CHAPTER 4
Environmental Consequences

4.1 Introduction

This chapter assesses environmental consequences or impacts that would result from the implementation of the Proposed Action or the alternatives described in Chapter 2. These analyses consider both short-term impacts during construction and decommissioning, and long-term impacts during operation and maintenance. The scope of the impact analyses presented in this chapter is commensurate with the level of detail for the alternatives provided in Chapter 2, *Proposed Action and Alternatives*, and the availability and/or quality of data necessary to assess impacts. Baseline conditions for assessing the potential environmental impacts for each resource area are described in Chapter 3.

The impact assessment that follows focuses on the general impacts that could occur as a result of implementing the Proposed Action and each of the alternatives. The methodology for this assessment conforms with the guidance found in the following sections of the CEQ regulations for implementing NEPA: 40 CFR section 1502.24, *Methodology and Scientific Accuracy*; 40 CFR section 1508.7, *Cumulative Impact*; and 40 CFR section 1508.8, *Effects*. The CEQ regulations require agencies to "rigorously explore and objectively evaluate" the impacts of the alternatives. The methodologies used in the impact assessment also conform to the requirements of CEQA (Public Resources Code §21000 et seq.), including the *Guidelines for Implementation of the CEQA* (Title 14 CCR §15000 et seq.). This chapter discusses short- and long-term direct, indirect, and cumulative impacts of the Proposed Action and alternatives; identifies mitigation measures to address adverse impacts; and summarizes the residual and unavoidable adverse impacts on an issue-by-issue basis.

4.1.1 Analytical Assumptions

The following impacts analysis was conducted with the following assumptions:

1. The laws, regulations, and policies applicable to the BLM, which has the responsibility for managing all geothermal operations on federal lands leased for geothermal resource development under the terms of the Geothermal Steam Act of 1970, would be applied consistently for all action alternatives.

2. The laws, regulations, and policies applicable to the USFS, which has the responsibility for managing and administering surface activities within national forests, would be applied consistently for all action alternatives.

3. The proposed CD-IV facilities would be constructed, operated, maintained, and decommissioned as described in each action alternative.

4. Short-term impacts are those expected to occur during the construction phase (approximately 16 months) and over the life of the Project as up to 16 geothermal wells are proposed (approximately half of the wells would be production wells and the other half would be injection wells). Short-term impacts are also expected during project decommissioning. Long-term impacts are those that would occur throughout the operation and maintenance phase (approximately 30 years).

4.1.2 Types of Effects

The potential impacts from those actions that would have direct, indirect, and cumulative effects were considered for each resource. The terms “effect” and “impact” as used in this document are synonymous and could be beneficial or detrimental.

Direct effects are caused by the action and occur at the same time and place as the action; indirect effects are caused by the action and occur later in time or further in distance, but are still reasonably foreseeable (40 CFR 1508.8). Cumulative impacts are those effects resulting from the incremental impacts of an action when combined with other past, present, and reasonably foreseeable future actions (regardless of which agency or person undertakes such actions) (40 CFR 1508.7). Cumulative impacts could result from individually insignificant but collectively significant actions taking place over a period of time. Short-term impacts occur only for a short time after implementation of a management action; for example, construction noise impacts from construction activities would be considered short term in nature. By contrast, long-term effects occur for an extended period after implementation of a management action; for example, operational noise during facility operations would be a long-term impact, as it would last for as long as the facility is in operation.

Section 1502.16 of the CEQ regulations forms the scientific and analytic basis for the comparison of alternatives as described under section 1502.14, *Alternatives including the Proposed Action.* The environmental consequences chapter (Chapter 4) of this EIS/EIR consolidates the discussions of those elements required by sections 102(2)(C)(i), (ii), (iv), and (v) of the NEPA which are within the scope of this EIS/EIR and as much of section 102(2)(C)(iii) as is necessary to support the comparisons. Chapter 5 of this EIS/EIR discusses any adverse environmental effects which cannot be avoided, the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.

