacts to traffic and quality of life could be substantial and significant.

The current mobile library service provided by Alpine County Library would continue under the Proposed Project. As the population of the area increases, additional library services may be warranted (i.e., more frequent visits by the mobile service or the development of a permanent library facility).

4.13.4.5 Family Services

The availability of family services such as social services, family counseling, shelters, etc. would not change with implementation of the Proposed Project. It is likely that as the population in the Kirkwood area

increases, the need for services would increase. Persons desiring such assistance would still be required to travel outside the Kirkwood area to communities such as Markleeville or South Tahoe. Depending on the level of assistance required by those moving into the area, it may be necessary in the future for the community to find some means of providing the needed support.

4.13.4.6 Parks and Recreation

Implementation of the Proposed Project would result in increased winter and summer activities. Summer activities such as hiking, mountain biking, fishing, sightseeing, and horseback riding would continue throughout the Kirkwood area. Special events would also be expected to continue.

Development of some of the proposed subdivisions would result in the need for rerouting some existing horse trails. With the proposed development north of SR 88, the stables may need to be relocated to another location within Kirkwood. One possible location for the stables would be adjacent to the KMPUD facilities off Loop Road and near the meadow. As residential development continues, the provision for additional summer amenities would be encouraged within the plan area.

The implementation of the Quimby Act – a subsection of the Subdivision Map Act – by a county jurisdiction has a clear purpose and rationale in an urban environment: dedication of property (5 acres per 1000 people) or fees in lieu of such dedication for the development of parkland. The intent of the Proposed Project is to preserve and protect the valuable open spaces and natural resources at Kirkwood. These open-space areas have the land use designations of Meadow and Open Space/Recreation. At the completion of the project, Kirkwood would have approximately 304 acres of open space. Dedicated open space would substantially exceed the Quimby Act's requirement of five acres per 1,000 residents. With the Draft Plan, there would be a total of approximately 33 acres per 1,000 residents. However, while the need for 'parkland' type opportunities would be somewhat less in the proposed development when compared to an urbanized setting, the need for community-organized recreation could still exist for visitors to the area. Funds could be collected in lieu of active recreation land dedication and be used for development of some public recreation facilities. Potential off-site impacts on public recreation facilities maintained by the Forest Service are described in the Recreation section of this document.

The Proposed Project would add more recreational facilities for use by Kirkwood residents and guests. These facilities would include swimming pools, hot tubs, an ice skating rink, and possibly a community/gymnasium/convention facility. The swimming pool complex is proposed for the south end of the existing four tennis courts adjacent to Kirkwood Meadow Drive. The ice skating rink would be located in the Village to allow patrons of the Village to observe ice skating. In order to minimize recreation conflicts, new facilities should be located in areas that would not interfere with existing recreational opportunities, where possible. Potential impacts of these new facilities on other resources such as wetlands are described in the Wetland Resources section of this document.

4.13.4.7 Snow Removal

Snow removal for Kirkwood Meadow Drive and the Village Plaza areas may be controlled by the Kirkwood Resort Master Owners Association. Snow removal for private roads, such as those serving private residences, drives, and parking areas may be provided by either the Kirkwood Resort Master Owners Association, KMPUD, or any other appropriate entity, by way of membership in the Master Association or by private contract.

KMR's snow removal plan consists of plowing snow to mapped snow storage areas at the edge of roads and parking lots, then when snow accumulation gets too high, using rotary blowers to blow the snow into the forest and meadow areas surrounding the paved areas. Ramping of snow is also a common practice in areas designated for snow storage. This practice involves pushing snow from roads, drives, and parking

facilities into areas where ramping will occur. Ramped piles are usually no bigger than 100 feet wide by 200 feet long. The actual size of the piles depends on the particular snow year. Future snow removal for the proposed development would appear to meet the projected need.

4.13.4.8 Telecommunications

Volcano Telephone appears to have the capability and desire to serve Kirkwood as it continues to develop. A fiber optic line reached Kirkwood during the summer of 1998, tying into the microwave substation from the west and providing fiber optic telephone connection as well as cable television service (Eichar 1999b).

4.13.4.9 Level of Significance Before Mitigation

4.13.4.9.1 Police/Sheriff Protection

Impacts on police/sheriff protection could be significant.

4.13.4.9.2 Fire Protection

Impacts on fire protection could be significant.

4.13.4.9.3 Medical Services

Impacts on medical services could be significant.

4.13.4.9.4 Schools and Child Care

Impacts on schools and child care could be significant.

4.13.4.9.5 Family Services

Impacts on family services would be less than significant.

4.13.4.9.6 Parks and Recreation

Impacts on parks and recreation would be less than significant.

4.13.4.9.7 Snow Removal

Impacts on snow removal would be less than significant.

4.13.4.9.8 Telecommunications

Impacts on telecommunications would be less than significant.

4.13.4.10 Mitigation

While some of the mitigation measures identified below could be considered elements of the Proposed Project, they are included to identify timing or other requirements, as applicable.

4.13.4.10.1 Police/Sheriff Protection

Mitigation Measure 4.13 (a). KMR will monitor the level of police protection services required as development proceeds and the resident population increases. Alpine and Amador Counties will add deputies as dictated by community needs.

4.13.4.10.2 Fire Protection

Mitigation Measure 4.13 (b). Construct all facilities to adhere to the UBC, *Uniform Fire Code, and all other applicable codes.*

Mitigation Measure 4.13 (c). KMR will continue to implement, *maintain, and revise as needed*, the Kirkwood Village Fire and *Life* Safety Plan and demonstrate that the development complies with the plan.

Mitigation Measure 4.13 (d). KMR will increase infrastructure and physical accommodations in the service district to support the level of fire protection required for the proposed development.

Mitigation Measure 4.13 (e). KMR will monitor the level of firefighting services required as development proceeds and the resident population increases. KMPUD will add firefighters as dictated by community needs.

4.13.4.10.3 Medical Services

Mitigation Measure 4.13 (f). KMR will continue to maintain medical facilities during the ski season consistent with the requirements of the U.S. Forest Service special use permit issued for the ski area.

Mitigation Measure 4.13 (g). KMR will monitor the level of medical services required as development proceeds and the resident population increases. If the increase in year-round population warrants, KMR will add medical services to meet community needs.

4.13.4.10.4 Schools and Child Care

Mitigation Measure 4.13 (h). KMR will continue providing funding support of educational facilities for elementary school children (Grades K-6) at Kirkwood (e.g., continue financial support for rented facilities). This requirement will be reviewed every 5 years and a determination made by Alpine County as to whether the requirement should be continued, modified or eliminated.

4.13.4.11 Level of Significance after Mitigation

With the proposed mitigation in place, there would be no significant impacts to public services.

4.13.5 SIGNIFICANT, UNAVOIDABLE, ADVERSE IMPACTS

No significant, unavoidable, adverse impacts to public services have been identified.

4.13.6 CUMULATIVE EFFECTS

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Both of the cited cumulative actions could combine with the Proposed Project to generate cumulative effects, primarily in the areas of police/sheriff protection and medical services. Both growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area could place additional demands on these public services at Kirkwood. With the suggested mitigation in place, such demands would be factored into monitoring of these services and ongoing assessments of the need for upgrades. As a result, these cumulative effects would be less than significant.

4.14 UTILITIES AND INFRASTRUCTURE

4.14.1 ISSUES

The following issues for utilities and infrastructure were identified during scoping:

- Disclose the long-term power requirements of the proposed project and analyze possible alternatives to augment or replace existing supplies.
- Disclose the probable source of domestic water at buildout and analyze the impacts of acquiring and using that water.
- Effects of additional development of wastewater treatment facilities and the determination of its ability to service the needs of the proposed development.
- Effects of solid waste generated in the future and analysis of the ability to adequately manage that waste.

4.14.2 METHODS

The area of influence addressed in for this analysis includes the planning area and locations of service providers potentially affected by the proposed development. Existing baseline and projected utilities and infrastructure information was derived from information received by KMPUD, KMR, or included in the Draft Plan (KMR 1998, 2001). Potential direct, indirect, and cumulative impacts were identified and significance determinations were made by comparing the direct, indirect, and cumulative impacts of the Proposed Project to the significance criteria. Mitigation measures were developed based on the potential impacts of development and the level of significance of those impacts.

4.14.2.1 Assumptions

Information contained in the Draft Plan provides a reliable baseline source of information with respect to

public services.

4.14.2.2 Significance Criteria

Standards for the determination of significance include the following:

- Energy (Electricity and Propane): The potential for the project to require expansions in existing electrical generating facilities or existing high-power transmission lines, and expansions in existing propane facilities.

- Water Supply: Compliance with water conservation and supply requirements imposed by state and local agencies. The potential for the project to require expansions in existing water supply treatment facilities or trunk conveyance lines. The adequacy of treatment facilities, conveyance capacity, and water supplies to serve project demand. The potential for the groundwater basin to be overdrawn in relation to demand and historical levels.

- Wastewater Treatment: Compliance with wastewater pretreatment standards enforced by federal, state, and local regulatory agencies. Adequacy of the wastewater treatment system to meet project demand.

- Solid Waste: Compliance with state and local requirements relating to source reduction, recycling, litter control, and solid waste handling. Llandfill Sufficiency to accommodate solid waste generated by the Proposed Project on a long-term basis (10 or more years).

4.14.2.3 Regulatory Setting

The WWTP is mandated to comply with the effluent requirements set forth in the Waste Discharge Requirement permit Order No. 94-108 issued by the Central Valley section of the California Regional Water Quality Control Board (CVRWQCB). These requirements were enacted on September 16, 1993, and supersede any previous discharge permits issued to Kirkwood PUD for wastewater discharge. The Waste Discharge Requirements reflect the water quality objective of the Basin Plan for the Sacramento River Basin. By adopting these Waste Water Discharge Requirements, the WWTP is in compliance with both the California Water Code and federal National Pollution Discharge Elimination System laws. (Kennedy/Jenks Consultants 1998).

4.14.2.4 Existing Studies and Information

Information contained in this section was obtained primarily through Alpine, Amador, and El Dorado Counties; the 1988 Master Plan (KAI 1988); the Draft Plan (KMR 1998, 2001), the waste discharge requirements (CVRWQCB 1994b), the *Wastewater Facilities Plan* (Kennedy/Jenks Consultants 1998) and subsequent technical memorandums (ECO:LOGIC 2000, 2001a, 2001b, 2001c) and KMPUD and KMR representatives.

4.14.3 ENVIRONMENTAL SETTING

Kirkwood Meadow Public Utility District (KMPUD) was formed by the Alpine County Local Agency Formation Commission (LAFCo) in June, 1985. KMPUD is responsible for the operation of the water and wastewater systems serving the community of Kirkwood (including the ski area), the operation of the Kirkwood Volunteer Fire Department, mosquito abatement, maintenance of existing parks and recreational facilities, and solid waste removal. It is anticipated that in the future, KMPUD may assume responsibility for electric utilities, gas/propane utilities, and other public services.

4.14.3.1 Energy

Electrical power is being produced on-site by Mountain Utilities (MU, formerly Kirkwood Gas & Electric) utilizing diesel generators. MU is a wholly-owned subsidiary of KMR and is regulated by the California Public Utilities Commission (PUC). The present plant is located northeast of Red Cliffs Lodge and has the capacity to produce 4.2 megawatts (MW). The plant was limited to distributing only 3.7 MW, but efficiency improvements have increased distribution capacity to meet current *peak* demands for short periods of time (<3 hours). Upgrades and expansion of this facility to increase capacity would be required to meet future demand at buildout. Electricity is produced utilizing two 12-cylinder (500 KW) and four 16-cylinder (800 KW) diesel generators. During the summer of 1997, MU installed a selective catalytic reduction system (SCR), which targets the reduction of NO_x (nitrogen oxides) from the diesel engine emissions.

Peak electric demand occurs during winter months primarily due to electrical demands generated by snowmaking activities during the early ski season, and lift operations. An average of 25 percent of the maximum capacity is consumed during the summer months. During the winter season, diesel fuel shipments to MU average six to eight times each month. During the summer season, diesel fuel is delivered about twice each month.

Within the developed portion of Kirkwood, underground electrical transmission and distribution lines are primarily located within road rights-of-way, with the exception of the following segments. One connects the Sun Meadows Condominium area with the KMR maintenance yard and runs along the west side of Kirkwood Meadow. An additional loop is buried in Kirkwood Meadows Drive, from the Sun Meadows Condominiums at the southern end of Kirkwood, then north to the maintenance area. The third segment is located at the north end of the meadow and connects East Meadows Phase II with Kirkwood Meadows West subdivision. Also, a single-phase line runs from West Meadows to Kirkwood North servicing the service center, Kirkwood Inn, the cross-country center, and the horse stables. A high voltage electrical cable runs south from the power house to the base of Lift 1, and then parallel to the lifts that go up the mountain to Lift 2, Lift 3, and to the base of Lift 4.

A large percentage of the electric load at Kirkwood is derived from motors (HESI 1999). There are three main categories of motor loads served by MU, including chair lifts, snowmaking equipment, and pumps. Current electric chair lifts at Kirkwood total an estimated maximum demand of 2,805 horse power (H.P.). The average annual energy use for chair lifts is 746 kWh/H.P. (HESI 1999). The present capacity of the snowmaking equipment is 3,332 H.P. The snowmaking equipment operates approximately 250 hours/year with an average annual energy use of 207 kWh/H.P. (HESI 1999). The operations of KMPUD rely on energy generated from localized diesel-generators at the wastewater treatment plant, not from MU. Energy demand comes primarily from pumps used for water supply or wastewater treatment processes. There is presently 128 H.P. of installed pump capacity with an average annual energy use of 4,357 kWh/H.P. (HESI 1999). Additional detailed information pertaining to the existing electrical environment is given for the Kirkwood area in HESI (1999).

Propane gas is distributed throughout Kirkwood via an underground distribution system operated by MU. The system is supplied by two bulk storage tanks (30,000 and 20,000 gallon capacities), and two vaporizer units located in the KMR maintenance yard. Deliveries are made about one or two times per month. Primary distribution gas lines are primarily located within road rights-of-way, with the exception of three segments. One of these segments connects the Sun Meadows Condominium area with the bulk storage area adjacent to the KMR maintenance yard and runs along the west side of Kirkwood Meadow. Kirkwood Meadow is crossed in the northern and central sections in an east-west direction. Propane is supplied to structures on the north side of SR 88 by individual tanks adjacent to each building.

Energy conservation efforts already in place within Kirkwood include, but are not limited to: insulation,

glazing and building standards in compliance with the Uniform Building Code (UBC) requirements for the area; signs and education regarding conservation of electric energy; and specification of low-flow water and hot water-consuming devices. The multi-engine, on-site power generation plant utilizes the minimum generating capacity necessary to meet the current load demand, which results in reduced fuel consumption.

4.14.3.2 Water Supply

Domestic water is currently available from four groundwater wells: Well 1, Well 3, Well 4, and Well 5. Well 1, used for emergency standby only, is located west of the end of Hawkweed Way, in the Kirkwood Meadow. Well 3 is located on the southwest edge of Kirkwood Meadow, Well 4 is located on the east side of Kirkwood Meadow, and Well 5 is located about 280 feet south of Well 4. Well 2, the Lodge well, is located at the southeast edge of Kirkwood Meadow. It is currently off-line due to MTBE contamination. However, remediation efforts have been successful and Well 2 will soon be available for water supply. A complete discussion is included in section 4.2, Water Resources.

Yield during fall and winter months for Wells 2 and 3 is about 83 gallons per minute (gpm) combined, while the yield for Well 1 is about 40 gpm. These gpm ratings are based upon continuous pumping during the winter months, the time at which the aquifer is at its lowest level. The aquifer is recharged during the spring and early summer when demand for domestic water is lowest. The combined production rate from wells 4 and 5, the primary production wells, is approximately 140 gpm, of which only a portion is required to meet Kirkwood's current water demand (see section 4.2.3.3 for more details).

Well 2 is treated at the well head, whereas Well 3 is treated next to the lower Chair 7 parking lot adjacent to the Loop Road. Water is disinfected with sodium hypochlorite and pumped into the distribution system. Well 4 is treated at the existing treatment building adjacent to Hawkweed Way. The existing water supply system includes two storage tanks with a total capacity of 950,000 gallons. These tanks are located on the lower slopes of the ski mountain above the community, thereby providing adequate pressure to all dwellings.

Water from the wells is pressurized to approximately 150 pounds per square inch (psi) and pumped into the distribution system. The existing system consists of about 5 miles of pipelines ranging from 6 to 10 inches in diameter. These lines are primarily located within existing roadways on the east and west sides of Kirkwood Meadow. South of the existing KMPUD offices, pipelines are located at the meadow edge and run under Kirkwood Meadow Drive to serve Timber Creek Lodge (western edge of Kirkwood) and the Red Cliffs Lodge (south end of Kirkwood).

The groundwater basin below Kirkwood Meadow provides the domestic drinking supply for Kirkwood. The recharge of groundwater to the alluvial aquifer is primarily from surface water runoff which is contained in the snowpack (typically 90 percent of the annual runoff). This snowpack runoff occurs primarily during April, May, June, and July. Other months of the year provide a lesser percentage of the approximately 5,660 acre-feet average annual runoff from the watershed. Minimum runoff under drought conditions is estimated at 1,869 acre-feet. This watershed encompasses 2,265 acres. The storage volume of the aquifer is about 1,100 acre-feet with surplus water exiting the basin via Kirkwood Creek and/or evapotranspiration. Water used for snowmaking is taken from Caples Lake.

Water quality monitoring of the wells currently used for domestic water supply shows that no water quality standards have been violated and that the water is of excellent quality. Current average annual domestic water demand at Kirkwood is about 56,700 gallons per day (gpd). Typical maximum monthly demand over the peak months of January, February, and March depends on skiing conditions, and averages 2,100,100 gallons per month, or 70,000 gpd. Maximum daily demands of 130,000 gpd occur during Christmas and New Year's Day. Demand of this amount typically lasts for only 1 or 2 days. At the present time, there are 587 equivalent dwelling units (EDUs) connected to the water system, averaging 97 gpd per EDU over a

year, and up to 120 gpd per EDU per month during the peak months.

4.14.3.3 Wastewater Treatment

The KMPUD Wastewater Treatment Plant (WWTP) treats wastewater from the Kirkwood community and ski resort. The main building associated with the WWTP was constructed in 1984 (Kennedy/Jenks Consultants 1998). Most of the earlier treatment facilities have been abandoned or removed. Due to the local climate, all wastewater treatment facilities are located indoors. The sanitary sewer system serving the Kirkwood community consists of gravity-flow sewage collection lines and two lift stations that transfer the sewage to the WWTP. One lift station is located near the WWTP and the other is located on the east side of Kirkwood Creek at the northern end of Kirkwood Meadow. The WWTP includes primary screening, activated sludge biological treatment, chemical coagulation and filtration, and discharge into effluent absorption beds.

Operation of the WWTP is regulated by permit under the jurisdiction of the Central Valley Regional Water Quality Control Board (CVRWQCB). Kirkwood is an environmentally sensitive area. Therefore, the wastewater discharge permit is stringent and requires ongoing weekly sampling and analysis of Kirkwood Creek to determine the effects, if any, to the water quality of the Kirkwood watershed. The results are submitted to CVRWQCB.

The WWTP is designed to treat an average flow of 100,000 gpd and a peak flow of approximately 200,000 gpd; the discharge permit allows for a monthly average effluent flow of 150,000 gpd. The largest flow recorded by the plant occurred in December 1996 and January 1997 when heavy rains resulted in flooding. The peak flow recorded over New Year's holiday weekend was 237,000 gpd, which exceeded the peak flow design for the WWTP of 200,000 gpd. Average monthly flows during the winter of 1997/98 ranged from 79,100 gpd to 90,600 gpd. The average monthly flows can be twice as high during the ski season as during the summer and fall months. The WWTP is nearing its design capacity (Kennedy/Jenks Consultants 1998).

The WWTP dampens peak flows by using flow equalization. Flow equalization results in reduced effluent flow rates when compared to inflow rates. Flow rates for the WWTP are measured at the effluent line.