4.1.3 Resources and Resource Uses Not Affected or Present in the Action Area

Resources or other aspects of the human environment that are not affected or present in the Casa Diablo area include: wild and scenic rivers; national scenic or historic trails, monuments, and national recreation areas; cooperative management and protection areas; outstanding natural areas; forest reserves; back country byways; and wild horses and burros.

4.1.4 Mitigation Measures Included in the Analysis

For impacts identified in the following resource sections, both PDMs and mitigation measures have been developed that would be implemented during all appropriate phases of the project from initial ground breaking to operations, and through closure and decommissioning. The measures include a combination of the following:

1. Measures that have been proposed by ORNI 50, LLC;
2. Regulatory requirements of other federal, state, and local agencies;
3. Mitigation measures developed by the lead agency's environmental consultant; and
4. Additional USFS- or BLM-proposed mitigation measures and best management practices.

The latter three categories are generically referred to as "mitigation measures" throughout this Draft EIS/EIR. Measures proposed by the ORNI 50, LLC are referred to as PDMs. Many of the other mitigation measures are required and enforced by agencies other than the BLM or the USFS. For instance, the federal Endangered Species Act Section 7 mitigation measures of the USFWS will be included in the ROD, and the National Historic Preservation Act (NHPA) Section 106 Programmatic Agreement will include a number of processes that also will be included in the ROD. ORNI 50, LLC will be required by the ROD to comply with the requirements of those other agencies (see, e.g., 43 CFR 2805.12(a) (Federal and state laws and regulations), (i)(6) (more stringent state standards for public health and safety, environmental protection and siting, constructing, operating, and maintaining any facilities and improvements).

4.1.5 Cumulative Scenario Approach

This Draft EIS/EIR analyzes the cumulative impact of the construction, operation and maintenance, closure and decommissioning of the CD-IV Project power plant and all other elements of the Proposed Action, taking into account the effects in common with other past, present, and reasonably foreseeable future actions. The cumulative effects analysis highlights past actions that are closely-related either in time or space (i.e., temporally or in geographic proximity) to the Proposed Action, present actions that are ongoing at the same time this EIS/EIR was being prepared; and reasonably foreseeable future actions, including those for which there are existing decisions, funding, formal proposals, or which are highly probable, based on known opportunities or trends.

The intensity, or severity, of the cumulative impacts analysis considers the magnitude, geographic extent, duration, and frequency of the effects. The magnitude of the effect reflects the relative size or amount of the effect; the geographic extent considers how widespread the effect may be; and the duration and frequency refer to whether the effect is a one-time event, intermittent, or chronic. Varying degrees of information exist about projects within the cumulative scenario. Therefore, for resource areas where quantitative information was available, a quantitative analysis is provided; however, if said level of detail was not available, a qualitative analysis is provided. If the Proposed Action and alternatives would have no direct or indirect effects on a resource, the

Draft EIS/EIR does not analyze potential cumulative effects on that resource. See, for example, Section 4.1.3, *Resources and Resource Uses Not Affected or Present in the Action Area*.

Table 4.1-1 (located at the end of this section) provides a comprehensive listing of all foreseeable projects that could contribute to a cumulative impact on the environment. Projects listed include geothermal development projects located on BLM-administered lands, other BLM and USFS actions/activities, and projects identified by local governments, such as the town of Mammoth Lakes. Table 4.1-1 presents the project name, location, type, status, and a brief description of each project, to the extent available. Most of the projects listed in Table 4.1-1 have been, are being, or would be required to undergo their own independent environmental review under NEPA or CEQA or both, as applicable.

For the Proposed Action, the cumulative scenario for each issue area includes all or a portion of the projects identified in Table 4.1-1.

With the exception of climate change, which is a global issue, the specific area of cumulative effect varies by resource. For each resource, the geographic scope of analysis is based on the topography surrounding the CD-IV Project and the natural boundaries of the resource affected, rather than jurisdictional boundaries. The geographic scope of cumulative effects often extends beyond the scope of the direct effects, but not beyond the scope of the direct and indirect effects of the Proposed Action and alternatives.

In addition, each project in a region would have its own implementation schedule, which may or may not coincide or overlap with the Proposed Action's schedule. This is a consideration for short-term impacts from the proposed CD-IV Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the proposed CD-IV Project.

TABLE 4.1-1
CD-IV CUMULATIVE PROJECTS

Project Name	Location	Description	Status/Schedule	Approximate Distance from Proposed Project
Other Casa Diablo Geothermal Development Projects				
Mammoth Pacific I Replacement Project	Town of Mammoth Lakes (northeast of U.S. Highway 395 and SR 203 junction, Mono County)	MPLP proposes to replace the aging MP-I power plant on about 5.7 acres of land located between the existing MP-I and MP-II plant sites. The new M-I power generation facilities would replace the existing MP-I power generation facilities and the existing MP-I power generation facilities would be dismantled and removed. Project operations would result in increased generation of electricity and lower fugitive emissions of motive fluid, isobutene from plant equipment.	April 2012 – November 2012	Overlaps with Project area.
Mammoth Pacific II Project	Town of Mammoth Lakes (northeast of U.S. Highway 395 and SR 203 junction, Mono County)	Existing 15 MW geothermal electric generating facility and production and injection well field. Located approximately 1,200 feet northeast of the MP-I plant on land referred to as "G2," the MP-II project has been operating since 1990. The two projects have been integrated by MPLP and geothermal fluid discharged from either of the plants can be injected into any of the available injection wells.	Currently operates under an existing Conditional Use Permit issued by Mono County.	Overlaps with Project area; northwest of well site facilities 55-32 and 65-32.
PLES-I Project	Town of Mammoth Lakes (northeast of U.S. Highway 395 and SR 203 junction, Mono County)	This existing 15 MW PLES-I project includes a geothermal electric generating facility and is located immediately south of the MP-II project power plant. The plant site is also referred to as "G3."	Currently operates under approved Plans of Operation from the U.S. Department of Interior's Bureau of Land Management.	Overlaps with project area; northwest of well site facilities 55-32 and 65-32.
Highway and Capital Improvement Projects				
Digital 395 Middle Mile Project	*Follows U.S. Highway 395 throughout Carson City, Nevada and Barstow, California*	*Construction of a new 583-mile, fiber network that would mainly follow Highway 395. The proposed service area encompasses 36 communities, six Indian reservations and two military bases. The new unused, high-capacity fiber optic line would be available to the region's last mile providers to expand or enhance service to households and businesses; as well as to government agencies or carriers seeking local or long-haul transport.*	*Environmental assessment completed in November 2011. Construction estimated to begin early 2012*	*Overlaps with project area (Highway 395 pipeline crossing. The cable will be installed "in" Sawmill Cutoff Road.*
New Airport Terminal	Mammoth Yosemite Airport (Town of Mammoth Lakes)	Construction of a new airport terminal with capacity to manage increased enplanements. Includes 271 space parking lot and new airplane apron for an increased number and larger airplanes.	Oct. 2011 CIP indicates that the 2011/2012 budget will cover prelim. ALP currently underway.	Approximately 4 miles east of Project area.
Airport Security Upgrades	*Mammoth Yosemite Airport (Town of Mammoth Lakes)*	*New 8-foot tall security fence with 12 foot gates and security cameras.*	*Construction scheduled to occur in 2012-2013*	*Approximately 4 miles east of Project area.*