The WWTP receives wastewater from three sources: residential, commercial, and infiltration/inflow (I/I). Wastewater characteristics for each source are different. Therefore, the composition of the wastewater prior to treatment varies depending on the contribution from each source, which also varies seasonally. During the summer months when conditions are drier, flow to the plant is mainly composed of commercial and residential flows, whereas, during periods of high runoff, up to 60 percent of the total flow can be accounted for by I/I. Residential wastewater sources are composed of condominiums and single-family residences. Commercial wastewater sources are composed of metered water from commercial units and employee housing. I/I wastewater sources are determined by calculating the difference between the sum of the commercial and residential flows and the total WWTP flow.

4.14.3.4 Solid Waste

Solid waste is presently hauled by a private contractor to a landfill located in Stockton, California. Solid waste collections occur three times each week during peak occupancy periods and once each week during the summer months. One truck with a capacity of 45 compacted cubic yards is required per collection. This truck travels primarily on SR 88. When SR 88 is closed during winter storm conditions, collections are either delayed until the road reopens or, if necessity dictates, trucks are rerouted through the Tahoe Basin via US 50, SR 89, and SR 88 over Carson Pass to Kirkwood.

KMPUD uses an independent solid waste hauler and contracts with the majority of the homeowner

associations at Kirkwood. KMR also contracts with this private contractor for its commercial refuse service.

A private solid waste contractor also provides recycling services in the Kirkwood area. Several recycling bins are placed throughout the area and the materials are hauled to a facility in Pine Grove. Of the solid waste produced at Kirkwood, approximately 28 percent consists of recycled materials. The proportion of recycled material increases with increased construction activity (Mollinari 1999).

4.14.4 Environmental Impacts

Advances in technology occur on a daily basis. As detailed plans are developed prior to construction, it is reasonable to assume that the latest, most efficient, technology would be used. The impacts disclosed in this analysis are based upon the latest technology available at this time. However, future advances in technology may suggest the use of other specific methods, equipment, or upgrades to optimize efficiency and possibly reduce costs. As technology changes, it is assumed that changes in the proposed development would be made as long as the new technology resulted in environmental impacts equal to or lesser than the technology analyzed in this EIR.

4.14.4.1 Energy

The long-range electrical power needs of Kirkwood would require either the expansion of the on-site generating facilities or implementation of an alternative energy source option. The energy source options are described below.

Recent load calculations indicate a generation capacity of approximately 11 MW will be needed at the completion of the projected development to handle the anticipated growth. Table 4.46 projects the electrical load required for project completion based on historical data. Energy usage, including system losses, are forecast to increase to about 22 million kWh on an annual basis (Table 4.46). The following alternatives are considered as the best possibilities for meeting the projected electrical demand: (1) expanding the existing diesel plant; or, (2) installation of propane-fueled fuel cells. A third option, building transmission lines to connect with an outside energy source, was once investigated, but is no longer considered feasible. Other changes considered to the existing system include converting the existing plant to Liquefied Natural Gas (LNG) or Compressed Natural Gas (CNG), or relocating the plant site, both of which are not viable at this time.

One alternative would use the existing diesel plant and expand its capacity with additional diesel generators. This expansion would require that the existing plant building increase in size by about 3,300 square feet. New diesel engines, two transformers, expanded switching apparatus, and a larger SCR (adding capacity) would also be required. Detailed information pertaining to the expansion of the MU powerplant was developed for the Kirkwood area (HESI 1999). Powerplant expansion would need to be completed prior to buildout. Recent efficiency improvements have increased the amount of usable power generated at the powerplant. These improvements provide enough electricity to meet the current year's demand and would be supplemented by temporary power for the next few years.

Table 4.46. Projection of kilowatt usage at Kirkwood through project completion.

Year	Projected Peak kW [a]	Projected Summer kWh Use	Projected Winter kWh Use	Projected Annual kWh Use

97 – 98	2,410	2,188,000	4,342,400	6,530,400
98 – 99	3,275	2,231,600	5,411,200	7,642,800
99 – 00	3,243	2,440,364	5,918,795	8,359,159
00 – 01	3,731	2,807,944	6,810,316	9,618,260
01 – 02	3,996	3,007,173	7,293,520	10,300,693
02 – 03	4,223	3,178,545	7,709,161	10,887,706
03 – 04	5,634	4,239,891	10,283,321	14,523,212
04 – 05	6,343	4,773,770	11,578,177	16,351,947
05 – 06	6,635	4,993,574	12,111,285	17,104,859
06 – 07	7,169	5,395,266	13,085,538	18,480,804
07 – 08	7,390	5,561,552	13,488,845	19,050,397
08 – 09	7,586	5,709,408	13,847,451	19,556,859
09 – 10	7,694	5,790,307	14,043,660	19,833,967
10 – 11	7,985	6,009,620	14,575,576	20,585,196
11 – 12	8,523	6,414,779	15,558,238	21,973,017

[a] Projected peak occurs in the winter due to ski resort operations.
kW = kilowatt
kWh = kilowatt hour
Source: KMR 2002.

The second alternative, which involves advancement of new technology, would rely on distributed generation through the use of propane-powered fuel cells in combination with the existing diesel generators. Fuel cells could be placed at various locations throughout the valley to provide power directly to particular sites. Fuel cells use propane in a non-combusting chemical process to produce electricity. Excess heat and water are by-products. Distributed generation sources can be thought of as mini, on-site power plants. Fuel cells would not supply the entire valley's need for power. They would provide individual projects with power, and surplus power could be recovered by existing grid lines for use elsewhere in the system, thus reducing the requirement for the expansion of the existing power plant. Cost-competitiveness of installation and maintenance are drawbacks to distributed generation alternatives at this time.

The third alternative, once considered, but determined to be infeasible, would be to bring an electrical transmission line to Kirkwood to supply electricity generated by an out-of-valley source. The project was analyzed by Sierra Pacific Power Company for MU and the KMPUD and is reported in *Kirkwood Transmission Line Feasibility Study, July 10, 1996*. This alternative is no longer considered feasible due to visual and environmental sensitivities, and cost and timing prohibitions. It would require a complex process involving permits from approximately 10 agencies and involvement of up to seven additional interested parties.

Another alternative would be to locate a new plant at a new site, resulting in two separate powerplants. Retaining the old plant and building a second new plant was not considered feasible because the operational costs of staffing two plants would result in higher electrical rates in the long term. Moving the whole plant would cost substantially more than the diesel expansion. The benefit from a different location would be a centrally located system with a newer control system.

The supply of propane gas throughout the Kirkwood area was described above. It is anticipated that the combined 50,000 gallons of stored propane could supply Kirkwood through the completion of the Proposed Project.

Implementing any one of the options for electrical power would meet the increased electrical demand predicted to occur at buildout of the Proposed Project.

4.14.4.2 Water Supply

Upon completion of the Proposed Project, the ultimate annual water demand is projected to reach 190.4 acre-feet, or 170,000 gpd, in comparison to the current average demand of 56,700 gpd. Maximum daily demands are expected to reach 211,000 gpd during January, February, and March (ECO:LOGIC 2001a).

For water planning purposes it was estimated that 1,757 equivalent dwelling units would be connected to the water system at the completion of the project, compared to the current 587 equivalent dwelling units. The projected number of units at project completion would actually be 1,503 residential units. The larger number of equivalent dwelling units accounts for water demand from the additional commercial space associated with the Proposed Project. Based on present patterns of use, maximum daily demands at project completion would be 390,000 gpd based on 1,757 equivalent dwelling units, with a maximum daily demand per unit of 182 gpd.

Storage requirements at project completion are based on providing 117,000 gallons for operational/equalization storage (30 percent of projected maximum daily demand), and 240,000 gallons for fire protection (2,000 gallons per minute for 2 hours), leaving 593,000 gallons for emergency storage (the remaining total storage capacity of the two existing tanks). Emergency reserves are available during power outages or if a well needs servicing, and would meet maximum daily demand for 1.5 days, or approximately 3 days on an annual demand levels (ECO:LOGIC 2001a). Storage capacity would be adequate to meet projected storage requirements at buildout.

Future water supplies would come from the existing shallow or deep aquifer groundwater wells, with treatment provided as necessary to comply with water quality regulations. KMPUD presently maintains four wells for municipal supply, and one for emergency supply. At project completion, well supplies totaling 390,000 gpd are needed. Short-term pumping capacity of Wells 2-5 equals 489,000 gpd, or 345,600 gpd with the largest well out of service. If emergency storage supplies were needed, they would last 13.5 days at this future rate of demand. On a long-term basis, existing wells are sufficient to meet future maximum monthly demand with the largest well out of service (ECO:LOGIC 2001a).

Well 2 has been off-line for 2 years for MTBE contamination remediation efforts. It is projected to be back in service within 1 year. KMPUD has constructed a new well, Well 5, to accommodate water supply demands in the absence of Well 2. Well 5 has an estimated capacity rating of 50-100 gpm.

If needed, future wells would be constructed as growth occurs in general conformance with the following KMPUD policy: a new well would be connected to the system when the maximum daily demand exceeds the available supplies with the largest well out of service, such that emergency storage reserves would be depleted in 7 days if demands continued at the maximum rate. This policy is based on the assumption that a well could be repaired and returned to service within 7 days, and reflects the fact that KMPUD's peak demands last for short periods of time (KMR 2001a).

While implementation of the Proposed Project would result in increased water supply needs, the existing water supply would meet that need. Existing water storage capacity is also sufficient to meet those demands at buildout. Since the increase in demand would be met by current supply capabilities, this increase is

considered a potentially less-than-significant effect.

The reader is referred to Water Resources, section 4.2, for a complete discussion of the impacts to groundwater due to the increased use of wells for domestic water.

4.14.4.3 Wastewater Treatment

The average daily flow during peak months is currently close to the WWTP design capacity; therefore, the additional wastewater generated by the proposed development is projected to overload the existing plant. Due to this projected overload, the WWTP would require expansion. The projected maximum monthly flows at the completion of the Proposed Project are shown in Table 4.47.

Table 4.47. Projected Monthly Flows at Buildout.

Wastewater Source	Present Flow (gpd)	Growth Factor [a]	Future Flow (gpd)
Residential	24,000 [b]	3	72,000
Commercial	30,100 [c]	2	60,200
Subtotal	54,100		132,200
Infiltration/Inflow (I/I)	33,500 [d]	1.5	50,300
Total	**87,600**		**182,500**

[a] Based on projected growth of each respective wastewater source (i.e., the number of residential units is projected to triple, while the number of commercial units is projected double by the end of the project).
[b] March 1997 metered water usage for single-family and multi-family dwellings.
[c] March 1997 metered water usage for commercial establishments.
[d] March 1997 WWTP effluent flow minus total metered water usage.
Source: Kennedy/Jenks Consultants (1998).

At the completion of the project, the maximum monthly flow is projected at 182,500 gpd, approximately twice the current maximum monthly flow of 87,600 gpd. Based on the future flow and load characteristics of the WWTP, the Draft Plan recommends the following:

- Provide interim expansions to the plant to accommodate flow and constituent loads for the plant beyond current capacity until complete expansion is possible.

- Expand the WWTP to accommodate flows and constituent loads at project completion. A new or revised Waste Discharge Permit would need to be obtained reflecting the larger anticipated effluent flow.

To accommodate future wastewater flows, the existing plant would require modification and expansion. Details of the proposed improvements were given in Chapter 3, section 3.5.3. The proposed upgrade plans for the WWTP would result in a maximum monthly flow capacity of 190,000 gpd. Based on the projected peak monthly flow and the proposed upgrade, the upgraded WWTP would sufficiently meet the needs of the Kirkwood area, including the needs of the resort and the associated guests.

Other wastewater operations that would need to be considered include: influent pumping, sludge dewatering and disposal, and effluent pumping and disposal. Projected requirements for these operations are described below.

The influent pumping station would need to be capable of handling peak hourly flows to the WWTP. As projected, the peak hourly flow at the completion of the project would be approximately 730,000 gpd. Assuming the pumping station would accommodate 70 percent of the total flow (with the East Meadows lift station accommodating the remaining 30 percent), the required capacity of the influent pumping station would be 511,000 gpd, or approximately 355 gpm. The alternative influent pumping processes would include either building a parallel pump station and using the existing pump as a backup or building a parallel pump station and replacing the existing pumps (equipped with grinder mechanisms to minimize potential clogging concerns).

It is anticipated that the peak volume of sludge to be treated per day would double, and the future solids handling system should be capable of dewatering this peak volume of one to two percent sludge. Hauling costs for sludge disposal are high at Kirkwood. Therefore, the more sludge that could be dewatered, the less the WWTP would have to pay in hauling costs. At buildout, an estimated 31,000,000 gallons of wastewater would be treated annually, resulting in 83,000 pounds of dry solids being produced. This is equivalent to 8,000 cubic feet per year of dewatered sludge at a concentration of 15 percent solids. This will require an estimated 40 loads of sludge to be hauled annually, or, six loads per month during the ski season. Waste is hauled, in 17-cubic-yard bins filled half full of sludge, to the landfill in Stockton, California.

The best process for effluent disposal at Kirkwood continues to be absorption beds. Five new effluent absorption beds would need to be developed to accommodate the increased effluent volumes through project completion. As discussed in Chapter 3, the new absorption beds would be located in the Chair 7 parking area and in the vehicle maintenance shop area. Direct discharge to Kirkwood Creek is no longer considered an option.

The reader is referred to the Water Resources section (4.2) of this document for a discussion of the potential impacts to water quality and aquifers due to the increased wastewater treatment. Impacts associated with construction of the proposed alternative with respect to vegetation, soils, and cultural resources are disclosed in those respective discipline sections of this document. Impacts associated with operation of the proposed alternative on the human environment with respect to air quality, noise, and visual resources are likewise disclosed in those respective discipline sections of this document.

As discussed in Chapter 3, if delays to the proposed major upgrades occur, interim improvements would be made which would allow for the capacity to increase to 120,000 gpd. Interim improvements would include converting the existing aerobic digester into an additional aeration basin (increasing total aeration basin capacity from 50,000 gallons to 75,000 gallons), purchasing and installing a 25 H.P. blower, replacing the air diffusers in the existing digester with additional and higher capacity diffusers, providing additional return activated sludge (RAS) pumping capacity so that all RAS is returned to the anoxic basins, providing mechanical mixers in the anoxic basins, and providing the necessary piping and electrical facilities to accommodate the foregoing facilities.

In addition to these interim improvements, additional measures could include improving the two existing emergency storage tanks by insulating them and providing air diffusers and additional air supplies. The purpose of these improvements, which would increase capacity to 140,000 gpd, would be to provide additional equalization capacity for use during peak periods. These improvements would ensure that the interim wastewater needs for the Kirkwood area are met.

4.14.4.4 Solid Waste

It is the goal of KMPUD to solely manage the solid waste management program by contracting with waste hauling companies, providing pick-up and storage locations, and recycling-deposit locations for the

community of Kirkwood. However, for KMPUD to solely manage solid waste, a positive Proposition 218 vote would be required. It would be necessary to place solid waste receptacles and recycling facilities throughout the development, particularly in easily accessible areas.

The amount of solid waste generated by the proposed development would approximately triple. Therefore, solid waste pickup would require about nine trucks per week during peak-occupancy periods and about three trucks per week during the summer months. The landfills currently used in Reno and Fairfield for waste disposal have life expectancies of 200 and 80-90 years, respectively (Assereto 1999). The landfill in Stockton has recently opened and the longevity of that facility is unknown. These facilities are projected to have adequate capacity to handle the increased solid waste produced by this project.

Policies for solid waste at Kirkwood would include requirements for developments to incorporate facilities for both solid waste and recycling. Recycling of metals, plastics, aluminum, glass, and paper products would be encouraged throughout the development.

4.14.4.5 Level of Significance Before Mitigation

Without mitigation, potential impacts to demand for energy and wastewater treatment would be significant. Impacts to demand for water supply and solid waste disposal would be less than significant.

4.14.4.6 Mitigation

While some of the mitigation measures identified below are elements of the Proposed Project, they are included to identify timing or other requirements, as applicable. Mitigation measures identified for utilities and infrastructure incorporate the Draft Plan, the wastewater treatment plant upgrade, and the MMDP.

4.14.4.6.1 Energy

Mitigation Measure 4.14 (a). MU will expand the existing electrical facility or construct a new facility to meet projected electrical demands as identified in section 4.14.4.1. As electrical requirements increase and the existing facility reaches capacity, expanded or new facilities must be developed. At the time a tentative development map is submitted, MU must provide the respective county with the current capacity of the electrical generation facility, the current electrical demand of the Kirkwood area, and the projected electrical requirements of the development. If the projected electrical need would not be met by the existing facility, improvements will also be provided and the schedule for completion will be identified. Expanded or new facilities must be in operation prior to electrical demands of the new development.

4.14.4.6.2 Water Supply

Mitigation Measure 4.14 (b). KMPUD will connect a new well to the water supply system if the maximum daily demand exceeds the available supplies with the largest well out of service, such that emergency storage reserves would be depleted in 7 days if demands continued at the maximum rate.

Mitigation Measure 4.14 (c). KMPUD will monitor water supply output and install additional wells prior to increased water supply demands of new development parcels. At the time a tentative development map is submitted, KMPUD will provide the respective county with the current water supply, the current water consumption of the Kirkwood area, and the projected water requirements of the development. If the projected water requirements will not be met by the existing supply, as defined in Mitigation Measure 4.14 (b), KMPUD will identify the number and location of proposed wells to be installed and the schedule for completion. Additional wells must be in operation prior to water demands of the new development.

Mitigation Measure 4.14 (d). Plan and implement new development to ensure the use of best available

technologies for water conservation, including, but not limited to, water conserving toilets, showerheads, faucets, and irrigation systems.

4.14.4.6.3 Wastewater Treatment

Mitigation Measure 4.14 (e). Monitor wastewater treatment operations and install a treatment system before capacity of existing facilities is exceeded. Expanded or new facilities must be in operation prior to wastewater demands of the new development.

Mitigation Measure 4.14 (*f*). At the time a tentative development map is submitted, KMPUD will provide the respective county with the current capacity of the wastewater treatment facility and the current wastewater output of the Kirkwood area. KMPUD will also provide the projected wastewater requirements of the development. Expanded or new facilities must be in operation prior to wastewater demands of the new development.

Mitigation Measure 4.14 (*g*). Implement Mitigation Measure 4.14 (d).

4.14.4.7 Level of Significance After Mitigation

With the proposed mitigation in place, there would be no significant impacts to utilities and infrastructure..

4.14.5 SIGNIFICANT, UNAVOIDABLE, ADVERSE IMPACTS

No significant, unavoidable, adverse impacts to utilities and infrastructure were identified.

4.14.6 CUMULATIVE EFFECTS

As discussed in section 3.6, Kirkwood's isolation and the limited development potential of the public lands surrounding it restrict the range of cumulative actions. As a result, this cumulative impact discussion involves only two cumulative actions, growth and development in South Tahoe and other surrounding communities, and increasing dispersed recreation in the surrounding area.

Of these cumulative actions, only the first has the potential to interact with the Proposed Project to generate cumulative effects on utilities and infrastructure. Growth and development in South Tahoe and other surrounding communities would hasten growth in Kirkwood visitor numbers, driving up average and peak demand for energy, water, and wastewater treatment. As a result, the rate of background population growth would be a factor in determining when upgraded facilities and infrastructure were required. In light of the monitoring, reporting, and planning stipulations included in the suggested mitigation measures, this cumulative effect would be less than significant.

CHAPTER 5: ALTERNATIVES

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

5.1 DEVELOPMENT OF ALTERNATIVES

The range of potential, viable alternatives to the Proposed Project is limited by the fact that the community of Kirkwood, the on-mountain ski area facilities, and the wastewater treatment plant are already well established. As a result, the starting point for development is not a blank slate, and past development inevitably shapes future development. Therefore, no feasible alternative location exists for the overall project. Nevertheless, some alternative scenarios are required by CEQA, and others have been suggested by public comments and internal agency review. On the basis of these considerations, the alternatives assessed in this chapter were developed to address each element of the Proposed Project: the Kirkwood Specific Plan (Draft Plan), the Mountain Master Development Plan (MMDP), and the wastewater treatment plant (WWTP) upgrade.

The range of alternatives required in an EIR is governed by a rule of reason that requires the document to set forth only those alternatives necessary to permit a reasoned choice (Bass et al. 1996). The alternatives must be limited to those that would avoid or substantially lessen one or more of the significant environmental effects of the project. The EIR need only examine the alternatives in detail that the lead agency determines could feasibly attain most of the basic objectives of the project. (Guidelines Section 15126[d][5].)