TABLE 4.1-1 (Continued)
CD-IV CUMULATIVE PROJECTS

Project Name	Location	Description	Status/Schedule	Approximate Distance from Proposed Project
Highway and Capital Improvement Projects (cont.)				
Sierra Nevada Sidewalk Project	Sierra Nevada Road (Town of Mammoth Lakes)	8-foot wide sidewalk construction along the north side of Sierra Nevada Road from Laurel Mountain to Chaparral Road.	Construction expected to occur summer of 2012.	Approximately 1.3 miles southwest of Project area.
Sierra Park Gap Closure	Sierra Park Road (between Old Mammoth Road and Sierra Park)	Project will construct and continue the 8-foot wide sidewalk, landscaping, and drainage improvements along Sierra Nevada Road.	Construction expected to occur summer of 2012.	Approximately 1.3 miles southwest of Project area.
Waterford Bridges project	*Old Mammoth Road and Mammoth Creek crossing*	*Construct bridge and pedestrian improvements over Mammoth Creek to provide emergency access for residents north of Mammoth Creek to Old Mammoth Road.*	*Summer 2012 and 2013.*	*Approximately 1.5 miles southwest of Project area.*
Meadow Creek Connector Path	*Adjacent to Old Mammoth Road (between Mammoth Creek Park and Old Mammoth Road /Minaret Road intersection)*	*Construction of a multi-use connector path that will connect Mammoth Creek Park to the Main Path at the intersection of Minaret and Old Mammoth Road, closing a gap in the Town's Main Path.*	*Design this summer; construction next summer.*	*Approximately 1.5 miles southwest of Project area.*
Tavern Road Sidewalks	*Tavern Road (from Sierra Park to Laurel Mountain)*	*Project will reconstruct and improve sidewalks, landscaping, and drainage along Tavern Road.*	*Construction expected to occur summer 2013.*	*Approximately 0.75 mile southwest of Project area.*
Lake View/Lake Mary Road Intersection Improvements	Lake View Road and Mary Road intersection (Town of Mammoth Lakes)	Provide separate south bound left and right turns from Lake View Road to Lake Mary Road. Install a hydronically heated pavement section on Lake View Road.	Improvements are expected to occur this summer.	Approximately 2 miles southwest of Project area.
Transit Parking Lot Paving	*Town of Mammoth Lakes*	*Paving of the existing impound lot and install proper oil/sediment separators. Facility will accommodate additional transit.*	*Summer 2012 and 2013.*	
Lower Canyon Boulevard Rehabilitation	*Canyon Boulevard (Town of Mammoth Lakes)*	*Reconstruction of Canyon Boulevard from Forest Trail to Hillside Drive. The project will also include new curb, gutter, sidewalks, lights, and improvements to the storm drainage system.*	*Construction expected to occur summer of 2013.*	*Approximately 1.5 miles southwest of Project area.*
5-Year Road Rehabilitation Project	*Various road sections*	*Rehabilitation of various road segments throughout the Town of Mammoth Lakes, including Sierra Nevada (Sierra Park to Old Mammoth),*	*2010 through 2016*	*Various*