In determining whether alternatives are feasible, lead agencies are guided by the general definition found in CEQA: “Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors” (Guidelines Section 15364). In addition, the lead agency should consider site suitability, economic viability, availability of infrastructure, general plan consistency, other regulatory limitations, jurisdictional boundaries, and the proponent’s control over alternative sites in determining the range of alternatives to be evaluated in an EIR (Bass et al. 1996).

Alternatives to the Draft Plan were developed through a series of meetings and discussions conducted by the Alpine County Planning Department (ACPD), the lead agency, in conjunction with other members of Tri-County Technical Advisory Committee (TC-TAC). Kirkwood Mountain Resort (KMR) and Cirrus Ecological Solutions, LC, the third-party consultants assisting with the EIR process, were also involved. Public and agency concerns raised in comments on the Notice of Preparation (NOP) and on previous drafts of this EIR were considered in alternative development, as was ongoing public input during preparation of previous drafts of the EIR. Draft Plan alternatives are described in section 5.1.2 below.

In the case of the MMDP component of the Proposed Project, the proposed plan was scoped and alternatives developed during the course of initial Forest Service review in 1999. The alternatives developed through those efforts have been incorporated into this analysis and are described in section 5.1.2 below. They include the required No Project alternative and one development alternative. The previous Forest Service analysis suggested another development alternative but later determined that it did not warrant further analysis. This alternative is discussed in the following section, Alternatives Considered but Dismissed.

For the WWTP upgrade component of the Proposed Project, alternatives were developed and assessed in the *Wastewater Facilities Plan* (Kennedy/Jenks 1998). This analysis investigated different wastewater treatment methods and developed the best apparent alternative based on monetary and non-monetary criteria. The best apparent alternative is represented by the WWTP upgrade proposal described in Chapter 3. Two other alternative technologies were assessed in the Kennedy/Jenks report but dropped from further consideration, as discussed in the following section. As a result, the only alternative to the proposed WWTP upgrade analyzed in detail in this document is the No Project scenario, described in section 5.1.4 below.

5.1.1 ALTERNATIVES CONSIDERED BUT DISMISSED

5.1.1.1 Draft Plan

Draft Plan alternatives have a long history. The TC-TAC met on December 4 and 16, 1998, to review the preliminary alternatives, outlined in Table 5.1, below.

Table 5.1. Initial alternatives to the Proposed Project outlined in November 1998.

Alternative	Description
No Action 1	1988 Master Plan.
No Action 2	Status quo, no new development.
Alternative 3	Kirkwood North - move Single-Family/Duplex Residential density to main Village Center (or within valley south of SR 88), keep the bed-and-breakfast and limited highway commercial parking development within Kirkwood North area.
Alternative 4	Kirkwood North - change Single-Family to Multi-Family mid rise.
Alternative 5	Ski-In/Ski-Out North - change Single-Family to Multi-Family.
Alternative 6	Reduce overall 1998 planned density by some percentage.

Source: Peters (1999b).

The results of these meetings were the following (Peters 1999b):

- No Action 2 was eliminated. Prohibiting any future development was viewed as infeasible from both economic and legal perspectives. The objective of developing a viable full-season resort would be seriously compromised if no additional development were allowed. Prohibiting any future development would also raise significant vested rights and possible issues of takings.

- Alternatives 3 and 4 were combined to reflect a cluster concept for multi-family development that would concentrate development in Kirkwood North. This change was subsequently reflected in Alternative C.

- Alternative 5 was refined and subsequently reflected in Alternative D. Alternative D limited the change from single-family to multi-family zoning in the Ski-In/Ski-Out subarea to accommodate only the population displaced by the buffer. The buffer is now included in the Draft Plan instead of as an alternative, and Alternative D now focuses on reducing unit density throughout the Ski-In/Ski-Out subareas.

- Alternative 6 was eliminated. In its place, TC-TAC recommended the option subsequently defined as Alternative B. The development level in Alternative B is based on elimination of single-family

residential development in Kirkwood North, along with additional reductions of multi-family density in the valley, as opposed to an arbitrary percentage reduction across the entire resort.

An additional alternative was initially considered by TC-TAC, but eliminated from detailed analysis. This alternative would have allowed for an increase in multi-family density within the valley. The result would have been an overnight population in excess of 6,558. The alternative was eliminated since it would be questionable whether or not the CEQA requirement for alternatives to be environmentally superior to the Proposed Project could be satisfied.

Following TC-TAC review and subsequent discussions with KMR, a new alternative (Alternative E) was developed. It combined reductions in density in Kirkwood North and Ski-In/Ski-Out North with an increase in multi-family residences in the Mountain Village. This alternative allowed for the possibility of reducing development in these two areas while keeping the maximum overnight population at the same level as the Proposed Project.

On January 27, 1999, the lead agency approved for study alternatives A through E, which were addressed with minor revisions in previous drafts of this EIR. These revisions were reflected in a February 5, 1999, memorandum (Artz and McIvor 1999) to the Kirkwood Specific Plan EIR technical team.

Since the decision to issue this Recirculated Revised EIR was made, Alpine County and KMR have continued dialog with interested parties at Kirkwood, resulting in two new alternatives being developed and two alternatives considered in the last version of the EIR being dropped. The new alternatives, which became the new Alternatives D and E in this document, address three issues: (1) the unit count and maximum overnight population authorized at buildout, (2) development north of SR 88, and (3) development in the Ski-In/Ski-Out subarea. Both of these alternatives would reduce the authorized unit count to the number included in the 1988 Master Plan (1,413 units), and both would achieve this reduction by eliminating units in the Kirkwood North and Ski-In/Ski-Out subareas. These alternatives, combined with the population-based approach to assigning density, would allow for this reduction in residential development while retaining the same limit on overnight population as the Proposed Project.

The previous Alternatives D and E were dropped because the new Draft Plan and alternatives address the same concerns in a more thorough way.

5.1.1.2MMDP

In their 1999 review of the proposed MMDP, the Forest Service Interdisciplinary Team initially considered an alternative that would have reduced the scope of development within Emigrant Valley, in addition to the MMDP alternative proposing no Emigrant Valley development (described below). The element separating this alternative from the MMDP Proposed Project was the exclusion of the Covered Wagon lift. However, the Forest Supervisor may choose to adopt select components of each, forming a new alternative. Therefore, it was determined that an alternative proposing limited Emigrant Valley development would not provide additional contrast or valuable comparison of the anticipated effects of the action alternatives given the alternative for no Emigrant Valley development. The Forest Service dropped this alternative from consideration, and it is not analyzed in this EIR.

5.1.1.3WWTP Upgrade

Several processes are involved in wastewater treatment, some of which are dependant on the type of treatment system being used. These projects can include flow equalization, denitrification, filtration, screening, sludge dewatering, and effluent disposal, as well as necessary facilities such as offices and support areas. As identified in the Kennedy/Jenks report (1998), following an initial screening to determine whether the projects objectives would be met, monetary and non-monetary factors were used to compare alternative wastewater

treatment systems and develop the best apparent alternative. The membrane bioreactor (MBR) system was identified as the best apparent alternative and is addressed in this EIR as the WWTP upgrade element of the Proposed Project.

In all alternatives, the continued use of absorption beds for effluent disposal was chosen over stream discharge. Direct stream discharge is not considered as a disposal option. While the proposed MBR treatment of wastewater effluent normally meets the more stringent requirements for stream discharge, it would have required separate approval by the Regional Water Quality Control Board.

The two options not selected as the best apparent alternative are described below. For further information on these alternative wastewater treatment approaches and the process of determining the best apparent alternative, see the following, herein incorporated by reference: *Wastewater Facilities Plan* (Kennedy/ Jenks 1998). It is available for review at the Alpine County Planning Department office, Markleeville, CA and the KMPUD office, Kirkwood, CA. The alternative treatment methods are not considered further in this EIR for the reasons indicated in the Kennedy/Jenks (1998) report and the following descriptions.

5.1.1.3.1 Extended Aeration Activated Sludge

This is the wastewater treatment method currently employed at Kirkwood. It is known to be effective and the original facilities were designed in anticipation of future expansions. Associated processes include in-line flow equalization, secondary clarification, filtration, and aerobic digestion. The main disadvantage of expanding capacity using this process is the increase in space required for these associated treatment processes. Twice as much tank volume would be required to meet projected ultimate buildout flows, and construction of new basins would be required to accommodate the flow equalization and denitrification processes. These additions would significantly add to the cost and disturbance area of the upgrade project, making them infeasible compared to the treatment system proposed in the WWTP upgrade.

5.1.1.3.2 Deep Shaft System

This process has several advantages over the extended aeration method. The space requirements are less and the efficiency is high, allowing for better accommodation of increased peak flows. However, drilling of the shafts would be required, as would construction of new basins overlying the shafts. Unlike the MBR system, the deep shaft system would still require new construction of basins, clarifiers, and filters, thus reducing its cost-effectiveness and increasing the disturbance area of the expansion project. This alternative would result in greater environmental impacts and capital costs compared to the proposed WWTP upgrade and is therefore not considered feasible.

5.1.2 ALTERNATIVES TO THE DRAFT PLAN

5.1.2.1 Alternative A - 1988 Master Plan

CEQA mandates evaluation of a no-project scenario in the EIR process. Alternative A is the No-Project Alternative. CEQA regulations and guidance for the no-project scenario were revised and clarified in 1998 (CEQA Guidelines 15126.6, Bass et al. 1998). Pertinent points in the revised regulations include the following.

The no-project analysis must discuss the existing conditions at the time the NOP is published (the no-development scenario), as well as what could reasonably be expected to occur in the foreseeable future if the project were not approved, based on current plans and *consistent with* available infrastructure and *community services*. The existing conditions, for purposes of this No-Project Alternative, are discussed in detail in the Environmental Setting subsections of Chapter 4.

In the previous version of this EIR, the date for evaluating existing conditions was August 1998, when much of the relevant information was compiled. Since that time, further changes to existing conditions at Kirkwood include the completion of the community services building and fire house, *phase 1 of the recreation center, Palisades 1-3, the Mountain Club,* construction of additional dwelling units, and drilling of well number 5. The description of current conditions has been updated accordingly.

CEQA requirement that EIRs include a no-development scenario as a basis for impact assessment is met in this document by contrasting the Proposed Project to current conditions, then contrasting the impacts of alternatives to those of the Proposed Project.

When a proposed project entails the revision of an existing land use plan, as is the case here, the No-Project Alternative is by definition the continuation of the existing plan into the future *(CEQA Guidelines 15126.6[3][A])*. In this case, if the Draft Plan or an alternative specific plan were not adopted, the 1988 Master Plan would remain in force. This scenario constitutes the No-Project Alternative.

To ensure consistence with the CEQA guidance regarding available infrastructure and community services, applicable aspects of the current setting at Kirkwood were reviewed for any constraints that would impede the obtainability of future infrastructure and thus preclude buildout of the 1988 Plan. This review aimed to identify any regulatory or physical changes that would have occurred since the adoption of the 1988 Master Plan making development of the necessary infrastructure and community services unobtainable. Key components of infrastructure and community services under review included municipal water supply, traffic and circulation, housing, public services (e.g. police and fire protection), and utilites, such as wastewater treatment and electricity generation. Similarities between the No-Project Alternative and the Proposed Project facilitated this review, particularly in regard to development areas, total unit counts, and the projected population. As a result of these similarities, the conclusions regarding the adequacy of infrastructure and facilities under the Proposed Project (see Chapter 4 of this EIR) also hold for the no-project scenario. No constraints that would preclude the buildout of either plan were identified. The differences between impacts projected to occur under the No-Project Alternative are discussed in section 5.2.1.

As noted elsewhere in this EIR, the 1988 Master Plan is clearly the foundation for the Draft Plan, and the two share many common features. Both plans include the following characteristics:

- Limiting the maximum overnight population to 6,558.
- A Mountain Village center, with concentrated commercial and multi-family residential development, at the south end of the valley.
- A Day Skier Center (Timber Creek Village) west of the meadow and Kirkwood Meadows Drive, with parking, commercial space, and multi-family development.
- A service area across Kirkwood Meadows Drive from Timber Creek Village. The service area would include maintenance facilities, a school site, a microwave receiving station, a fire station, a wastewater treatment plant, and parking.
- A highway commercial and residential center north of SR 88.
- Single-family residential development east and west of the meadow.
- Permanent retention of Kirkwood Meadow as open space.

However, this analysis focuses on differences between the Draft Plan and the 1988 Master Plan in order to

distinguish their environmental impacts. These differences can be summarized as follows:

- The 1988 Master Plan calls for a community that is more dispersed and less pedestrian oriented than specified in the Draft Plan, with more development north of SR 88 and less commercial and condominium development concentrated in the Village at the south end of the valley.

- The 1988 Master Plan assigns specific numbers and types of residential units, as opposed to the population-based approach taken in the Draft Plan. As a result, the 1988 Master Plan limits developers' flexibility to respond to shifts in market demand.

- Ultimately, the same potential overnight population of 6,558 could be reached, but this could occur sooner under the 1988 Master Plan as a result of the different mix of housing and lodging types. Specifically, the Draft Plan calls for more single-family units, which are generally built more slowly and less predictably than the multi-family developments.

- Under the 1988 Master Plan, 1,413 residential units could ultimately be built, compared to 1,503 units under the Draft Plan.

- The 1988 Master Plan, *as revised,* provides for fewer single-family/duplex units (*324*) than the Draft Plan (425).

- The 1988 Master Plan, *as revised,* also provides for fewer multi-family units (*829*) than the Draft Plan (1,078) (numbers include employee housing). However, this difference results primarily from a change in land use designations. The 1988 Master Plan includes lodge units (260) as a separate land-use designation, which, when combined with the *829* units, results in more total multi-family units than the Draft Plan (*1,089*). The Draft Plan does not include this designation, but it would allow lodge, hotel, or bed-and-breakfast accommodations in the multi-family residential and commercial zoning designation. Though no specific unit number is stipulated, these units would be included in the multi-family total.

- The 1988 Master Plan contains provisions for 160,000 square feet of commercial space, while the Draft Plan calls for 194,300 square feet. Some of this difference is because the 1988 Master Plan lists a number of commercial facilities separately (e.g., the riding stable and the cross-country facility), while the Draft Plan includes such facilities under the commercial zoning designation.

The revisions to the 1988 Master Plan regarding the authorized mix of single-family/duplex and multi-family units are discussed above in sections 1.3.1.1 and 2.2.2. Note that the plan retains the ceiling of 1,413 total units, as well as the 6,558 cap on population, with the cited revisions in place.

The 1988 Master Plan is not as detailed and comprehensive as the Draft Plan, which limits the degree to which some impacts can be assessed, *such as project-specific density and infrastructure*.

The goal of the 1988 Master Plan is to balance the base area development with the skiing capacity of the mountain. Factors considered in the plan include the comfortable carrying capacity (CCC) of the ski mountain at full development, the amount of development appropriate in the base area so as not to degrade the visual quality and atmosphere of the area, summer usage, day skier usage, and the potential market (demand) for a mountain resort facility (KAI 1988).

The strategy for development at Kirkwood in the 1988 Master Plan is to develop a full-service resort with lodging, restaurants, shops and attendant services to accommodate summer and winter visitors. In developing

the resort, particular attention is to be paid to the preservation of the natural beauty and mountain atmosphere of the area (KAI 1988). These goals and strategies are similar to those outlined in the Draft Plan.

Maximum overnight population is limited to 6,558 in the Kirkwood Specific Plan and the 1988 Master Plan. As described in Chapter 3 (section 3.5.1.1), person-per-unit factors were used to calculated the overnight population associated with a particular number and mix of unit types. By altering the number of units and mix of unit types in the Draft Plan alternatives, the resultant projected overnight population changes. Table 5.2 provides a guide to the unit-based population projections of the Proposed Project and alternatives.

5.1.2.2 Alternative B- Reduced Kirkwood North and Resort-wide Residential Development

This alternative was developed in response to two of the broad issues raised during scoping and TC-TAC review of the Draft Plan: specific concerns regarding residential development north of SR 88 (i.e., Kirkwood North), and more general concerns associated with overall population growth in the valley. Key concerns regarding Kirkwood North include impacts to visual resources, soils, vegetation, water quality, and surrounding public recreation areas. General concerns associated with population growth include traffic, air quality, noise, visual resources, and adequacy of utilities and services.

Alternative B would eliminate the single-family/duplex residential zone in Kirkwood North and convert this zoning area to open space. This would increase the acreage of undeveloped land in Kirkwood North, thus reducing potential impacts to visual resources and other resources of concern in the area north of the highway. The zoning change would eliminate an estimated 18 single-family residential units with a potential overnight population of 98. KMR identified 83 other single-family residential units in both Ski-In/Ski-Out North and Ski-In/Ski-Out South, which, along with elimination of the Kirkwood North development, could be abandoned to reduce the potential overnight population at buildout by 552 people.

Alternative B would also limit additional multi-family residential development throughout the valley resulting in reductions in the ultimate overnight population. Of the multi-family units, a reduction of 232 multi-family units would occur in Ski-In/Ski-Out North, Timber Creek Village, the West Valley (Thimblewood and Edelweiss developments), and Kirkwood North, 27 of which would be relocated to the Village. The potential overnight population associated with multi-family units would be reduced by 799 people. Combined with the population reduction from the identified single-family residential units, these unit reductions would result in a total population reduction of 1,351 people, a 20 percent reduction relative to the Draft Plan.

A total of 1,202 units could be developed under this alternative, with a projected maximum overnight population of 5,196. This would result in less development and population growth than the Draft Plan or other alternatives.

The design for this alternative is depicted in Figure 5.1. In all other respects, this alternative would be the same as the Draft Plan.

Table 5.2. Maximum unit and population projections for Kirkwood Resort, Proposed Project and alternatives.

Existing Conditions (Nov. 2001)			Specific Plan (Proposed Project)		Alternative A: 1988 Master Plan (No-Project)		Alternative B: Reduced Kirkwood North and Resort-wide Residential Development		Alternative C: Clustered Kirkwood North Development		Alternative D Reduced Kirkw North and Sk In/Ski-Out No Developmen	
Units	**Persons**		**Units**	**Persons**	**Units**	**Persons**	**Units**	**Persons**	**Units**	**Persons**	**Units**	**Pers**
173	946	**Single-Family/ Duplex[1] 2020**	268	1,466	*324*	*1,772*	275	1,504	275	1,504	275	1,50
		Single-Family/ Duplex 2045	425	2,325			324	1,772	407	2,226	419	2,29
381	1,486	**Multi-Family[1]**	1,078	4,203	*727*	*2,835*	878	3,424	1,106	4,313	994	3,87
NA	NA	**Lodging/ Hotel**	NA	NA	260	520	NA	NA	NA	NA	NA	NA
Accounted for within multi-family units.		**Employee Housing** (included in unit total)	Housing will be provided for 50% of employees.		102	398			Housing will be provided for 50% of empl			
NA	NA	**2020 Total**	1,346	5,669	1,413	***5,525***	1,160	4,928	1,388	5,817	1,269	5,38
554	**2,432**	**2045 Total**	**1,503**	**6,528**	**1,413**	***5,525[2]***	**1,202**	**5,196**	**1,513**	**6,539**	**1,413**	**6,16**

Sources: KMR 2001, RRC 2001
[1]Single-family population calculated using 5.47 people per unit; Multi-family population calculated using 3.9 people per unit, from RRC 2001.
[2]Total is calculated to occur in the year 2028 for the 1988 Master Plan.

5.1.2.3 Alternative C- Clustered Kirkwood North Residential Development

This alternative was also developed in response to issues associated with residential development in Kirkwood North, but it incorporates an alternate approach to address these issues. Under this alternative Kirkwood North development would be clustered, resulting in disturbance of a smaller area. This is intended to reduce impacts to visuals, soils, vegetation, and water quality.

This alternative would change the proposed zoning of the Kirkwood North single-family/duplex residential area to multi-family residential. Population projections for Kirkwood North would be retained under this change in proposed zoning. However, a net increase in the number of units in this subarea would result due to the lower number of residents per unit. The 18 single-family units proposed under the Proposed Project would be converted to 28 multi-family units. Total unit development in Kirkwood North would equal 96 units. The size of the area zoned for residential development would not change, but the altered zoning designation would result in fewer structures and less overall disturbance.

A total of 1,513 units could be developed under this alternative, with a projected maximum overnight population of 6,539. This would be slightly more development than the Draft Plan, with the difference due to conversion of single-family units to multi-family units at Kirkwood North.