TABLE 4.1-1 (Continued)
CD-IV CUMULATIVE PROJECTS

Project Name	Location	Description	Status/Schedule	Approximate Distance from Proposed Project
Parks and Recreation Projects				
Trails End Park	*Just north of Meridian Boulevard and Wagon Wheel Road*	*This new park consists of a playground, a skate park for all ages, and a water play area. Phase I is complete. Phase 2 includes landscaping, a pavilion, and a playground; Phase 3 may include a smaller additional skate area.*	*Construction of Phase 2 expected to occur summer of 2012.*	*Approximately 0.75 mile south of Project area.*
Whitmore Track Facility	*Whitmore Regional Park on Benton Crossing Road near Highway 395*	*Joint effort by the High Sierra Striders and the Town of Mammoth Lakes, this project includes construction of a high-performance 9-lane track, synthetic infield, locker rooms, storage and concession space, dog park, picnic pavilion, and parking lot with access road. Project would occur on land leased by the Town from LA Department of Water and Power.*	*MND adopted in October 2011, approved by Mono County Planning Commission in December 2011. Construction anticipated to begin Spring/Summer 2012.*	*Approximately 5 miles east of Project area.*
College Connector Path	*Meridian Boulevard (Town of Mammoth Lakes)*	*Includes a Class I off-street bike path adjacent to Meridian Boulevard, College Parkway and connecting to the Main Path (part of the Trails System Master Plan). This path will link MUSD schools, library, recreational uses, retail and commercial centers, and Cerro Coso Community College.*	*Currently under design. Construction expected to occur next summer.*	*Approximately 0.75 mile south of Project area.*
Lake Mary Road Bicycle Path Completion Project	*Lake Mary Road (Town of Mammoth Lakes)*	*Includes a Class I off-street bike path adjacent to Lake Mary Road (part of the Trails System Master Plan). This will complete the Main Path network through the town to Lake Mary.*	*Summer 2012 – 2013*	*Approximately 2 miles southwest of Project area.*
Sawmill Cutoff Road Reconstruction Project	Sawmill Cutoff Road, Town of Mammoth Lakes	Includes reconstruction of Sawmill Cutoff Road so that roadway can be used year-round. Project also includes extension of a staging area for winter and summer activities.	Grant is currently under review.	Overlaps with Project area along Sawmill Cutoff Road.
Inyo National Forest Shady Rest Motorized Staging Project	Shady Rest Park	Inyo National Forest received an OHV grant from the State of California to support recreation planning efforts for the “Shady Rest” area within the Town of Mammoth Lakes. The desired outcome of this project is to design and approve development of a new motorized staging area for year-round use at the Shady Rest area.	Currently in the planning phase.	Overlaps with Project area; adjacent to well site 38-25.
Development Projects				
Downtown Neighborhood District Plan	Downtown Area of Mammoth Lakes	Revitalization for the Mammoth Lakes’ Downtown area, encompassing Main Street/SR 203 corridor from the town entrance to Minaret Road, the North Old Mammoth Road area, and the Shady Rest site.	Currently in planning phase; unlikely to overlap with proposed action. Final Downtown Concept for Main Street approved September 2010.	Overlaps with Shady Rest Park

TABLE 4.1-1 (Continued)
CD-IV CUMULATIVE PROJECTS

Project Name	Location	Description	Status/Schedule	Approximate Distance from Proposed Project
Development Projects (cont.)				
Hidden Creek Crossing	Town of Mammoth Lakes	Planning effort aimed to revitalize the Shady Rest Tract, which has long been identified as a critical affordable/workforce housing site for the town.	Neither an application nor a Master Plan for this project has been prepared.	Overlaps with Shady Rest Park
Mammoth Creek crossing	Minaret Road and Main Street (Town of Mammoth Lakes)	Redevelopment of three of the four corners that comprise the Main Street-Lake Mary Road/Minaret Road intersection with a combination of resort accommodations, retail uses, and public plazas.	Final EIR published in April 2009. General plan amendment approved but land is not yet entitled.	Approximately 1.5 miles southwest of the project area
Mammoth View Project	Bounded by Main Street, Mountain Boulevard, Alpine Circle (Town of Mammoth Lakes)	Removal of three existing motel buildings from the project site and development of the site with a 54-room hotel, 24 townhouse condominium, and 28 freestanding condominium cabin units.	Initial Study published May 2011 and project has been approved. Town of Mammoth Lakes is currently coordinating with Mammoth View about right-of-way improvements.	Approximately 1 mile southwest of the project area
Old Mammoth Place	Old Mammoth Road and Lake Mountain Road, Town of Mammoth Lakes	Mixed use development for a condominium hotel with up to 488 hotel rooms and 8 units for workforce housing. Also would include outdoor plazas, restaurant space, commercial, conference areas, spa, and underground parking structure.	Application approved in March 2011.	Approximately 0.75 mile southwest of project area.
Search and Rescue Facility	1315 Meridian Boulevard (Town of Mammoth Lakes)	New permanent 3,850-square foot facility for the Mono County Sheriff's Search and Rescue. Building would accommodate up to seven vehicles and a small office and meeting area.	MND adopted May 2011. Under construction.	Approximately 0.75 mile south of Project area
Sierra Star Master Plan Project	South of Main Street and along both sides of Minaret Road (Town of Mammoth Lakes)	Development of approximately 42 acres of the 114-acre site surrounding the existing Sierra Star Golf Course. The project proposes 763 new dwelling units.	Draft EIR published April 2007.	Approximately 1.5 miles southwest of the project area
Snowcreek Master Plan	Encompasses areas north and south of Old Mammoth Road west of Fairway Drive (Town of Mammoth Lakes)	Master plan update which incorporates recreational facilities, golf course, school uses, Mammoth Lakes fire station, and land for a water treatment facility	Final EIR supplemental published in May 2009. Plan has been approved but land is not entitled.	Approximately 1.5 miles southwest of Project area.
Mammoth View Project	Bounded by Main Street, Mountain Boulevard, and Alpine Circle (Town of Mammoth Lakes)	Plan is comprised of a 54-room hotel, 24 townhouse condominium units in two buildings, and 28 freestanding condominium cabin units on a 5.5 acre site.	MND published May 2011. Project has been approved.	Approximately one mile southwest of Project area.