The design for this alternative is depicted in Figure 5.2. In all other respects, this alternative would be the same as the Draft Plan.

5.1.2.4 Alternative D- Reduced Kirkwood North and Ski-In/Ski-Out North Development

Like alternative B, this alternative was developed to address concerns regarding Kirkwood North and overall population growth in the valley. It addresses population growth by altering the density of development in the Ski-In/Ski-Out North subarea. Concerns center on impacts related to development density and to visual resources, soils and geology, vegetation, wildlife, and water quality.

In order to lessen density and associated resource impacts, 39 multi-family units would be eliminated in the Ski-In/Ski-Out North subarea. This reduction in density is intended to lessen impacts related to overall population growth, as well as impacts to soils, vegetation, wildlife, and water quality. Multi-family units are also reduced in the Village and Kirkwood North.

At Kirkwood North, the single-family units would be reduced to 12 from the 18 units proposed in the Draft Plan. The number of multi-family units in this subarea would be reduced to 40 units from the 68 proposed under the Draft Plan. These reductions are also intended to alleviate issues related to population growth and development, such as impacts to visual resources, soils, vegetation, and water quality.

The total number of proposed units under this alternative would be 1,413, similar to the 1988 Master Plan, with a projected maximum overnight population of 6,169. The unit-count is 90 units less than the Draft Plan. The projected maximum overnight population is 359 fewer residents/visitors, or 5 percent less than under the Draft Plan. This reduction is intended to reduce impacts to traffic, air quality, noise, visual resources, and adequacy of utilities and services.

The design for this alternative is depicted in Figure 5.3. In all other respects, this alternative would be the same as the Draft Plan.

5.1.2.5 Alternative E- Reduced Kirkwood North and Ski-In/Ski-Out Development and Unit Relocation

This alternative was designed to respond to three issues, development at Kirkwood North, density of

development in the Ski-In/Ski-Out subareas, and overall population growth in the valley. Of these issues, this alternative emphasizes reduced development at Kirkwood North and Ski-In/Ski-Out North.

Development in the Kirkwood North subarea would be reduced through the elimination of all proposed single-family units and conversion of this area to open space. This would increase the acreage of undeveloped land in Kirkwood North with the intent of reducing potential impacts to visual resources, soils, vegetation, wildlife, water quality, and surrounding recreation areas. This zoning change would eliminate an estimated 18 single-family residential units with a potential overnight population of 98. Other reductions to Kirkwood North development would include limiting multi-family units to 40. These remaining units would include 24 cabin-style units and a bed-and-breakfast, and 16 employee housing units above the general store and other commercial developments.

Ski-In/Ski-Out North development would be reduced by 59 multi-family units relative to the Draft Plan. Twenty of these units would be relocated to the Village, effectively redistributed into one or more yet-to-be constructed lodge units and focusing 43 percent of total unit development in the Village. An overall reduction in proposed commercial development in the Village has resulted in less space needed than is currently zoned for commercial facilities in the Village. This space, zoned as multi-family residential and commercial, would be developed as multi-family lodging under this alternative. Use of this space for multi-family residential purposes would have minimal additional effects due to its occurrence in already planned structures. Loading unit development in the Village area rather than at other locations of Kirkwood would further one of the main objectives of the Proposed Project, to create a more pedestrian-friendly community and center visitors close to access points for mountain activities.

The Ski-in/Ski-out South subarea would be reduced by five single-family units under this alternative in order to shift development downhill and reduce visual impacts.

A total of 1,413 units could be developed under this alternative, with a projected maximum overnight population of 6,142. The unit-count limit is similar to the 1988 Master Plan, and the projected maximum overnight population is 386 residents/visitors fewer, or 6 percent less, than under the Draft Plan. This reduction is intended to reduce impacts to traffic, air quality, noise, visual resources, and adequacy of utilities and services.

The design for this alternative is depicted in Figure 5.4. In all other respects, this alternative would be the same as the Draft Plan.

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Figure 5.1. Alternative B- Reduced Kirkwood North and Resort-wide Residential Development.

Back of Figure 5.1

Figure 5.2. Alternative C- Clustered Kirkwood North Residential Development.

Back of Figure 5.2

Figure 5.3. Alternative D- Reduced Kirkwood North and Ski-In/Ski-Out North Development.

Back of Figure 5.3.

Figure 5.4. Alternative E- Reduced Kirkwood North and Ski-in/Ski-out Development and Unit Relocation.

Back of Figure 5.4.

Figure 5.5. MMDP Alternative B- No Additional Emigrant Valley Development.

Back of Figure 5.5.

5.1.3 ALTERNATIVES TO THE PROPOSED MMDP

5.1.3.1 MMDP Alternative A – No Project

The MMDP No-Project Alternative would reflect maintenance of existing ski area facilities and management practices. Because existing, approved, on-mountain plans have been built out, no further changes, additions, or upgrades could be carried out under current approvals. Under this alternative, the ski area would continue to operate at an established on-mountain comfortable carrying capacity (CCC) of 6,200 skiers.

5.1.3.2 Alternative B- No Additional Emigrant Valley Development

This alternative was developed in response to concerns over the potential effects to the Emigrant Trail and/or the setting of the historic trail within the Emigrant Valley (see Figure 5.5 above). Alternative B excludes all on-mountain development components of the proposed MMDP in Emigrant Valley. Excluded project elements would include: the Covered Wagon surface lift, the Thimble Peak lift, and the multi-purpose trail from Caples Crest to the bottom of the Sunrise lift. Ski patrol stations, snowfencing, and related infrastructure associated with these facilities would also be excluded.

5.1.4 ALTERNATIVES TO THE WWTP UPGRADE

Alternatives for the WWTP component of the project were previously developed and analyzed in the *Wastewater Facilities Plan* (Kennedy/Jenks 1998), which is incorporated by reference and available for review at the KMPUD office, Kirkwood, and the Alpine County planning department office, Markleeville. This analysis investigated different wastewater treatment methods and developed the best apparent alternative for each process involved based on an initial screening of their ability to meet the objectives of the wastewater treatment upgrade project, and then by a monetary and non-monetary criteria comparison. The best apparent alternatives were combined and are represented by the WWTP upgrade proposed in Chapter 3. Alternative biological treatment projects to the best apparent alternative (discussed in section 5.1.1) represent the other wastewater treatment methods identified in the Kennedy/Jenks (1998) report, which were determined to be infeasible or less favorable than the processes included in the proposed WWTP upgrade project. These alternatives are therefore not considered further in this EIR.

5.1.4.1 WWTP Alternative A- No Project

Under the No-Project Alternative, only interim improvements to the wastewater treatment facility would occur. These improvements, also outlined in the WWTP project description in Chapter 3, are necessary to meet a maximum capacity 120,000 gpd. Their implementation would not result in an exceedance of the waste discharge permit issued in April, 1994 (Kennedy/Jenks 1998). Implementing the following improvements would avoid potential system failure in the event that demands exceed 100,000 gpd, the upper limit of current system reliability.

- Convert the existing aerobic digester into an additional aeration basin, increasing capacity from 50,000 to 75,000 gpd.
- Purchase and install a 25-HP blower.
- Replace air diffusers in the existing digester with additional, higher capacity diffusers.
- Provide additional return activated sludge (RAS) pumping capacity so that all RAS is returned to anoxic basins.

- Provide mechanical mixers in the anoxic basins.
- Provide the necessary piping and electrical facilities to accommodate the foregoing facilities.
- Repair two existing storage tanks to allow for emergency capacity up to 140,000 gpd.

5.1.5 ALTERNATIVE SUMMARY

Table 5.3 summarizes the alternatives addressed in this analysis.

Table 5.3. Kirkwood EIR alternatives.

	Specific Plan
Proposed Project: Draft Kirkwood Specific Plan.	The Draft Plan would be adopted as submitted, allowing a total of 1,503 units.
Alternative A: No Project.	The Kirkwood Master Plan Amended 1988 would remain in force, allowing 1,413 units.
Alternative B: Reduced Kirkwood North and Resort-wide Residential Development.	Single-family/duplex development in Kirkwood North would be eliminated and the area changed to Open Space. Areas of multi-family development throughout the valley would be reduced to lower the overnight population at buildout by 20 percent, allowing 1,202 units. In all other respects, this alternative would be the same as the Draft Plan.
Alternative C: Clustered Kirkwood North Residential Development.	Single-family/duplex development in Kirkwood North would be converted to more clustered, multi-family development. Through this conversion, a total of 1,513 units would occur. In all other respects, this alternative would be the same as the Draft Plan.
Alternative D: Reduced Kirkwood North and Ski-in/Ski-out North Development.	Single-family and multi-family development in Kirkwood North would be reduced. Multi-family development in Ski-In/Ski-Out North would be substantially reduced to address density concerns. Total units would equal 1,413. In all other respects, this alternative would be the same as the Draft Plan.
Alternative E: Reduced Kirkwood North and Ski-in/Ski-out Development and Unit Relocation.	Single-family/duplex development in Kirkwood North would be eliminated and the area changed to Open Space. Multi-family units would be reduced in Kirkwood North and the Ski- In/Ski-Out subareas. Some units would be relocated to already planned structures in the Village, which are zoned as Multi-family Residential and Commercial. Overall authorized units at Kirkwood would be 1,413. In all other respects, this alternative would be the same as the Draft Plan.
	MMDP
Proposed Project: KMR Mountain Master Development Plan.	KMR's MMDP would be approved as submitted, expanding capacity to accommodate 9,300 skiers.
Alternative A: No Project.	No facilities improvements would occur. Capacity would remain at 6,200 skiers. Management would continue to follow current guidance as set forth in the 1971 mountain master plan.
Alternative B: No Additional Emigrant Valley Development.	Excluded projects would include: Covered Wagon surface lift, Thimble Peak lift, multi-use trail from Caples Crest to the bottom of Sunrise lift. Infrastructure related to these projects would also be eliminated. Skier capacity and terrain access

would increase as much as with the MMDP. In all other respects, this alternative would be the same as outlined in KMR's MMDP.

WWTP Upgrade

Proposed Project: KMPUD's proposed WWTP upgrade.	The best apparent alternative, as analyzed by Kennedy/Jenks (1998), would incorporate membrane bioreactor process for treatment. Capacity would increase to 190,000 gpd.
Alternative A: No Project.	Only previously approved interim improvements would be allowed, meeting a maximum demand capacity of 120,000 gpd.

5.2 IMPACTS ASSOCIATED WITH THE DRAFT PLAN ALTERNATIVES

As discussed above, alternatives were developed to alleviate significant impacts or issues of concern that would occur with implementation of the Draft Plan. One primary concern with buildout of the Proposed Project is population growth and increases in neighborhood density. Some of the alternatives address these issues through unit reductions and thus maximum potential overnight population reductions. As a result, the composition of the maximum allowable SAOT/PAOT would change, to be comprised of more day skiers than destination skiers. Some impacts associated with larger numbers of day visitors, as described below for traffic and circulation, would result.

Unless described below, resource-specific impacts associated with the Draft Plan alternatives would be the same as those described for the Draft Plan in Chapter 4.

5.2.1 ALTERNATIVE A- NO PROJECT

5.2.1.1 Geology, Soils, and Geologic Hazards

5.2.1.1.1 Soil Disturbance

Alternative A would result in fewer total units than the Draft Plan, with many of the units contained within larger structures such as multi-family housing or hotels/lodges. This would result in an estimated 19.6 acres less ground disturbance (Table 5.4). Most of this reduction would be evident in the Ski-In/Ski-Out subareas, which would not be developed to the extent proposed under the Draft Plan. Some soils in this area contain a lithic layer and are shallow, resulting in a high relative erosion potential. They are also more difficult to revegetate. Reduced development in this area would minimize contact with these soils.

The more dispersed community designed under Alternative A may require more roads and parking facilities, partially offsetting the reduced disturbance associated with residential construction. Overall, Alternative A would generate less initial soil disturbance and erosion potential than the Draft Plan, but it would result in roughly the same amount of impervious surfaces contributing to increased runoff. Table 5.4 indicates the unit-mix changes by subarea under Alternative A and the estimated change in disturbance.

Table 5.4 Alternative A development and ground disturbance reductions.

Subareas with Changes in Unit-Mix Development	Single-family Units	Change in Construction Area Disturbed (acres)	Multi-family Units	Change in Construction Area Disturbed (acres)[1]	Total Change in Construction Area Disturbed (acres)
West Valley (Thimblewood and Edelweiss)			**-15**	**0**	**0**
Village			***+153***	**0**	**0**
Ski-In/Ski-Out South	**-51**	**-7.0**			**-7.0**
Ski-In/Ski-Out North and Timber Creek Village	**-32**	**-4.4**	**-181**	**-6.7**	**-11.1**
Kirkwood North	**-18**	**-2.5**	**+54**	**+1.0**	**-1.5**

Total Change	**-101**	**-13.9**	***+11***	**-5.7**	**-19.6**

[1] A zero value indicates an addition of units into space that would exist in proposed multi-family and commercial development structure(s), or as a change in a multi-floor structure.

5.2.1.2 Water Resources

The water resources impacts of the No-Project Alternative would be similar to those of the Draft Plan. Soil disturbance would be reduced somewhat, lessening sedimentation impacts, but the more dispersed community planned in Alternative A may require more roads and parking facilities. These features would result in more storm water runoff and associated contamination, more potential for oil and grease and other automotive pollutants, and more interference with surface water percolation to groundwater.

5.2.1.3 Biological Resources

5.2.1.3.1 Aquatic Resources

Compared to the Draft Plan, this alternative would result in slightly less construction, and consequently less ground disturbance and associated sedimentation impacts to aquatic habitat. This alternative would produce a more dispersed development than the Draft Plan, resulting in a greater dependance on roads, which could involve stream crossings. Also, a higher proportion of the commercial and condominium developments would be sited in Kirkwood North, potentially resulting in a relatively larger impact to aquatic habitat in this area. The increased development in Kirkwood North could create a greater risk than the Draft Plan to the Kirkwood and Caples Creek fisheries due to the relatively narrow floodplain and stream buffer at this location. Also, increasing the population in close proximity to Kirkwood Lake could result in increased human disturbance impacts on the lake and its fishery.

While some effects on aquatic habitat related to potential sedimentation would likely be reduced under this alternative, some new impacts would be generated. Overall, this project would likely have similar impacts to aquatic resources as the Draft Plan.

5.2.1.3.2 Wildlife Resources

Impacts to wildlife habitat under Alternative A would differ little from the Draft Plan. Some habitat loss would be avoided because the 1988 Master Plan does not allow as much development west of Kirkwood Meadow. However, development would be more dispersed, and therefore impacts to habitat and general disturbance of wildlife could be somewhat greater under this alternative. This alternative would also likely result in more impacts to the wildlife resource in Kirkwood North because of the higher density of development in this area. While the 1988 Master Plan did not establish a summer PAOT, this alternative would accommodate the same year-round PAOT as the Draft Plan. Therefore, overall impacts on wildlife associated with population would likely be similar to the Draft Plan.

5.2.1.3.3 Wetland Resources

Under Alternative A, ground disturbance impacts would be less than under the Draft Plan. The more mesic western side of Kirkwood, where the Ski-In/Ski-Out subareas are proposed under the Draft Plan, would not be built out to the same degree. However, the development would generally be more dispersed, resulting in the potential for more wetland impacts from road crossings.

5.2.1.3.4 Vegetation Resources

Under Alternative A, total impacts to vegetation could be slightly less than those described for the Draft Plan. In general, reductions in impacts to vegetation are the same as those described above for wetlands. Potential impacts to sensitive species would also be similar to those under the Draft Plan and would depend on the specific location of building footprints relative to potential populations of plant species.

5.2.1.4 Air Quality

The more dispersed nature of the development under Alternative A would tend to create more vehicular use and associated pollutants than the Draft Plan. The projected number of units and associated population at buildout would be slightly less under Alternative A, but this benefit would be countered by increased vehicle use due to a more dispersed nature of development. Overall, impacts to air quality would be similar to the Draft Plan.

5.2.1.5 Cultural Resources

While direct impacts to the Kirkwood Inn would not result from implementation of either the Draft Plan or Alternative A, the greater concentration of development in Kirkwood North under this alternative would further change the character or the Inn's surroundings and potentially lead to greater indirect impacts.

5.2.1.6 Land Use

The proposed development of the Ski-In/Ski-Out North area would be limited to areas already zoned for high-density condominium development near Kirkwood Meadows Drive. This would result in more land being left in an undeveloped state. This may have a beneficial effect on the views, privacy and perceived residential quality for residents of the KMA subdivision.

Residential areas would be more concentrated (more condominiums) and more dispersed throughout the valley than under the Draft Plan. This would leave more of the Kirkwood private lands in an undeveloped state but would require more use of roads and parking areas.

5.2.1.7 Traffic and Circulation

Under Alternative A, the ultimate maximum overnight population and ski area SAOT would be the same as the Draft Plan, although the 1988 Master Plan calls for fewer residential units. Since winter SAOT and maximum overnight population are the same, traffic volumes generated by ski activity would be similar to the Draft Plan. The 1988 Master Plan includes development that is more dispersed and less pedestrian oriented than the Draft Plan and would result in more traffic on roads within the resort. Parking requirements outlined in the 1988 Master Plan would be adequate as the ratio of overnight visitors to day skiers approaches the 60:40 goal.

Development planned in Kirkwood North differs significantly between the 1988 Master Plan and the Draft Plan. Under the 1988 Master Plan there would be up to 122 residential units built north of SR 88 and a Highway Center oriented primarily toward the highway consisting of 21,000 square feet of commercial space. The 1988 Master Plan map shows more access points into Kirkwood North compared to the Draft Plan. The greater number of residential units and commercial space would generate a corresponding increase in traffic exiting and accessing SR 88 in several areas, creating more disruption to the flow of traffic and increasing safety concerns.

5.2.1.8 Visual and Aesthetic Resources

Significant additive impacts would result from the development of the commercial and residential high-density zone at Kirkwood North. The development is within the foreground zone, with low to moderate visual absorption capacity. Contrasting modifications to form, line, color, and texture from the addition of structures would attract visual attention from the landscape's topographic and vegetative patterns. Development away from SR 88 in this area should not be visually evident from the highway during the day, but residential lighting could show through vegetation. The development would be seen from higher visual access points in the surrounding landscape.

Light and glare would be reduced from the Ski-In/Ski-Out subareas relative to the Draft Plan, reducing visual impacts especially in the adjacent KMA subdivision. However, light and glare impacts would increase in the Kirkwood North area.

5.2.1.9 Socioeconomics

Under Alternative A, development in the Kirkwood area would be guided by the 1988 Master Plan. As with the Draft Plan, the maximum overnight population under Alternative A would be 6,558. However, the projected population at buildout (occurring in 2028 for the 1988 Master Plan) based on person-per-unit factors would be 5,445 persons compared to 6,528 persons under the Draft Plan. The differences occur due to the type of housing and the number of each unit type built. Also, Alternative A includes a lodging/hotel component not included in the Draft Plan. The population associated with the 1988 plan's lodging/hotel accommodations would be 520 persons. As discussed in Chapter 3, the increase in population may occur sooner under Alternative A than under the Draft Plan due to earlier completion of single-family housing planned under the 1988 Master Plan. Reaching buildout sooner would result in a greater socioeconomic impact associated with Alternative A because services would be required to be in place sooner. A summer population increase is not projected under the 1988 plan, unlike in the Draft Plan. However the increase in accommodations may attract more visitors to Kirkwood and ultimately result in a summer population increase as well. The employee population associated with Alternative A would be the same as under the Draft Plan, as SAOT remains the same.

Housing under Alternative A would consist of single-family/duplex, multi-family, and employee housing units as well as lodging/hotel accommodations. Similar to the Draft Plan, single-family/duplex housing would be constructed at a rate of six units per year, consisting of *324* units. The infrastructure for all single-family/duplex housing developments would be in place by 2028. Multi-family and employee housing units would increase to *829* units by 2028. Alternative A is the only alternative that would include lodging/hotel accommodations as a separate housing category. The total number of units associated with the lodging/hotel accommodations would be 260. The total number of units under Alternative A would be 1,413 at the completion of the project (year 2028) as compared to 1,346 in 2020 and 1,503 in 2045 under the Draft Plan.