TABLE 4.1-1 (Continued)
CD-IV CUMULATIVE PROJECTS

Project Name	Location	Description	Status/Schedule	Approximate Distance from Proposed Project
Development Projects (cont.)				
Trails System Master Plan	Town of Mammoth Lakes	Planning effort that focuses on the trail system plan within the Town's Urban Growth Boundary containing public input/surveys, gap analysis and potential recommendations for future implementation. The Plan also contains a secondary effort that helps define the interface potential between the UGB and public lands outside the boundary.	Plan recently adopted in November 2011. Some soft surface trails planned to be constructed in next five years but specifics have not been developed.	Overlaps with project area.
Parks and Recreation Master Plan Update	Town of Mammoth Lakes	Plan assesses the Town's recreation needs for the future and establishes goals and policies that will guide park improvements. Contains an analysis of the supply, demand and needs for park and recreation facilities and services within the Town and includes recommendations to help meet challenges of providing parks and recreation facilities.	Plan and accompanying General Plan Amendment 2012-01 adopted in February 2012.	Overlaps with Shady Rest

NOTE: *Italicized* text indicates projects with tentative construction schedules that would potentially overlap with the construction schedule for the Casa Diablo Geothermal Development Project.

SOURCES: National Telecommunication and Information Administration and CPUC, 2011; Town of Mammoth Lakes, 2011, 2012; MLTPA, 2012; Bernasconi, 2012;

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4.2 Air Resources

4.2.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to air resources. Impacts are identified and evaluated based on air pollutant estimates, public health risk, odors, and cumulative impacts that would be generated during construction, operation and maintenance, and decommissioning of the Proposed Action.

4.2.1.1 Construction Emissions

Maximum day and annual construction emissions were estimated using Project-specific information identified in the ORNI 50, LLC application for the CD-IV Project (MPLP, 2010), as well as other information provided by ORNI 50, LLC (Ormat, 2011). The information includes the overall construction schedule, expected to occur in two separate 8-month phases in 2013 and 2014, followed by 2 months of additional well development and pipeline work in 2015. Appendix C.1, *Air Pollutant Emission Estimates*, contains the air pollutant exhaust and fugitive dust emissions estimates calculations and all of the assumptions used to estimate the construction emissions that would be associated with the CD-IV Project. For the purposes of the air resources analysis, construction emissions that would be associated with the CD-IV Project are described in terms of three main activity source types, including: power plant construction, well development construction, and pipeline construction. It is expected that each of the constriction phases would include approximately 8 months of power plant construction, 6 months of well development construction, and 6 months of pipeline construction, and the activity sources would overlap in schedule.

For each of the construction activity sources, the following types of assumptions were compiled:

1. A list of the types of off-road construction equipment and on-road vehicles to be used;
2. The number of pieces of each type of off-road equipment and on-road vehicles;
3. Daily usage rates in terms of hours per day or miles traveled per day for each piece of off-road equipment and on-road vehicles, respectively; and
4. The horse-power (hp) rating for each type of off-road equipment used.

Off-Road Equipment Exhaust

Air pollutant emissions, including ROG, NO_x, CO, SO_2, PM10, and PM2.5 that would be generated by off-road construction equipment (e.g., excavators, graders, loaders, backhoes, etc.,) were estimated using a variety of emissions models and regulatory emission factors. CARB's Offroad emissions inventory database was used to develop air basin specific construction equipment emission factors for calendar year 2013 for ROG, NO_x, and PM10. The Offroad database provides data for only NO_x, PM10, and total hydrocarbons (THC), so factors identified by CARB (CARB, 2012a) were applied to convert THC emissions rates to ROG emissions rates, and CARB's Offroad2007 emissions model was used to estimate construction equipment

emission factors for CO and SO_2. PM2.5 construction equipment exhaust emission factors were calculated by multiplying the PM10 emission factors by the mass fraction of PM2.5 emissions in PM10 diesel exhaust, as provided by South Coast Air Quality Management District (SCAQMD)'s *Final–Methodology to Calculate Particulate Matter (PM) 2.5 and PM2.5 Significance Thresholds* (2006).

In addition to mobile off-road construction equipment, ORNI 50, LLC has identified the need for two large drill rigs that would each include approximately four engines with a combined engine rating of over 4,250 hp per drill rig (Ormat, 2011). Construction activities associated with the drill rigs would occur 24 hours per day for a period of approximately 30 days at each well site, and for the purposes of the maximum day scenario, it is expected that the two drill rigs would operate simultaneously. Based on actual fuel use data during recent well drillings (Ormat, 2012) compared to the maximum fuel consumption specifications for similar engines (Caterpillar, 2012), it is assumed that the engines on each drill rig would operate a combined total of approximately 16 hours per day. Because the drill rigs would be registered with CARB's Statewide Portable Equipment Registration Program, it is expected that the drill rig engines would meet USEPA and CARB Tier 2 standards for off-road engines. Therefore, the Tier 2 grams/brake horsepower-hour (g/bhp-hr) emission standards obtained from CARB and SCAQMD for ROG, NO_x, CO, and PM10 were used as worst case emission rates for the drill rigs (CARB, 2012b; SCAQMD, 2010). Default load factors from the Offroad emissions inventory database model were used with Tier 2 emission rates to calculate emissions factors for the drill rig engines. CARB's Offroad2007 emissions model was used to estimate drill rig emission factors for SO_2 and the PM2.5 drill rig exhaust emission factors were calculated by multiplying the Tier 2 PM10 emission factors by the mass fraction of PM2.5 emissions in PM10 diesel exhaust (SCAQMD, 2006).

Details of the off-road construction emissions calculations and model input and output are provided in Appendix C.1, *Air Pollutant Emission Estimates*.

On-Road Motor Vehicle Exhaust Emissions

Emissions of ROG, NO_x, CO, SO_2, PM10, and PM2.5from motor vehicles were calculated by multiplying the estimated vehicle-miles-traveled (VMT) by each type of vehicle estimated to be used during the construction phase by emission factors that were compiled running CARB's EMFAC2011 Burden Model for average model years and average speed during calendar year 2013 in Mono County. Daily emissions by vehicle class (i.e., light-duty gasoline-fueled trucks and heavy-duty trucks) are estimated using the EMFAC2011 emission factors multiplied by the estimated CD-IV Project-related vehicle trips (see Section 4.16-1, *Traffic, Transportation, and Circulation*) and the estimated daily mileage traveled by the vehicles. The daily emissions were multiplied by the number of annual work-days per activity phase to estimate the annual on-road vehicle exhaust emissions. Details of the on-road construction emissions calculations and model input and output are provided in Appendix C.1, *Air Pollutant Emission Estimates*.