5.2.1.10 Recreation

In regard to recreation, the major differences between the Draft Plan and Alternative A involve summer use and development north of SR 88. The 1988 Master Plan does not include the development of summer recreational facilities and activities as the Draft Plan does, nor does it call for an increase in summer visitation to 6,558. Therefore, Alternative A would likely result in less summer traffic, less potential for use of surrounding public lands by Kirkwood visitors, and fewer summer recreational opportunities in the Kirkwood Valley. However, the higher density of development in Kirkwood North under Alternative A could increase impacts to Kirkwood Lake and the nearby Kirkwood and Caples Creeks. Maximum winter PAOT of 11,800 and SAOT of 10,800 would be the same for the 1988 Master Plan and the Draft Plan.

5.2.1.11 Public Services

Due to the lower resident population, estimates of school age students (grades K-12) residing in Kirkwood would be slightly less than under the Draft Plan. Impacts to other public services under Alternative A would be similar to those described for the Draft Plan.

5.2.2 Alternative B - Reduced Kirkwood North and Resort-wide Development

5.2.2.1 Geology, Soils, and Geologic Hazards

5.2.2.1.1 Soil Disturbance

Alternative B would result in less soil disturbance than the Draft Plan primarily due to the preservation of Kirkwood North as open space in place of developing it as a single-family residential area. This would reduce the amount of ground disturbance in Kirkwood North by 2.5 acres. Alternative B would allow construction in all other areas slated for development under the Draft Plan, but the total population associated with these units would be reduced by about 20 percent compared to the Draft Plan. Total ground disturbance would equal 22.2 acres less than the Draft Plan. Table 5.5 indicates the unit-mix changes by subarea under Alternative B and the estimated change in disturbance.

5.2.2.2 Water Resources

The 20 percent reduction in projected overnight population would reduce future water demands and waste loads proportionately. However, water supplies have been determined to be ample to meet buildout demand under the Draft Plan, and proposed improvements to the wastewater infrastructure would accommodate the greater maximum population associated with the Draft Plan. Elimination of single-family residential development in Kirkwood North would reduce the potential for impacts to adjacent Kirkwood and Caples Creeks and Kirkwood Lake.

Table 5.5 Alternative B development and ground disturbance reductions.

Subareas with Changes in Unit-Mix Development	Single-family Units	Change in Construction Area Disturbed (acres)	Multi-family Units	Change in Construction Area Disturbed (acres)[1]	Total Change in Construction Area Disturbed (acres)
West Valley (Thimblewood and Edleweiss)			-23	0	0
Village			+27	0	0
Ski-In/Ski-Out South	-51	-7.0			-7.0
Ski-In/Ski-Out North and Timber Creek Village	-32	-4.4	-181	-6.7	-11.1
Kirkwood North	-18	-2.5	-28	-0.5	-3.0
Total Change	108	15.0	205	7.2	-22.2

[1] A zero value indicates an addition of units into space that would exist in proposed multi-family and commercial development structure(s), or as a change in a multi-floor structure.

5.2.2.3 Biological Resources

5.2.2.3.1 Aquatic Resources

As discussed in the Aquatic Resources section of Chapter 4, the greatest potential impact to fisheries and aquatic resources at Kirkwood would result from construction activities. Because this alternative would reduce total construction disturbance by about 22.2 acres compared to the Draft Plan, there would be a proportionate reduction in potential impacts to aquatic resources. The elimination of proposed single-family residential development in Kirkwood North would reduce the potential for increased use of Kirkwood Lake by foot traffic and reduce potential sediment inputs to Kirkwood and Caples Creeks. Other potential impacts identified for the Draft Plan would be similar under Alternative B.

5.2.2.3.2 Wildlife Resources

Impacts to wildlife under this alternative would differ from the Draft Plan in two respects. Impacts to Kirkwood North would be lessened substantially as the single-family residential area is changed to open space. Also, general impacts to wildlife associated with human presence would be lessened, as ultimate overnight population would be reduced by 20 percent. However, this reduction in human population would be unlikely to reduce this impact below the level of significant and unavoidable.

5.2.2.3.3 Wetland Resources

Implementation of Alternative B would result in a slight reduction of impacts to wetlands and waters of the U.S. The Kirkwood North area would benefit the most from this alternative as a large part of this area would be designated as open space. Eliminating construction of single-family residential units in Kirkwood North and some other multi-family units throughout the valley would decrease soil disturbance and its associated impacts. However, because wetland impacts were not anticipated to be a major issue in the Kirkwood North area, decreasing the disturbance in this area, while generally beneficial, would probably not result in any notable change in wetland impacts.

5.2.2.3.4 Vegetation Resources

Implementation of Alternative B would result in a reduction in impacts to vegetation. Impacts in Kirkwood North would be lessened, as a large part of this area would be designated as open space. The single-family and duplex residential units at Kirkwood North would be eliminated, as would some other single-family and multi-family units in Ski-In/Ski-Out North and Timber Creek. It is estimated that these changes would reduce the impact to vegetation in Kirkwood North by approximately 26 percent. Less disturbed area would decrease the loss of native plant communities. It would also decrease the potential for weed invasion. Any potential risk to sensitive species would be similar to the Draft Plan.

5.2.2.4Air Quality

Less population growth at Kirkwood under Alternative B would result in reduced total automotive emissions at buildout. However, if more visitors stay for only the day, vehicle emissions could increase during morning and afternoon peak-activity times. Energy demand would be slightly less with a reduction in the overnight population, potentially resulting in lower emissions from the Mountain Utilities powerplant. This reduction would help reduce impacts to air quality.

5.2.2.5Cultural Resources

Alternative B would not introduce any impacts to cultural resources not already addressed under the Draft Plan. Preservation of more open space at Kirkwood North would reduce the possibility of disturbing the nearby cultural site as well as preserve the setting of the Kirkwood Inn. Alternative B would result in fewer potential indirect impacts associated with increased visitor use, as overnight populations would be less at buildout. The reduction in areal extent of ground disturbance throughout the project area would reduce the chance of construction-related disturbance to buried cultural artifacts. Other potential impacts to cultural resources would be similar to those described for the Draft Plan.

5.2.2.6Land Use

This alternative would change the single-family/duplex residential area in Kirkwood North to open space. It would also reduce the number of multi-family housing units. More of Kirkwood Valley would remain undeveloped. Overnight population would be reduced by 20 percent. The reduced population could result in a minor decrease in use of the Kirkwood Lake and Caples Creek roadless area, compared to the Draft Plan, because of the elimination of housing in Kirkwood North. Reduction of the overnight population would likely reduce the incremental increase in recreational use on surrounding NFS lands during the summer, compared to the Draft Plan. Winter recreational use of surrounding NFS lands is not projected to

change relative to the Draft Plan because SAOT would remain the same.

5.2.2.7 Traffic and Circulation

Alternative B would result in an overall decrease in local traffic due to the 20 percent reduction in buildout population relative to the Draft Plan. Less development at Kirkwood North would alleviate some traffic congestion from vehicles entering and exiting SR 88. However, the SAOT would still be 10,800, so increases in peak-hour traffic on Kirkwood Meadows Drive and at the SR 88/Kirkwood Meadows Drive intersection, and increased traffic volumes on SR 88, could be greater than under the Draft Plan or any of the other alternatives. Alternative B would reduce the projected maximum overnight population more than any of the other alternatives, to 5,196, so the maximum PAOT would be composed of more day skiers than destination skiers (5,196 + 6,604 = 11,800). Thus, parking demand would also increase, as the crucial component of parking availability involves numbers of day visitors, not residents or overnight guests. If day-visitors totalled 56 percent or more of PAOT parking demand would be greater than what is currently available.

5.2.2.8 Visual and Aesthetic Resources

The increased open space zone in Kirkwood North under Alternative B would reduce light and glare impacts from this area. Significant impacts as described for the Draft Plan would remain for the multi-family and commercial zone adjacent to SR 88.

5.2.2.9 Noise

Reduction of the overnight population could reduce traffic numbers and hence vehicle-generated noise in Kirkwood and along SR 88 compared to the Draft Plan during times of regular traffic flow. However, more traffic noise could occur during times of peak activity if the SAOT consists of proportionally more day skiers than destination skiers. More of Kirkwood Valley would remain undeveloped, reducing the number of construction projects causing short-term noise impacts. Overall noise impacts would be slightly less than the Draft Plan, but could be greater during morning and afternoon peak-activity times.

5.2.2.10 Socioeconomics

Alternative B would reduce the ultimate overnight population by approximately 20 percent in comparison to the Draft Plan. Under Alternative B, the resort would ultimately accommodate an overnight population of 5,196 persons. The maximum population in 2020 would be 4,928, compared to 5,669 persons for the Draft Plan. Single-family/duplex housing would be eliminated in Kirkwood North and multi-family residential housing would be reduced resort wide. The lessened impact of reduced single-family housing would not be experienced until later phases of the plan buildout as Kirkwood North is scheduled for the last phase. Decreased multi-family residential development would result in lower associated population levels throughout Kirkwood compared to the Draft Plan. The employee population needed to handle the maximum SAOT would be the same as the Draft Plan. The same maximum summer PAOT as in the Draft Plan would be established, as well as the summertime peak PAOT to accommodate special events.

Housing under Alternative B would be similar to the Draft Plan with fewer single-family/duplex and multi-family housing units. Employee housing would still be included with the multi-family units. The ultimate number of single-family/duplex units would be 324 in 2045 as compared to 425 units in the Draft Plan. The infrastructure for all single-family/duplex housing developments would also be in place by 2020. Multi-family housing units would increase to 878 units by 2020, 200 units lower than the total for the Draft Plan. The total number of units under Alternative B would be 1,160 in 2020 and 1,202 in 2045 as compared to 1,346 in 2020 and 1,503 in 2045 under the Draft Plan.

5.2.2.11 Recreation

While the resident population at buildout would be lower under Alternative B than the Draft Plan, the

maximum SAOT during would be the same. The overall population reduction would reduce the potential for user numbers to increase on surrounding lands, especially during the summer. The potential for increased wintertime use of surrounding lands would not change, but this is not considered a significant impact. Eliminating the single-family residential area in Kirkwood North should reduce the number of Kirkwood visitors and residents hiking over to Kirkwood Lake. This would have a minor effect on total use or number of visitors at the lake. The conversion of this area in Kirkwood North to open space would increase the amount of available recreational area. Other effects to recreation would be the similar to those described for the Draft Plan.

5.2.2.12 Public Services

With the population reduction, there would be slightly fewer school age (grades K-12) students residing in Kirkwood as compared to the Draft Plan. While the demand for other public services under Alternative B would be slightly less, impacts would not be substantially different than those described for the Draft Plan.

5.2.3 ALTERNATIVE C- CLUSTERED KIRKWOOD NORTH RESIDENTIAL DEVELOPMENT

5.2.3.1 Geology, Soils, and Geologic Hazards

5.2.3.1.1 Soil Disturbance

By reclassifying the single-family land use to multi-family at Kirkwood North, and clustering unit development, Alternative C would result in less soil disturbance than the Draft Plan. While the land area classified as multi-family would be the same, the total number of structures built would be less. Approximately 2.0 acres less ground disturbance would occur due to this change from single-family to multi-family unit development. Table 5.6 indicates the unit-mix changes by subarea under Alternative C and the estimated change in disturbance.

Table 5.6 Alternative C development and ground disturbance reductions.

Subareas with Changes in Unit-Mix Development	Single-family Units	Change in Construction Area Disturbed (acres)	Multi-family Units	Change in Construction Area Disturbed (acres)	Total Change in Construction Area Disturbed (acres)
Kirkwood North	-18	-2.5	+28	+0.5	-2.0
Total Change	18	2.5			-2.0

5.2.3.2 Water Resources

The shift to higher density development would result in slightly less construction disturbance and would reduce the potential for associated impacts to Kirkwood and Caples Creeks near the Kirkwood North subarea. Other potential impacts would be similar to those of the Draft Plan.

5.2.3.3 Biological Resources

5.2.3.3.1 Aquatic Resources

Changing to clustered, multi-family development in Kirkwood North would result in fewer structures compared to the Draft Plan. This would decrease construction-related impacts to Kirkwood and Caples Creeks, which would be susceptible to sedimentation from adjacent development activities. This alternative would have somewhat less impact on aquatic resources than the Draft Plan.

5.2.3.4 Traffic and Circulation

Alternative C would result in approximately the same population at Kirkwood North, but it would be clustered and divided into more units. The 18 single-family residences at Kirkwood North under the Draft

Plan would be converted to 28 multi-family units under this alternative. Trip generation is thought to be more a function of the number of units rather than the total population, as fewer people live in a multi-family unit than in a single family unit, and at least one vehicle is generally associated with each unit. Also, fewer individuals are dependant on a single vehicle for errands, etc. If each unit is associated with at least one vehicle, more units means more cars. Therefore, this alternative could generate more traffic activity in Kirkwood North than the Draft Plan. The difference would not be enough to cause a significant change in traffic volumes, but more turning movements between Kirkwood North and SR 88 could occur. In all other aspects, traffic impacts of this alternative would be similar to the Draft Plan.

5.2.3.5 Noise

Altered land use classifications in Kirkwood North under Alternative C would result in fewer structures, reducing construction noise impacts. However, the increase in vehicle trips anticipated in Kirkwood North, associated with greater unit numbers, would generate an increase in traffic noise. Noise impacts may increase slightly but not significantly. Otherwise, noise impacts would be similar to those projected under the Draft Plan.

5.2.3.6 Socioeconomics

Alternative C would eliminate the single-family/duplex residential area at Kirkwood North, changing this area to multi-family residential and increasing the number of units. While the same population would be retained, it would come on line slightly sooner when compared to the Draft Plan. The maximum overnight population allowed under Alternative C would be 6,558 persons, the same as the Draft Plan. However, the maximum projected population in 2020 would be 5,817 compared to 5,669 persons for the Draft Plan. The day user, summer, and employee population levels under Alternative C would be the same as under the Draft Plan.

Housing under Alternative C would differ from the Draft Plan, as the ultimate number of single-family units would be 407 by 2045 compared to 425. Multi-family housing would increase to 1,106 units by 2020, 28 units higher than the Draft Plan due to the conversion to multi-family in Kirkwood North. The total number of units under Alternative C would be 1,388 in 2020 and 1,513 in 2045, compared to 1,346 in 2020 and 1,503 in 2045 under the Draft Plan. Ten more units would be built under Alternative C compared to the Draft Plan. This would allow the potential population in Kirkwood North to remain the same through the change from single-family to multi-family unit development.

5.2.4 Alternative D- Reduced Kirkwood North and Ski-In/Ski-Out North Development

5.2.4.1 Geology, Soils, and Geologic Hazards

5.2.4.1.1 Soil Disturbance

Alternative D would result in an estimated 3.5 acres less soil disturbance than the Draft Plan. The elimination of six single-family residences and 28 multi-family units at Kirkwood North would reduce soil disturbance by about 1.3 acres. The additional 2.2-acre disturbance reduction in Ski-In/Ski-Out North would further reduce the amount of soil loss and other potential impacts from erosion. Table 5.7 indicates the unit-mix changes by subarea under Alternative D and the estimated change in disturbance.

5.2.4.2 Water Resources

A reduction in development at Kirkwood North and Ski-In/Ski-Out North would reduce the potential for erosion and sedimentation. All other impacts to water resources would be similar for Alternative D as for the Draft Plan.

Table 5.7 Alternative D development and ground disturbance reductions.

Subareas with Changes in Unit-Mix Development	Single-family Units	Change in Construction Area Disturbed (acres)	Multi-family Units	Change in Construction Area Disturbed (acres)[1]	Total Change in Construction Area Disturbed (acres)
Village			-17	0	0
Ski-In/Ski-Out North and Timber Creek Village			-39	-2.2	-2.2
Kirkwood North	-6	-0.8	-28	-0.5	-1.3
Total Change	6	0.8	84	2.7	-3.5

[1] A zero value indicates elimination of units in space that would exist in proposed multi-family and commercial development structure(s).

5.2.4.3 Biological Resources

5.2.4.3.1 Aquatic Resources

Reduced Kirkwood North and Ski-In/Ski-Out North development proposed under Alternative D would reduce the potential for erosion and sedimentation impacts and would result in reduced impacts to aquatic habitat in and near these subareas. Other impacts to aquatic resources would be similar to the Draft Plan.

5.2.4.3.2 Wildlife Resources

This alternative would reduce some impacts to wildlife habitat by reducing the amount of construction disturbance in Kirkwood North and Ski-In/Ski-Out North. It would also reduce human disturbance to wildlife due to the lower unit numbers and associated population in these areas at buildout. Other impacts to wildlife resources would be similar to the Draft Plan.

5.2.4.3.3 Wetland Resources

Reduced Kirkwood North and Ski-In/Ski-Out North development proposed in Alternative D would reduce the potential for erosion and sedimentation impacts, thus benefitting wetland habitats. Reduced acreage of wetland disturbance could occur in Ski-In/Ski-Out North. Other impacts to wetland resources would be similar to the Draft Plan.

5.2.4.3.4 Vegetation Resources

A decrease in ground disturbance would result from reducing unit development in Kirkwood North and Ski-In/Ski-Out North. This would eliminate some loss of native plant communities, and decrease the possibility for weed invasion. Other impacts to vegetation resources would be similar to the Draft Plan.

5.2.4.4 Air Quality

The potentially reduced population at buildout would result in slight reductions in air pollution from vehicles during regular traffic periods. However, emissions could be greater during peak times as a greater proportion of the maximum SAOT could be day-skiers compared to the Draft Plan. Overall, potential impacts to air quality would be similar to those described for the Draft Plan.

5.2.4.5 Cultural Resources

Alternative D would not introduce any direct impacts to cultural resources not addressed under the Draft Plan. Alternative D would result in a lessening of potential indirect impacts associated with human traffic

in the area. The reduction in areal extent of ground disturbance would reduce the chances of construction-related disturbance to buried cultural artifacts. Other potential impacts to cultural resources would be similar to those described for the Draft Plan.

5.2.4.6 Traffic and Circulation

Alternative D would result in a slight reduction in local traffic due to the potentially decreased projected overnight population at buildout, but traffic could increase during morning and evening peak-activity times. This could occur as a greater proportion of maximum SAOT could be day-visitors and would also increase parking demand. More parking facilities could become necessary. The reduction of single-family residences at Kirkwood North would reduce traffic in this subarea. Other traffic related impacts would be similar to the Draft Plan.

5.2.4.7 Visual and Aesthetic Resources

A slight reduction in light and glare would result from the reduction in unit numbers at Kirkwood North and along the west-side in Ski-In/Ski-Out North. Other visual and aesthetic impacts would be similar to the Draft Plan.

5.2.4.8 Noise

Noise from traffic would be slightly reduced due to the reduced projected overnight population at buildout. Traffic noise at peak times could be greater than under the Draft Plan as congestion could increase due to a greater number of day skiers entering and exiting Kirkwood daily. Other noise impacts would be similar to the Draft Plan.

5.2.4.9 Socioeconomics

Alternative D would reduce the single-family/duplex residential population and the multi-family residential population, as compared to the Draft Plan. The projected overnight population under Alternative D would be 6,169 persons in 1,413 units. The maximum population in 2020 would be 5,381 compared to 5,669 persons for the Draft Plan. The potential day user, summer, and employee population levels for Alternative D would be the same as in the Draft Plan.

As under the Draft Plan, housing under Alternative D would consist of single-family/duplex, multi-family, and employee housing units. Single-family/duplex housing are projected to be constructed at a rate of six units per year to total 275 units in 2020. The ultimate number of single-family units would be 419 in 2045. The infrastructure for all single-family/duplex housing developments would be in place by 2020. Multi-family housing units would increase to 994 units by 2020, 84 units less than the total for the Draft Plan. The total number of units under Alternative D would be 1,269 in 2020 and 1,413 in 2045 as compared to 1,346 in 2020 and 1,503 in 2045 under the Draft Plan.

5.2.5 Alternative E - Reduced Kirkwood North and Ski-In/Ski-Out North Development and Unit Relocation

5.2.5.1 Geology, Soils, and Geologic Hazards

5.2.5.1.1 Soil Disturbance

Based on maximum unit development, Alternative E would have less potential for disturbance of soils than the Draft Plan. The largest reductions would be in Kirkwood North, where the single-family/duplex residential zone would be changed to open space and the multi-family units reduced by 28, and in Ski-In/Ski-Out North, where the multi-family residential area would be reduced by 59 units. Construction disturbance would be reduced by 3.0 acres in Kirkwood North. Single-family construction in Ski-In/Ski-Out South would be reduced by 0.7 acre. The relocation of multi-family units to the Mountain Village would not change construction impacts to this subarea from those projected under the Draft Plan, as the units would be added to buildings already accounted for in the total disturbance estimates. Overall, total impacts to soils would be reduced by an estimated 7.1 acres under Alternative E. Table 5.8 indicates the unit-mix changes by subarea under Alternative E and the estimated change in disturbance.

Table 5.8 Alternative E development and ground disturbance reductions.

Subareas with Changes in Unit-Mix Development	Single-family Units	Change in Construction Area Disturbed (acres)	Multi-family Units	Change in Construction Area Disturbed (acres)[1]	Total Change in Construction Area Disturbed (acres)
Village			+20	0	0
Ski-In/Ski-Out South	-5	-0.7			-0.7
Ski-In/Ski-Out North and Timber Creek Village			-59	-3.4	-3.4
Kirkwood North	-18	-2.5	-28	-0.5	-3.0
Total Change	23	3.2	66	3.9	-7.1

[1] A zero value indicates an addition of units into space that would exist in proposed multi-family and commercial development structure(s).

5.2.5.2 Water Resources

The elimination of the single-family/duplex development in Kirkwood North and the reduction in development of the Ski-In/Ski-Out subareas would reduce the potential for sedimentation impacts. Some foot traffic to Kirkwood Lake would be reduced due to the change in projected population at Kirkwood North, potentially reducing human-use impacts to this area. Other impacts would be similar to those described for the Draft Plan.

5.2.5.3 Biological Resources

5.2.5.3.1 Aquatic Resources

This alternative would result in less risk to aquatic resources than the Draft Plan due to reduced surface disturbance in the Kirkwood North and Ski-In/Ski-Out subareas. The conversion of single-family residential area to open space would reduce the potential for increased use of Kirkwood Lake by Kirkwood North residents traveling to the lake by foot. Other potential impacts under Alternative E would be similar to the Draft Plan.

5.2.5.3.2 Wildlife Resources

Under Alternative E, impacts to wildlife in Kirkwood North would be reduced as the single-family residential area would change to open space. Less wildlife habitat would be impacted in the Ski-In/Ski-Out areas as well. In general, this alternative would likely impact wildlife less than any of the alternatives. However, population-induced impacts to wildlife would remain significant and unavoidable under this alternative, as under the Draft Plan.

5.2.5.3.3 Wetland Resources
There could be a slight reduction in wetland impacts corresponding to the overall decrease in disturbance in the Kirkwood North and Ski-In/Ski-Out subareas compared to the Draft Plan. Kirkwood North would benefit from this alternative as a large part of this area would be designated as open space. Development in the Ski-In/Ski-Out areas would also be reduced, potentially reducing the amount of wetland acreage disturbed. Other impacts to wetlands would be similar to the Draft Plan.

5.2.5.3.4 Vegetation Resources
This alternative would reduce impacts to vegetation by leaving more existing native vegetation within Kirkwood undeveloped. This, combined with less disturbance in the Kirkwood North and Ski-In/Ski-Out subareas would decrease plant community fragmentation and the opportunity for weed invasion. Other potential impacts to vegetation would be similar to the Draft Plan.

5.2.5.4Air Quality
The reduced unit numbers and associated population at buildout could result in slight reductions in air pollution from local vehicle use. However, some of this reduction would be offset by an increase in traffic during peak morning and afternoon times, as day skiers enter and exit Kirkwood. The reduction in potential overnight population would increase the number of visitors who are not staying overnight relative to the PAOT total. Potential impacts to air quality would be similar to those described for the Draft Plan.

5.2.5.5Cultural Resources
Alternative E would not introduce any direct impacts not already addressed under the Draft Plan. Alternative E would lessen the potential for indirect impacts associated with human traffic, especially in Kirkwood North. The reduction in areal extent of ground disturbance would reduce the chances of construction-related disturbance to buried cultural artifacts. The reduction in residential development north of SR 88 would benefit the setting of the Kirkwood Inn. Other impacts to cultural resources would be similar to the Draft Plan.

5.2.5.6Land Use
Alternative E includes conversion of the single-family/duplex residential zone in Kirkwood North to open space. Projected overnight population would be reduced. These differences could result in a minor decrease in use of Kirkwood Lake and the Caples Creek roadless area compared to the Draft Plan. Other land use-related impacts would be similar to the Draft Plan.

5.2.5.7Traffic and Circulation
Alternative E could result in a slight reduction in local traffic due to the potentially decreased residential development and associated overnight population at buildout, particularly at Kirkwood North. The concentration of density at the Village area would create a more pedestrian-friendly community and reduce the reliance on vehicles. The decrease in destination visitors would change the visitor composition, with a greater proportion of maximum SAOT consisting of day-visitors. This would increase the peak traffic during morning and evening, and increase parking demand. Other traffic related impacts would be similar to the Draft Plan.

5.2.5.8 Visual and Aesthetic Resources

Impacts to visual and aesthetic resources would be reduced under this alternative, especially in Kirkwood North and the Ski-In/Ski-Out subareas, due to open space retention and unit reductions. Some units proposed for the higher elevations in Ski-In/Ski-Out South would be eliminated, further reducing visual impacts, including lighting, relative to the Draft Plan.

5.2.5.9 Noise

The conversion of the single-family/duplex residential zone in Kirkwood North to open space would reduce ambient noise in Kirkwood North. Noise impacts from traffic throughout Kirkwood would be reduced due to the decrease in resident population. The concentration of density at the Village area would create a more pedestrian-friendly community and reduce the reliance on vehicles. Other noise-related impacts would be similar to the Draft Plan.

5.2.5.10 Socioeconomics

By eliminating the single-family/duplex residential subarea in Kirkwood North and reducing the number of single- and multi-family residential units in the Ski-In/Ski-Out subareas, the projected overnight population at Kirkwood would be reduced relative to the Draft Plan. The maximum population in 2045 would be 6,142 compared to 6,528 persons under the Draft Plan. The potential day user, summer, and employee population levels under Alternative E would be the same as under the Draft Plan.

Housing under Alternative E would consist of single-family/duplex, multi-family, and employee housing units. Similar to the Draft Plan, single-family/duplex housing would be constructed at a rate of six units per year and total 275 units in 2020. However, the ultimate number of single-family/duplex units would be 402 in 2045. The infrastructure for all single-family/duplex housing developments would be in place by 2020. Multi-family housing units would increase to 1,011 units by 2020, 67 units lower than the total for the Draft Plan. The total number of units under Alternative E would be 1,286 in 2020 and 1,413 in 2045 compared to 1,346 in 2020 and 1,503 in 2045 under the Draft Plan.

5.2.5.11 Recreation

Changing single-family/duplex residential development to open space in Kirkwood North would reduce the population in this subarea and reduce the number of residents that could readily hike to Kirkwood Lake. This would likely have a minor effect on the number of visitors at the lake. The conversion of some residential areas in Kirkwood North to open space would increase the available amount of dispersed recreation area. Other effects to recreation would be similar to those described for the Draft Plan.

5.3 Impacts Associated with the MMDP Alternatives

5.3.1 MMDP Alternative A – No Project

All construction-related impacts described in Chapter 4 that are associated with proposed on-mountain projects would be eliminated with implementation of the MMDP No-Project Alternative. On-mountain soil disturbance and its related effects, such as erosion and sedimentation, would not change from existing conditions, and wildlife and vegetation impacts would not increase. Noise impacts from increased snowmaking activities would not occur. Although on-mountain facilities would not increase or be improved, impacts associated with an increase in skier numbers could still occur if the Kirkwood population increases with base area development. Management of on-mountain facilities would continue under current direction of the *USDA Forest Service Environmental Impact Statement: Kirkwood Winter Sports Development, Eldorado National Forest* (Forest Service 1973) and the *Eldorado National Forest Land and Resource Management Plan* (Forest Service 1988). Unless described below, conditions under the No-Project Alternative would not change from current conditions.

5.3.1.1 Visual Resources

Under the No-Project Alternative, Kirkwood would continue to operate the majority of its on-mountain facilities under either modification or partial retention for compliance with Management Area 11 visual quality objectives (VQOs). However, violation of Forest Service VQOs established for the portion of Management Area 4 that bisects the SUP's southwest section (i.e., Emigrant Valley) would continue with selection of the No-Project Alternative, although no new development would occur in this area.

5.3.1.2 Socioeconomics

Selection of the No-Project Alternative for the MMDP component of the Proposed Project would result in maintenance of the existing conditions on the ski mountain. The ski area would continue to operate at the comfortable carrying capacity (CCC) of 6,200 guests, resulting in a continuation of the current challenges faced by the resort with respect to skier satisfaction. However, with an increase in the maximum overnight capacity of the community, as proposed in the Draft Plan, existing on-mountain problems would be exacerbated. This imbalance between base-area and on-mountain capacity may deter visitors, as the on-mountain facilities reach comfortable capacity more frequently. The requirement for employee housing would be slightly less under the No-Project Alternative for the MMDP. Numbers of employees needed for on-mountain operations would be similar to current conditions but could increase slightly as the number of residents increases.

5.3.1.3 Recreation Resources

No change in recreation offerings on National Forest System (NFS) lands managed under the SUP at Kirkwood would occur with selection of the No-Project Alternative for the MMDP. Winter operations would continue in the present configuration, with resort capacities limited by the lift network capacity–hovering around 6,200 skiers. A slight imbalance between uphill and downhill capacities would persist, causing periodic long waits at key lifts. Without on-mountain expansion and lift upgrades, visitation during peak periods such as the Christmas holiday and Presidents weekend may not increase.

Population projections for regional metropolitan areas indicate that steady growth is likely to continue for the next decade. Based upon past and future population trends for the local market area, it can be assumed that this nearby, growing population will play an increasingly important role in generating day and destination skiers for Kirkwood.

With or without implementation of the Draft Plan, it is expected that Kirkwood will experience increased demands for on-mountain services over the next 10 to 20 years. Selection of the No-Project Alternative for the MMDP, in combination with selection of the Draft Plan or Alternatives B through E, could increase stress on existing recreational facilities/capacities (e.g., lift availability, downhill capacities, and terrain), and create an imbalance between base area and on-mountain facilities, which would result in a significant impact to recreation.

5.3.1.4 Public Services

On-mountain medical services would be unchanged from current conditions, reflecting the unchanged CCC. The public school requirement would not change from what is proposed under the Draft Plan and the alternatives because this requirement would be tied to the resident population rather than skier visitation numbers. The requirement for day care would remain close to current levels due to the unchanged CCC, but could increase slightly if the population increases. Due to the required infrastructure for the Draft Plan, the need for fire and police/sheriff protection would remain the same regardless of which on-mountain component is chosen, as would other public services discussed above under the Draft Plan and alternatives.

5.3.1.5 Utilities and Infrastructure

Under the No-Project Alternative for the MMDP, projected energy requirements would be reduced relative to that required for the MMDP due to the exclusion of five new lifts, increased snowmaking activities, and the Caples Crest Restaurant. Water supply requirements under the No-Project Alternative for the MMDP would not be substantially different. However, water demand could be less due to the decrease in water needed for snowmaking and the possible reduction in guests. Projected demand on wastewater treatment would also be less during peak periods, but would not result in a reduction in planned treatment capacity for the WWTP. The necessary capacity was determined based on maximum PAOT, which does not change relative to on-mountain improvements. Solid waste production would also be less as fewer visitors are attracted to the resort, resulting in a reduction in the number of loads to be hauled.

5.3.2 MMDP Alternative B – No Emigrant Valley Development

Unless described below, impacts of the MMDP Alternative B would be the same as described in Chapter 4 for the proposed MMDP. This alternative, which is intended to eliminate visual, cultural, and recreational impacts to the Emigrant Trail, would also result in reduced impacts to soils, aquatics, wildlife, and vegetation.

5.3.2.1 Geology, Soils, and Geologic Hazards

5.3.2.1.1 Soil Disturbance

Improvements to on-mountain facilities and infrastructure included under the MMDP would also occur under Alternative B except for proposed development in Emigrant Valley. Exclusion of two new lifts, a multi-use trail, snowfencing, ski patrol stations, and related infrastructure would reduce total disturbance to soils.

5.3.2.1.2 Avalanche/Rockfall

Potential safety impacts associated with avalanches would be the same as under current operation, and slightly less than under the proposed MMDP. The exclusion of two new lifts in Emigrant Valley, which would have increased access to some high-avalanche-hazard ski terrain, would reduce safety concerns.

5.3.2.2 Water Resources

The potential for sedimentation impacts would be slightly reduced as no new development would occur in the Emigrant Valley watershed.

5.3.2.3 Biological Resources

5.3.2.3.1 Aquatic Resources

This alternative would result in less risk to aquatic resources than would full implementation of the MMDP due to reduced surface disturbance and related runoff and sedimentation impacts in the Emigrant Valley watershed.

5.3.2.3.2 Wildlife Resources

This alternative would reduce direct impacts to wildlife and wildlife habitat, as well as population-induced indirect impacts to wildlife that would otherwise occur in the Emigrant Valley under full implementation of the MMDP.

5.3.2.3.3 Vegetation Resources

This alternative would reduce impacts to vegetation by eliminating disturbance in Emigrant Valley. Existing native vegetation would remain undisturbed and intact in this area. Plant community fragmentation and the opportunity for weed invasion would also be reduced. Potential impacts to the population of Whitney's locoweed (*Astragalus whitneyi* var. *lenophyllus*), an Eldorado National Forest watch list species, would be eliminated. This species was found near the proposed Covered Wagon lift and ski patrol hut.

5.3.2.4 Air Quality

Air pollution would be slightly reduced due to the exclusion of two new lifts and the resultant decrease in demand for electricity. Temporary, construction generated dust would also be reduced.

5.3.2.5 Cultural Resources

Alternative B of the MMDP would reduce indirect impacts associated with human traffic in the Emigrant Valley area. Potential visual impacts to the viewshed of the historic Emigrant Trail would be reduced, as no additional development in Emigrant Valley would occur. The reduction in areal extent of ground disturbance would also reduce the chances of construction-related disturbance to buried cultural artifacts.

5.3.2.6 Visual and Aesthetic Resources

MMDP Alternative B was designed specifically for maintenance of the Emigrant Valley's visual integrity, particularly the viewshed of the Emigrant Trail. None of the Emigrant Valley elements of the MMDP would be authorized, so no new visual impacts would be generated.

Because Emigrant Valley is not visible from Kirkwood, MMDP Alternative B would not represent any tangible changes to viewers in Kirkwood, and on-mountain visual impacts would be identical to those described for implementation of the MMDP.

5.3.2.7 Noise

Emigrant Valley noise impacts would be less under MMDP Alternative B than the proposed MMDP because lifts would be excluded in the area and skier activity would be reduced. Noise impacts would remain the same as current conditions.

5.3.2.8 Recreation Resources

The effects of MMDP Alternative B on recreation at Kirkwood are similar to those of the proposed MMDP. With the exclusion of both the Thimble Peak and Covered Wagon lifts, some terrain considered highly desirable for lift service would remain accessible only by hiking. However, the existing Sunrise lift would remain, providing lift access to some terrain in Emigrant Valley. This terrain would be utilized at current levels for in-bounds and off-piste skiing opportunities. Skiers who prefer to hike into this area would benefit. On-mountain skier capacities would be slightly less than those under the MMDP.

5.3.2.9 Utilities and Infrastructure

Exclusion of the Thimble Peak and Covered Wagon lifts would slightly reduce the overall electrical energy requirement.

5.4 Impacts Associated with the WWTP Alternative

5.4.1 No Project - Interim Improvements Only

The interim WWTP improvements would expand the treatment capacity of the existing plant to 120,000 gpd. These improvements would constitute an approximate one-third increase in current capacity and would limit buildout development to approximately 30 percent of the Proposed Project. The proposed WWTP upgrade would be necessary to accommodate the population projected under the Draft Plan and alternatives addressed in this analysis. A second phase of interim improvements, involving repairs to two existing storage tanks, would increase treatment capacity to 140,000 gpd for emergency purposes. Eventually, 190,000 gpd capacity would be needed to meet larger resident populations and guest capacities associated with on- and off-mountain facilities expansion.

The interim improvements would require the same building expansion and design as the proposed WWTP upgrade. Soil disturbance and potential for sedimentation, and impacts to vegetation, wildlife, and visuals would be the same as under full implementation of the WWTP upgrade.

Implementing interim improvements to the WWTP would have no direct effect on recreation resources at Kirkwood. However, without full buildout of the proposed WWTP upgrade, recreationist numbers may be limited by the capacity of the existing treatment system.

Selection of the No-Project Alternative for the WWTP would still increase the energy demand on KMPUD-generated power, but the demand would be less than under the proposed WWTP upgrade. Implementation of the Draft Plan in combination with selection of the No-Project Alternative for the WWTP would result in a significant wastewater treatment impact. The capacity of the WWTP would not sustain the future flows generated by full development of the Draft Plan.

5.5 Environmentally Superior Alternative

As the CEQA Lead Agency, Alpine County must identify an environmentally superior alternative to the Proposed Project. CEQA Guidelines (Section 15126) further specify that if the No-Project Alternative is

also the environmentally superior alternative, then another environmentally superior alternative must be identified. In this analysis, the least construction-related impacts and resultant lowest amount of population growth would occur under Alternative B of the Draft Plan. The reduction of impacts in Kirkwood North, Ski-In/Ski-Out North, Timber Creek, Ski-In/Ski-Out South and West Meadows associated with reduced development primarily proves this alternative to be the environmentally superior alternative. The exchange of single-family/duplex residential development in Kirkwood North for open space would eliminate many direct and indirect impacts in this area. The open space zone would also mitigate some of the indirect population-related impacts to the surrounding lands. However, the EIR does identify a drawback of reducing the residential population to the extent proposed under Alternative B from what is proposed in the Draft Plan and other alternatives. If the 11,800 PAOT was to be reached, a larger proportion of it would be comprised of day visitors. Impacts related to increases in traffic would be greater under Alternative B, as it results in the lowest potential overnight population. Although the reduction in population under Alternative B would not eliminate the population-related impacts identified in this EIR, it would help to greatly reduce impacts to resources such as soils, water, vegetation, wildlife, and visual qualities. The smaller resident population would result in some local reductions in air quality, traffic, and noise, but impacts related to these resources may be greater during peak times when a high percentage of the PAOT are entering and exiting Kirkwood.

MMDP Alternative B, no additional Emigrant Valley development, is the environmentally superior alternative in terms of the on-mountain component of the Proposed Project. It would eliminate issues concerning the Emigrant Valley trail, such as visual and aesthetic, cultural, and recreational impacts. It would also reduce overall impacts related to soils, vegetation, and wildlife. This area would remain less developed and accessed, which would address concerns of some skiers regarding loss of remote terrain, more frequent user interactions, and availability of hike-to terrain. However, this alternative would allow the other on-mountain improvements proposed in the MMDP, thus eliminating the possibility for a great imbalance between the base area capacity and on-mountain facilities.

The proposed WWTP upgrade was designed to incorporate the best apparent alternative for wastewater management at Kirkwood. The environmentally superior alternative is to implement the WWTP upgrade, which would develop system capacity to meet predicted future treatment demands generated by future growth at Kirkwood.

CHAPTER 6: CEQA STATUTORY SECTIONS

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

This chapter discusses short-term uses versus long-term productivity, and outlines growth inducing impacts of the Proposed Project as required by the California Environmental Quality Act (CEQA).

6.1 COMMITMENT OF RESOURCES

The irreversible impacts of a Proposed Project must be considered in an EIR pursuant to CEQA Guidelines. Irreversible effects may include the commitment of natural resources to the construction or operation of a project or damage caused by an environmental accident.

During construction, fuel, steel, lumber, and other natural resources would be consumed or irreversibly committed to achieve project objectives. Once in place, materials committed to the development of Kirkwood are unlikely to be removed and recycled or reused for any other purpose. The resources required for construction are not considered to be limited, so their commitment to the Proposed Project or its alternatives would not constitute a significant impact. The long-term operation of the resort would result in the commitment of diesel fuel to operate the generators to provide electricity to the community. Other natural resources would also be committed, including potable water and land area.

Trees, vegetation, and other natural resources would be removed during the construction process. This would constitute an irreversible loss of a small percentage of Kirkwood's vegetation resource, although a portion of the area slated for disturbance would be revegetated. Commercial timber production does not occur in any of the areas affected by the action alternatives, although timber cut for subdivision development is commercially sold by KMR through a timber harvest plan (Eichar 1999b).

6.2 SHORT-TERM USES VERSUS LONG-TERM PRODUCTIVITY

CEQA requires that EIRs consider the relationship between short-term uses of the environment and the environment's long-term productivity. A project completed for the benefit of short-term uses may achieve its goals at the cost of limiting the future range of beneficial uses of the environment.

The development of Kirkwood will impact a number of the natural resources in the area, including soils, water, wildlife, wetlands, vegetation, and air quality. Most of the impacts associated with these resources have been determined to be less than significant, particularly with the implementation of appropriate mitigation measures. However, taken collectively, the impacts associated with the development of Kirkwood will affect the ecological function of the Kirkwood area. Such impacts include soil compaction, loss of groundwater recharge through conversion to impermeable surfaces, trampling of vegetation from

increased human visitation, and disturbance of wildlife from increased human presence. The short-term use of the environment represented by the development of Kirkwood will, to a limited extent, preclude some of the long-term ecological functions of the local ecosystem.

It is worth noting that the scale of the impacts discussed in this section are restricted to the Kirkwood area. Ecosystem function is likely to continue unimpeded outside the immediate vicinity of the resort and the Kirkwood basin that supports the associated ski facilities.

6.3 GROWTH-INDUCING IMPACTS

CEQA requires the evaluation of the growth-inducing effects of a project. A project is considered growth-inducing if it fosters economic or population growth or if it removes obstacles to such growth. Any project which induces substantial growth or concentration of population will normally be considered to have a significant effect on the environment (Guidelines Section 15126[g]).

Because the Proposed Project and its alternatives seek to develop a four-season, destination resort, the objective of the proposal is in fact to foster population and economic expansion, albeit in a controlled and planned manner. Therefore, it is appropriate to restrict this discussion to impacts that would induce growth in addition to that intended by the project.

Direct and indirect impacts specifically related to the growth facilitated by this project are explained in the Socioeconomic sections of Chapters 4 and 5. Because all alternatives, including the Proposed Project, call for a similar level of development and population at buildout, growth inducing impacts would be similar under all alternatives.

The Draft Plan is designed to provide adequate housing for visitors, residents, and employees, as well as the community infrastructure necessary to accommodate the maximum PAOT permitted for the resort. Numerous thresholds for expanding community services have been identified in the Draft Plan and in this EIR. Land use restrictions associated with the adjacent NFS lands will not permit residential or commercial construction, and any utility right-of-ways would require special use permitting by the Forest Service, after NEPA review. Furthermore, the thresholds identified for installing additional community services appear to be adequate to accommodate the projected growth.

All action alternatives would increase revenues derived from Kirkwood's operations, and could contribute to expenditures elsewhere in the three counties. Additional revenues derived from Kirkwood's expansion and operation include contributions to the counties' tax rolls. The economic growth would occur year round, thereby contributing some stability to Kirkwood's economy, which has historically been highly seasonal and closely tied to annual snowfall. The expansion of Kirkwood's operations is expected to increase job opportunities in the region. All of these jobs would likely be restricted to Kirkwood resort operations, and are well within the levels analyzed in this EIR.

The Draft Plan proposes to develop the Kirkwood area into a four-season, destination resort. Therefore, growth in the Kirkwood area is projected to increase substantially as described in the Socioeconomics sections of Chapters 4 and 5. As a result of the proposed development, growth inducement would occur to outlying communities due to employees living outside the area, students (grades 7-12) attending school outside the area, and additional annual skier visits.

The total employee population and projected employee housing for the Kirkwood area would increase as a result of the implementation of the Draft Plan (Table 6.1). Employees not living in the Kirkwood area

would live in communities that would require commuting twice each day for work. These employees would have an induced effect on the surrounding communities with respect to their requiring goods and services from their respective communities. These employees would induce growth in surrounding communities such as Woodfords, Markleeville, Minden/Gardnerville, Meyers, South Lake Tahoe, and Carson City. Depending on the size of the outlying communities, impacts from these employees and their families could be large or small. Employees living in small surrounding communities would result in a much larger impact than employees living in larger communities.

School attendance requirements and associated impacts were described in the Socioeconomics section of Chapters 4 and 5. Impacts to surrounding communities due to increased school children would be limited to school children in grades 7-12.

Another potential impact of induced growth would include changes in visitor numbers and use patterns. Current visitors to Kirkwood are predominantly from a day-skier orientation. With the completion of the Proposed Project, visitors would be predominantly destination-skier oriented. Day-skiers tend to base their visit around high-quality snow conditions, whereas destination-skiers are more likely to stay in the area over a longer period of time. Therefore, peaks in skier visits are more likely to occur with day-skiers than with destination skiers.

The Proposed Project would not change the SAOT limit of the ski area, therefore, peak ski days would not be projected to increase. An increase in destination skiers would result in a higher annual visitation because off-peak and mid-week visitation would increase.

An increase in annual skier visitation would likely be associated with an increase in visits to South Lake Tahoe and other surrounding areas. However, much of the increased visitation would be due to destination skiers that would be staying in the Kirkwood area. Housing and accommodation impacts for Kirkwood area visitors was described in the Socioeconomics sections of Chapters 4 and 5. Also, the increased bed base at Kirkwood may attract skiers to stay at Kirkwood, who currently stay in areas such as South Lake Tahoe and visit the area for day-skiing.

Growth induced impacts would also include an increase in visitors in surrounding areas such as Forest Service campgrounds and trails, and the adjacent wilderness area.

CHAPTER 7: REFERENCES

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

ABC (Administrative Budget Counseling). 1997. Kirkwood Meadow Public Utility District: Fire Service Master Plan. Prepared for Fire Chief Peter Tobacco and the Kirkwood Meadow Volunteer Fire District by Richard Milbrodt. Sacramento, CA. August.

ALG (Ashworth Leininger Group). 1999. Air Quality Modeling Technical Attachment for the Kirkwood Expansion Project.

ALG. 2000. Memorandum to Ed Morrow, Kirkwood Mountain Resort, regarding modeling of KMPUD generator, May 16.

ALG. 2001. Memorandum to Ed Morrow, Kirkwood Mountain Resort, regarding modeling of KMPUD generators. May 8.

Alpine County. 1982. Alpine County General Plan, Report Prepared for Central Sierra Planning Council, 285 pp.

Alpine County. 1999. Alpine County General Plan, updated.

Amador County. 1973. Amador County General Plan: Land Use, Open Space, Conservation, Scenic Highways Elements, Amador County, 63 pp.

Aquatic Ecosystems Management. 1990. Kirkwood Creek - Caples Creek Water Quality, Periphyton, and Aquatic Macrophyte Study: Effect on Nitrogen and Phosphorus on Periphyton Growth. Prepared by Aquatic Ecosystems Management for Kirkwood Meadow Public Utility District. Davis, CA.

ARB 2000a. Risk reduction plan to reduce particulate matter emissions from diesel-fueled engines and vehicles, Air Resources Board, Stationary Source Division, Emissions Assessment Branch.

ARB 2000b. Risk management guidance for the permitting of new stationary diesel-fueled engines, Air Resources Board, Stationary Source Division, Emissions Assessment Branch.

Artz, N. and D. McIvor. 1999. Memorandum outlining alternatives for the Kirkwood EIR, sent to resource specialists. February 5.

Assereto, P. 1999. Aces Trash Service. Personal communication with Don McIvor, KW Brown & Associates, Inc. Logan, Utah. August 19.

Bass, R. E., A. I. Herson, and K. M. Bogdan. 1996. CEQA Deskbook. Solano Press Books, Point Arena, CA.. 368 pp.

Bass, R. E., A. I. Herson, and K. M. Bogdan. 1998. CEQA Deskbook: 1998 Supplement to the 1996 Edition. Solano Press Books, Point Arena, CA.

Bedrossian, T.L. 1979. Geologic Reconnaissance of the Silver Lake 15-Minute Quadrangle, Unpublished Field Study for State Map Project, Scale 1:62,500.

Bennyhoff, J. A., V. Bente, M. Hilderman-Smith, and T. Jones. 1982. Emigrant Summit Trail: Archaeological Investigation and Historic Research of the Trail from Caples Lake to Maiden's Grave. Report prepared for U.S. Forest Service, Eldorado National Forest.

Birkeland, P. W. 1984. Soils and Geomorphology, Oxford University Press, New York, 372 pp.

Boyd, A. 1999. Eldorado National Forest Geologist, Personal Communication with T. Butcher, January 28, 1999.

Brady, J. P. 1973. Archaeological Reconnaissance Report of Selected Land - 4,000 Acres, Kirkwood Winter Sports Development, Eldorado National Forest.

Buskirk, S. W., and L. F. Ruggiero. 1994. American marten. Pages 7-37 in Ruggiero, L. F., K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, technical editors, The Scientific Basis for Conserving Forest Carnivores: American marten, Fisher, Lynx, and Wolverine in the Western United States. USDA Forest Service General Technical Report RM-254. Fort Collins, CO.

Cadwalader & Watters. 1997. Master declaration of covenants, conditions and restrictions and reservation of easements for Kirkwood Resort Master Owners Association. Recorded December 1.

California Department of Parks and Recreation. 1979. California Historical Landmarks. Sacramento, CA.

Caltrans (California Department of Transportation). 2000. Traffic volumes from website (www.dot.ca.gov), last updated 5/18/01.

Caltrans. 1989. Transportation Project-Level Carbon Monoxide Protocol, prepared by University of California at Davis, Institute of Transportation Studies, for California Department of Transportation, Sacramento, CA.

Caltrans. 1997. Traffic Volume Reports.

CCIC (Central California Information Center). 1995. Records results transmitted to John Dougherty, ASI for CCIC File #2528K. Letter dated September 18, 1995.

CDFG (California Department of Fish and Game). 1998. California Department of Fish and Game Natural Diversity Data Base. Report prepared for KW Brown and Associates, October 28.

CDFG. 1999. Personal communication between a representative of the California Department of Fish and Game and Matt Petersen, Aquatic Ecologist, KW Brown and Associates, Inc., Logan, UT.

CDFG. 2001a. Special animals. Wildlife and Habitat Data Analysis Branch. California Natural Diversity Data Base. July.

CDFG. 2001b. California's plants and animals: species of special concern. CDFG website, Habitat Conservation Planning Branch: www.dfg.ca.gov/hcpb/species/ssc/. November.

CDFG. 2001c. State and federally listed endangered and threatened animals of California. Habitat Conservation Division. Wildlife and Habitat Data Analysis Branch. California Natural Diversity Data Base. October.

CVRWQCB (Central Valley Regional Water Quality Control Board). 1994a. Central Valley Region Water Quality Control Plan for the Sacramento River and San Joaquin River Basins.

CVRWQCB. 1994b. Waste Discharge Requirements for Kirkwood Meadow Public Utility District. Kirkwood Meadow Wastewater Treatment Facility, Alpine and Amador Counties, CA.

CEQA. 1970. California Environmental Quality Act, as amended. Available at http://ceres.ca.gov/ceqa/.

CEQA. 1998. California Environmental Quality Act Guidelines, as approved January 1, 1999. Available at http://ceres.ca.gov/ceqa/.

CEQA: California Environmental Quality Act Statutes and Guidelines.1996. Governor's Office of Planning and Research (OPR). Sacramento, CA.

Clark, W. B. 1977. Mines and Mineral Resources of Alpine County, California, County Report 8, California Division of Mines and Geology, 48 pp.

Clark, E. H., J. A Haverkamp, and W. Chapman. 1985. Eroding Soils: The Off-Farm Impacts. The Conservation Foundation, R.R. Donnelley and Sons Company, Harrisonburg, VA, 252 pp.

CNPS. 1998. California Native Plant Society Rare and Endangered Plant List. http://www.calpoly.edu/~dchippin/listings.html.

Converse Consultants Southwest, Inc. 1996. Phase I Environmental Site Assessment for the Red Cliffs and Timber Creek Lodges, Kirkwood Inn, and East Meadows Phase III, Kirkwood Ski Resort, Kirkwood, California.

Culp/Wesner/Culp. 1984. Final Report, Kirkwood Basin Geohydrology Study for El Dorado Irrigation District, 259 pp.

Cylinder, P. D., K. M. Bogdan, E. D. Davis, and A. I. Herson. 1995. Wetland Regulations. Solano Press Books. Point Arena, CA.

Derck, G. 2000. CEO, Kirkwood Mountain Resort. Letter to Brian Peters, Alpine County Planning Director. March 10.

D'Azevedo, W. L. 1986. Washo. Pages 466-498 in Great Basin, W.L. D'Azevedo, editor. Handbook of American Indians, vol. 11, W.C. Sturtevant, General Editor. Smithsonian Institution, Washington, D.C.

dePolo, C. M, J. G. Anderson, D. M dePolo, and J. G. Price. 1997. Earthquake Occurrence in the Reno-Carson City Urban Corridor, Seismological Research Letters, Vol. 68, No. 3, May/June.

Design Workshop. 1998. Ski In/Ski Out Master Plan. Kirkwood Ski Resort, Kirkwood, California.

Dittes, J. 2001. Botanical Resource Survey Report for the Kirkwood Mountain Resort, Base Area Development (Private Lands) Alpine and Amador Counties, CA. Amendment to Initial Botanical Surveys conducted for the Kirkwood Specific Plan. September 13.

DMG. (California Division of Mines and Geology). 1997. Guidelines for Evaluating and Mitigating Seismic Hazards in California, California Division of Mines and Geology Special Publication 117.

Dougherty, J. 1995. Kirkwood Subdivisions Cultural Resource Survey, Amador, Alpine and El Dorado Counties, CA. Report prepared by ASI for Simpson Environmental, Inc., Stockton, CA. Revised 1996.

Dougherty, J., and R. Werner. 1994. Kirkwood Ski Area Snowmaking Project Cultural Resource Survey, Alpine, Amador, and El Dorado Counties, CA. Prepared by ASI for Kirkwood Associates, Inc. Report on file ASI, Stockton.

EBCE (Ensign & Buckley Consulting Engineers). 1996. Kirkwood Creek Floodplain Study. Prepared for Kirkwood Associates, Inc. Ensign & Buckley Consulting Engineers, North Highlands, CA. February.

ECO:LOGIC. 1996. Reconnaissance Evaluation of Two Wastewater Treatment and Disposal Alternatives. Roseville, CA.

ECO:LOGIC 2001a. Technical memorandum re: water supply. May 18.

ECO:LOGIC 2001b. Technical memorandum re: wastewater sludge disposal. May 22.

ECO:LOGIC 2001c. Wastewater facilities plan update. June 6.

ECO:LOGIC 2000. Negative Declaration KMPUD WWTP Upgrade and related letters.

Eichar, P. 1998a. Memorandum regarding surface disturbance transmitted to N. Artz, KW Brown and Associates, Inc. Logan, UT. November 18.

Eichar, P. 1998b. Planner, Kirkwood Mountain Resort, Kirkwood, CA. Facsimile to Marian Wolfe, Vernazza Wolfe Associates, Inc., Oakland, CA providing SAOT/PAOT and occupancy comparisons for 1998 and buildout. December 9.

Eichar, P. 1999a. Planner, Kirkwood Mountain Resort, Kirkwood, California. Fax transmission to Neal Artz, KW Brown & Associates, Logan, Utah. July 9.

Eichar, P. 1999b. Planner, Kirkwood Mountain Resort, Kirkwood, California. Comments on the Screen Check EIR submitted to KW Brown & Associates, Logan, Utah. April.

Eichar, P. 1999c. Kirkwood Associates, Personal Communication with T. Butcher, February 4, 1999.

Eichar, P. 1999d. Planner, Kirkwood Mountain Resort, Kirkwood, California. Personal communication with Scott Evans, KW Brown & Associates, Logan, Utah. January 29.

EIP Associates. 1989. Draft Program Environmental Impact Report Westside Specific Plan. 357 pp.

El Dorado County. 1995. General Plan.

EPA (Environmental Protection Agency). 1993. Interagency workgroup on air quality modeling (IWAQM) Phase I Report: Interim recommendation for modeling long range transport and impact on regional visibility. EPA - 454/R-93-015, April, 1993, US EPA Technical Support Division (MD-14) NC.

EPA. 1995. User's guide for the Industrial Source Complex (ISC3) Dispersion Models, Volumes 1 and 2, EPA Publication Nos. EPA-454/B-95-003a &b, U.S. EPA. RTP, NC.

EPA. 1999. Information from website www.epa.gov.

EPA. 2000. Storm Water Phase II Final Rule: An Overview. Fact Sheet 1.0.

EPA. 2001. Information from website www.epa.gov.

Federal Register. 1980. 40 CFR Part 230: Section 404 (b)(1) guidelines for specification of disposal sites for dredge or fill material. Vol. 45, No. 249, pages. 85352-3. Washington, D.C.: U.S. Government Printing Office (GPO).

Fehr & Peers Associates, Inc. 1998. Amador County Regional Transportation Plan, 1996/1997 Update, Final Report, June.

Fenneman, N. M.. 1931. Physiography of the Western United States. McGraw-Hill, New York.

Forest Service. 1971. SUP agreement.

Forest Service. 1973. USDA. Forest Service Environmental Impact Statement: Kirkwood Winter Sports Development, Eldorado National Forest, CA. April.

Forest Service. 1974. The Visual Management System, Chapter 1 *in* National Forest Landscape Management, Volumes 1 and 2.

Forest Service. 1977. Forest Service Manual, Title 2300 - Recreation Management. Chapter 2380 - Landscape Management, Washington, DC.

Forest Service. 1987. Draft Eldorado National Forest Highway 88 Future Recreation Use Determination Environmental Impact Statement. Forest Service, Pacific Southwest Region. 505 pp.

Forest Service. 1988. Eldorado National Forest: Land and Resource Management Plan. Forest Service, Pacific Southwest Region. 438 pp.

Forest Service. 1995. Mokelumne Wilderness Management Guidelines, Environmental Assessment #EO95-01.

Forest Service. 2000. Seed, Mulch, and Fertilizer Prescription. Letter to Forest Leadership Team from Judie L. Tartaglia, Acting Forest Supervisor, March 31.

Forest Service. 2001. Eldorado National Forest Species List. Region 5 Forest Service Designated Sensitive Species. September.

Fox, S. 2001. Yellow-legged frog and Yosemite Toad surveys for the Kirkwood on-mountain and off-mountain projects, Kirkwood, California. Wildlife Resource Consultants. Unpublished survey report. July.

GRD (Geotechnical Research and Development). 1997. Kirkwood Ski-In/Ski-Out Expansion Areas, Geologic Planning Study, Report Prepared for Kirkwood Associates, October.

Godden, D. 1999. Letter to D. Gaige, URS Greiner Woodward Clyde, re: Kirkwood Associates-Specific Plan- Mitigation of Wood Smoke Emissions. March 4.

Godden, D. 2002. Personal communication with Michele Weidner, Cirrus Ecological Solutions, Logan, UT regarding air quality impacts. July 23.

Hart, E. W. and W. A. Bryant. 1997. Fault-rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning Act With Index to Earthquake Fault Zones Maps. California Division of Mines and Geology Special Publication 42.

Hatoff, B. 2000. Cultural Resources Specialist, URS Greiner Woodward Clyde, Oakland, CA. Phone conversation with Don McIvor, KW Brown & Associates, Logan, UT. February 8, 2000.

Hecht, P. 1999. El Dorado land plan tossed out. Sacramento Bee. February 9.

Hernandez, J., W. Ziebron, T. O'Hare, N. Dakin, and S. Ness. 1993. CEQA Handbook: A Practical Guide to Implementing the California Environmental Quality Act, California Environmental Publications, San Rafael, CA, 204 pp.

HESI (Henwood Energy Services, Inc.). 1999. Electrical Generation System – Master Plan, Mountain Utilities, Kirkwood, California. Henwood Energy Services, Inc. Sacramento, California. March 30.

Hill, M. 1975. Geology of the Sierra Nevada, California Natural History Guides: 37. 232 pp.

Hinz, D. 1999. California Department of Fish and Game, Region 2. Phone conversation with Don McIvor, KW Brown & Associates, Logan, UT. 22 February.

HMR (Architects). 2001. Historic analysis of the Kirkwood Inn for Kirkwood Mountain Resort, August.

Hunt, D. 1999a. U.S. Forest Service, Eldorado National Forest, Amador Ranger District, personal communication, February 3, 1999.

Hunt, D. 1999b. U.S. Forest Service, Eldorado National Forest, Amador Ranger District. Phone conversation with Don McIvor, KW Brown & Associates, Logan, UT. December 22, 1999.

ITE. (Institute of Traffic Engineers). 1997. Trip Generation Manual.

Jennings, C. W. 1994. Fault Activity Map of California and Adjacent Areas With Locations and Ages of Recent Volcanic Eruptions, Geologic Data Map No. 6, Scale 1:750,000, California Division of Mines and Geology.

Jones and Stokes. 2000. Botanical Resource Survey Report for the Kirkwood Mountain Resort, Amador County, CA. (Phase I Proposed Action Project Sites). Prepared for Sno. Engineering, Inc. by Jones and Stokes Associates, Inc., Sacramento, CA. May 10.

KAI (Kirkwood Associates, Incorporated). 1988. Kirkwood Master Plan: Amended 1988, prepared by Churn, Fittinghoff & Associates, Inc. Reno, NV. 51 pp.

Kennedy/Jenks Consultants. 1998. Final Report: Wastewater Facilities Plan, Kirkwood, CA. Palo Alto, CA. September.

Keyser, D. 1994. Northern goshawk and great gray owl surveys for the Kirkwood water rights and snowmaking project, Kirkwood, California. Dale Keyser and Associates. Unpublished report. June and July.

Keyser, D. 1995. Northern goshawk surveys for the Kirkwood water rights and snowmaking project, Kirkwood, California. Dale Keyser and Associates. Unpublished report. June and August.

Keyser, D. 1999. Willow flycatcher surveys for the Ski-In/Ski-Out subdivision project, Kirkwood Ski Resort, Kirkwood, California. Dale Keyser and Associates. Unpublished report. July.

Kleinfelder, J. H., and Associates. 1971. Preliminary Soil Data, Sewage Facilities, Kirkwood Meadow Project, Alpine and Amador Counties, California. Report to Mr. J.F. Yost, December.

Kleinfelder, J. H., and Associates. 1972a. Preliminary Soil Data, Proposed Aggregate Base Sources, Kirkwood Meadow Project, Alpine and Amador Counties, California. Report to Mr. J.F. Yost, January.

Kleinfelder, J. H., and Associates. 1972b. Preliminary Foundation Investigation, Proposed Maintenance Area, Kirkwood Meadow Project, Amador County, California. Report to Mr. J.F. Yost, January.

Kleinfelder, J. H., and Associates. 1972c. Preliminary Foundation Investigation, Proposed Village Structures, Kirkwood Meadow Project, Amador and Alpine Counties, California. Report to Mr. J.F. Yost, February.

Kleinfelder, J. H., and Associates. 1973a. Preliminary Foundation Investigation, Proposed Condominium Structures, Kirkwood Meadow Project, Amador and Alpine Counties, California. Report to Mr. A. Kerr, July.

Kleinfelder, J. H., and Associates. 1973b. Final Foundation Recommendations, Proposed Condominium

Structures, Kirkwood Meadow Project, Alpine County, California. Report to Mr. A. Kerr, July.

Kleinfelder, J. H., and Associates. 1973c. Final Foundation Recommendations, Proposed Condominium Structures, Kirkwood Meadow Project, Alpine County, California. Report to Mr. A. Kerr, August.

Kleinfelder, J. H., and Associates. 1973d. Preliminary Soils Investigation, Proposed Kirkwood Meadow, Alpine Unit No. One Subdivision, Kirkwood Meadow Project, Alpine County, California, Report to Mr. A. Kerr, August.

Kleinfelder. 1990. Geotechnical Investigation for the East Meadows Subdivision, Kirkwood, California. Report Prepared for Kirkwood Associates, February.

Kleinfelder. 1994. Letter to Penny Tirschman, Kirkwood Associates. May 3.

Kleinfelder. 1995. Geotechnical Investigation Report, Proposed Phase I Village Center, Kirkwood Lodge. Report Prepared for Kirkwood Associates, July.

Kleinfelder. 1997. Phase I Environmental Site Assessments completed for Properties at Kirkwood Ski Resort, Kirkwood, California.

Kleinfelder. 1998. Phase I Environmental Site Assessments completed for Properties at Kirkwood Ski Resort, Kirkwood, California.

Kleinfelder. 2001. Hydrogeologic characterization of absorption bed area, KMPUD. Final Report. June.

Knowles, A. J. 1991. Kirkwood Water Storage Tank Construction Project. Report on file North Central Information Center, CSU Sacramento.

KMR (Kirkwood Mountain Resort). 1998. 1998 Kirkwood Specific Plan. Kirkwood, CA.

KMR. 1999. Summer recreation survey.

KMR. 2000. Summer operating plans.

KMR 2001a. Kirkwood Specific Plan. Kirkwood, CA.

KMR 2001b. Kirkwood Resort Master Owner Association. Design Guidelines. April.

KMR. 2002a. Fax to Michele Weidner, Cirrus Ecological Solutions, regarding employee wages for 2001-2002 season. February.

KMR. 2002b. Emergency Housing Procedure Plan, March 12.

Leal, R. 2002. Range Conservationist, Eldorado National Forest, Personal Communication with John Stewart, Cirrus Ecological Solutions, Logan UT, February 13.

Lehr, S. California Fish and Game, area biologist. Personal communication with R. Thompson, Cirrus Ecological Solutions, LC regarding fish allotments, fish sampling, and amphibians in Caples and

Kirkwood Lakes and Creeks. November.

Lercari, F. A. 1999. California Hazardous Material Spill/Release Notification Guidance. Governor's Office of Emergency Services, Hazardous Materials Unit. Revised by T. Vardas and D. Cossairt. Available from http://www.oes.ca.gov/.

Lindstrom, S. 2001. Kirkwood Subdivisions Cultural Resource Survey Addendum, July 4.

Lindstrom, S. 2000. Kirkwood Mountain Master Development Plan Phase I Proposed Mountain Facilities and Infrastructure Multiple Use Trails. ARRA 05-03-331-375A, October.

Lindstrom, S. 1999. Kirkwood Ski Area Expansion Project, Martin Point Chairlift, Addendum. ARRA 05-03-331-276D, January.

Lindstrom, S. 1998. Kirkwood Ski Area Expansion Project, Kirkwood Ski Resort, Amador/Alpine County, CA Addendum. ARRA 05-03-331-276C, August.

Lindstrom, S. 1995a. Kirkwood Ski Area Expansion Project, Kirkwood Ski Resort, Amador/Alpine County, CA. ARRA 05-03-331-276, December.

Lindstrom, S. 1995b. Sierra Cellular Chair 6 Project, Kirkwood Ski Area, Amador County, CA. ARRA 05-03-331-223, January.

Litton, R. B., Jr. 1966. Landscape terminology. In Summary report on cooperative agreement supplement No. 61, Forest Service master contract No. A5FS-16865. Unpublished report on file, US Forest Service, Pacific Southwest Forest and Range Experiment Station.

Loffland, C. 2001. Amador Ranger District, Eldorado National Forest, USDA Forest Service. Personal communication with R. Thompson, Cirrus Ecological Solutions, LC regarding bald eagles, golden eagles, and peregrine falcons in the Eldorado National Forest. November.

Manning, J. P. 1985. Archaeological Survey for the Proposed Kirkwood Meadow Golf Course, Amador and Alpine Counties, California. Report prepared for Kirkwood Associates, Inc.

Maurer, P. 1999. El Dorado County Planning Dept., personal communication.

McKee, E. H., M. A. Chaffee, F. E. Federspiel, E. L. McHugh, E. E. Cather, D. F. Scott, and C. M. Rumsey. 1981. Mineral Resource Potential of the Mokelumne Wilderness and Contiguous Roadless Areas, Central Sierra Nevada, California. Summary report to accompany U.S. Geological Survey Map MF-1201-D, 6 pp.

McKee, E. H. and R. A. Howe. 1981. Geologic Map of the Mokelumne Wilderness and Contiguous Rare II Further Planning Area, Central Sierra Nevada, California. U.S. Geological Survey Map MF-1201-A, Scale 1:62,000.

Mears, A. I. 1995a. Design-magnitude Avalanche Mapping and Hazard Analysis, Kirkwood Resort, California. Report prepared for Simpson Environmental, Gunnison, CO. November.

Mears, A. I. 1995b. Avalanche Mitigation Concepts, East Meadow 3. Report prepared for Mr. Larry Kumpost, Kirkwood Resort, Gunnison, CO. December.

Mears, A. I. 1997. Design-magnitude Avalanche Mapping and Mitigation Analysis, Kirkwood Resort, California – An Updated Study. Report prepared for Mr. Peter Eichar, Kirkwood Resort, Gunnison, CO. October.

Meyer, V.C. 1995. Botanical and Sensitive Plant Survey for the Kirkwood Ski Area.

Meyer, V. C. 1996a. Botanical and Sensitive Plant Survey for East Meadows 3 Project.

Meyer, V. C. 1996b. Botanical and sensitive plant survey: Kirkwood Master Plan: Alpine, Amador, and El Dorado Counties. Prepared for Simpson Environmental, Stockton, CA by V.C. Meyer, Shingle Springs, CA. 28 January.

Mitchell, P. G. 1999. Attorney for KMR, letter to Peter Eichar, Planner, Kirkwood Mountain Resort, Kirkwood, CA. April 15.

Mollinari, P. 1999. Aces Trash Service. Personal communication with Scott Evans, KW Brown & Associates, Inc., Logan, UT. August 17.

Moore Biological Consultants. 1997. Wetland Delineation: Kirkwood Specific Plan Expansion Areas. Prepared for Kirkwood Associates, Kirkwood, CA by Moore Biological Consultants, Lodi, CA. October.

Moore Biological Consultants. 1999. Yellow-legged frog surveys for the Ski-In/Ski-Out Subdivision Project, Kirkwood Ski Resort, Kirkwood, CA. Unpublished survey report, Moore Biological Consultants, Lodi CA. September.

Moore Biological Consultants. 2001. Wetland delineation map, Kirkwood Mountain Resort. March.

Moratto, M. J. 1984. California Archaeology. Academic Press. Orlando.

Morrow, E. 2002*a*. Personal communication with Michele Weidner, Cirrus Ecological Solutions, Logan, UT regarding fuel storage tanks. January 8.

Morrow, E. 2001a. Skier counts. Facsimile to Michele Weidner, Cirrus Ecological Solutions from Ed Morrow, Kirkwood Mountain Resort, Kirkwood, California. December 13.

Morrow, E. 2001b. Nordic skier counts. Facsimile to Michele Weidner, Cirrus Ecological Solutions from Ed Morrow, Kirkwood Mountain Resort, Kirkwood, California. December 17.

Morrow, E. 2001c. 1998-1999 Nordic numbers. Facsimile to Michele Weidner and Scott Evans, Cirrus Ecological Solutions, from Ed Morrow, Kirkwood Mountain Resort, Kirkwood, CA. December 21.

Morrow, E. 2001d. Personal communication with Michele R. Weidner, Cirrus Ecological Solutions, regarding cultural resource survey status. Logan, Utah. October.

Morrow, E. 2000. Comment letter submitted on the Kirkwood Draft EIR, to KW Brown & Associates, Inc., Logan, UT. January 4.

Nolte and Associates, Inc. 1996a. Report of Preliminary Geotechnical Investigation, Kirkwood Expansion, Kirkwood, California. Report prepared for Kirkwood Associates, March.

Nolte and Associates, Inc. 1996b. Geotechnical Investigation Report, Children's Center, Kirkwood, California. Report prepared for Kirkwood Associates, June.

Nolte and Associates, Inc. 1996c. Geotechnical Investigation Report, Quartershare, Kirkwood, California. Report prepared for Kirkwood Associates, June.

Nolte and Associates, Inc. 1996d. Geotechnical Investigation Report, Snowboard Shop, Kirkwood, California. Report prepared for Kirkwood Associates, June.

Nolte and Associates, Inc. 1996e. Report of Geotechnical Findings, Proposed General Store Site, Kirkwood, California. Report prepared for Kirkwood Associates, September.

Nolte and Associates, Inc. 1996f. Report of Preliminary I, Trust Parcel Project Area, Kirkwood, California. Report prepared for Kirkwood Associates, October.

Northwest Information Center. 1994. Telephone Record Search #60800-94-235, June 22, 1994. On file, Woodward-Clyde Consultants, Oakland, CA.

OHP (Office of Historic Preservation). 2001. E-mail communication with Michele Weidner, Cirrus Ecological Solutions, Logan, UT, regarding historical status of Kirkwood Inn. October.

Pacific Geotechnical. 1976.

Parsons, J. 1996. Superintendent, Alpine County Unified School District. Personal communication with Peter Eichar, Planner, Kirkwood Mountain Resort.

Peters, B. 1999a. Telephone conversation with Don McIvor, KW Brown & Associates, Inc., Logan, UT. August 2.

Peters, B. 1999b. Memorandum outlining alternatives development process, sent to Don McIvor, KW Brown & Associates, Inc., Logan, UT. February 19.

Petersen, M. D., W. A Bryant, C. H. Cramer, T. Cao, M. S. Reichle, A. D. Frankel, J. J. Lienkaemper, P.A. McCrory, and D. P. Schwartz. 1996. Probabilistic Seismic Hazard Map for California (10 % probability of exceedance in 50 years) Peak Horizontal Ground Acceleration, Uniform Firm-rock Site Condition, Scale 1:2,000,000.

Pioneer. 1997. Unpublished field notes collected at Kirkwood by D. Branson, Wildlife Biologist, Pioneer Environmental Services, Inc., Logan, UT.

Platts, W. F., and M. L. McHenry. 1988. Density and Biomass of Trout and Char in Western Streams.

U.S.D.A.- Forest Service General Technical Report INT-241.

Price, M. 2001. Marty Price, Amador County Public Works Agency. Personal communication with Michele Weidner, Cirrus Ecological Solutions, Logan, UT. November.

Roberts (James A. Roberts Associates, Inc.). 1973. Final Environmental Impact Report: Kirkwood Meadow Ski Development. Prepared for, and under the supervision of the Board of Supervisors, Lead Agency, Alpine County, California. James A. Roberts Associates, Inc. Carmichael, CA 1 August.

Robinette, G. O. 1973. Energy and the Environment. Kendall/Hunt Publishing Co., Debuque, IA.

Rosgen, D. 1996. Applied river morphology. Wildland Hydrology, Pagosa Springs, CO.

RRC Associates. 2001. Visitor survey report, June 29.

Russell, J. 1988. Trust for Public Land Exchange, ARR No. 05-03-331-33. Amador Ranger District, Eldorado National Forest, Pioneer CA.

SECOR (SECOR International Incorporated). 1997a. Kirkwood Gas & Electric Company Ambient Air Quality Monitoring Program. Prepared for Kirkwood Gas & Electric Company. Fort Collins, CO. February.

SE Group 2001. Mountain Master Development Plan. 53pp.

Sierra Club et al. v. Cliff et al. 1972. Findings of fact and conclusions of law. Civil No. S-2408, United States District Court for the Eastern District of California.

Sierra Pacific Power Company. 1996. Kirkwood Transmission Line Feasibility Study, report prepared for MU and KMPUD. July 10.

Simpson. 1996a. Draft Supplemental Environmental Impact Report: East Meadows 3 Subdivision. Simpson Environmental, Stockton, CA. 182 pp.

Simpson. 1996b. Technical Appendices B-1 for the Draft Supplemental Environmental Impact Report: East Meadows Phase 3 Subdivision..

Simpson. 1995a. Wetland Delineation: Kirkwood Master Plan. Prepared for Kirkwood Associates, Inc. Simpson Environmental, Stockton, CA. November.

Simpson. 1995b. Technical Appendices for the Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA. Prepared in association with Geotechnical Research & Development; Archeological Services, Inc.; and kdANDERSON Transportation Engineers. Stockton, Calif.; Simpson Environmental. 17 July.

Simpson. 1995c. Wetland Delineation: Kirkwood Lodge. Simpson Environmental, Stockton CA. 8 pp.

Simpson. 1995d. Final Environmental Impact Report and Environmental Assessment for Public Comment: Kirkwood Water Rights and Snowmaking Project in Alpine and Amador Counties, CA. Prepared in association with Geotechnical Research & Development; Archeological Services, Inc.; and kdANDERSON Transportation Engineers. Simpson Environmental, Stockton, CA 17 July.

Simpson. 1995e. Wetland Delineation: East Meadows 2. Prepared for Kirkwood Associates, Inc. Simpson Environmental, Stockton, CA. August.

Skinner, M.W. and B.M. Pavlik. 1994. California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California. CNPS Special Publications No. 1, (fifth edition). Sacramento, CA.

Taylor, M. 2002. Personal communication with Michele Weidner, Cirrus Ecological Solutions, Logan, UT regarding special-status plants. March.

Thomas, J. 1999. Personal communication on August 3, 1999 with D. McIvor, State Historic Preservation Office, Sacramento, CA regarding status of Kirkwood Inn.

Turnbeaugh, L. 2001. Alpine County, transportation. Personal communication with Michele Weidner, Cirrus Ecological Solutions. December 14.

URS Greiner Woodward Clyde. 1999. Traffic Technical Memorandum for the Kirkwood/SR 88 Intersection. February 17.

USDA/NRCS (U.S. Department of Agriculture and National Resource Conservation Service). 1985. Soil Survey of the Eldorado National Forest. US Government Printing Office, Lincoln, NE. 644 pp.

USDA/NRCS. 1996. Keys to Soil Taxonomy.

USGS (U.S. Geological Survey). 1992. Caples Lake Quadrangle, California, 7.5 Minute Series, Topographic Map, 1973, revised 1992.

USFWS (US Fish and Wildlife Service). 1998. Letter from the Service providing a species list for Caples Lake, Alpine, Amador, and El Dorado Counties, CA. Sacramento Fish and Wildlife Office. 1-1-99-SP-0168. November 24.

USFWS. 2001. Federal endangered and threatened species that may be affected by projects in the Caples Lake 7 ½ minute quad, Eldorado National Forest, Lake Tahoe Basin Management Area, and Lake Tahoe Basin. Species list is an updated version of USFWS 1998. Sacramento Fish and Wildlife Office. October.

Veatch, S. 1996. Personal communication with Peter Eichar, Planner, Kirkwood Mountain Resort.

Wagner, D. L., C. W. Jennings, T. L. Bedrossian, and E. J. Bortungo. 1981. Geologic Map of the Sacramento Quadrangle, California, 1:250,000, Map No. 1A. California Division of Mines and Geology.

Watershed Systems. 1996. Kirkwood Meadows Water Resources Investigations: Assessment of Opportunities and Review of Existing Data. Soquel, CA.

Western Botanical Services. 1997. Botanical and Sensitive Plant Survey: Kirkwood Ski Area/ Alpine County, CA. Prepared for Kirkwood Associates, Kirkwood, CA. J. Etra. Reno, NV.

Westen Botanical Services. 1994. Botanical and Sensitive Plant Survey for the Proposed Chair Four Up-Grade and the Thimble Peak and Silver Saddle Lifts. Prepared for Simpson Environmental, Stockton, CA J. Etra. Reno, NV.

Wilcove, D. S., C. H. McLellan, and A. P. Dobson. 1986. Habitat fragmentation in the temperate zone. Pages 237-256 in M. E. Soulé, editor, Conservation Biology: The Science of Scarcity and Diversity. Sinauer Associates, Inc., Sunderland, Mass.

Wyels, W. 1999. Central Valley Regional Water Quality Control Board, telephone conversation with Don McIvor, KW Brown & Associates, Inc., Logan, UT. October 15.

CHAPTER 8: REPORT PREPARATION

Note: Text in italics (excluding document titles and scientific names for plant and animal species) indicates changes from the Recirculated Revised Draft EIR.

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CHAPTER 9: APPENDICES

Appendix A: Traffic Technical Memorandum for the Kirkwood SH 88 Intersection.

Appendix B: Grazing Management Plan for Kirkwood Meadow and Noxious Weed Management Plan for Kirkwood Mountain Resort.

Appendix C: Water Resource Tables.

Appendix A:

Traffic Technical Memorandum for the Kirkwood SH 88 Intersection.

Appendix B:

Grazing Management Plan for Kirkwood Meadow

and

Noxious Weed Management Plan for Kirkwood Mountain Resort

Appendix C:

Water Resource Tables.