Fugitive Dust Emissions

On-Site Construction Activities

Earth-disturbing activities such as excavation, filling, grading, and vehicle travel during construction of the CD-IV Project would generate fugitive dust emissions, including emissions of PM10 and PM2.5. Maximum daily fugitive particulate matter emissions generated at the CD-IV Project sites during construction were estimated using an emission factor developed by Midwest Research Institute (MRI). The emission factor is based on observations of construction operations in California and Las Vegas. The emission factor uses estimates of geologic dust emissions from construction activities. The emission factor is 0.11 tons PM10/acre-month of activity (or approximately 10 pounds PM10/acre-day, assuming approximately 21 workdays per month). The fugitive dust emission factor includes the effects of typical control measures such as routine watering (CARB, 2002) that are proposed for the CD-IV Project (see Section 4.2.2). It is estimated that power plant construction, well development construction, and pipeline construction would result in daily area disturbances of approximately 2.0 acres, 1.0 acre, and 0.5 acre per day, respectively.

Off-site Unpaved Road Travel

CD-IV Project-related dust emissions that would be generated by vehicle travel on unpaved roads was estimated using USEPA methodology identified in its AP-42 document (USEPA, 2006). Maximum daily and annual trip amounts associated with the well development and pipeline construction activities were derived from data provided in Section 4.16-1, *Traffic, Transportation, and Circulation*. It is expected that there would be negligible off-site unpaved road travel associated with construction of the power plant, and that each off-site trip related to pipeline and well development construction would result in an average of approximately 0.5 mile of travel on unpaved roads. This VMT amount was multiplied by the AP-42 predictive emission factor Equation 1a with appropriate variables as identified in AP-42 Section 13.2.2, *Unpaved Roads* (USEPA, 2006). The AP-42 emission factor was combined with an overall dust control efficiency of approximately 75 percent related to the proposed maximum speed limit on unpaved roads (see Section 2.2.3.3) and watering actively travelled unpaved roads (see Section 4.2.2). The overall unpaved road dust control efficiency of 0.75 percent is based on control efficiencies published by the SCAQMD (SCAQMD, 2007).

Public Health Risk

The primary hazardous air pollutant emissions that would be associated with construction of the Proposed Action and Alternatives are hydrogen sulfide (H_2S) released from geothermal fluid during well drilling and testing, and DPM exhaust emissions from on-site construction equipment. Small quantities of other hazardous air pollutants would be associated with gasoline-fueled vehicles also operating on-site during construction. The location of hazardous pollutant emissions from the well sites and construction equipment operation would vary across the CD-IV Project sites over the construction period, and thus would not be in a fixed location for long periods of time. The closest sensitive receptor to a CD-IV Project site is the Shady Rest Campground, approximately 0.5 mile to the west-southwest of Well Site 38-25, and the closest residences are along Trails End Road, approximately 0.8 mile southwest of Well Sites 38-25 and

50-25. Therefore, given the temporary nature of construction activities and the lack of long-term emissions that would occur at Site 38-25, health risks are assessed qualitatively and a full health risk assessment was not warranted.

Class I Areas

It is not likely that air pollutant emissions resulting from construction activity associated with the CD-IV Project would degrade the air quality of nearby Class I areas, including the John Muir Wilderness Area. This wilderness area is at elevations above 8,000 feet, and the CD-IV Project site is at an elevation of approximately 7,300 feet. Predominant westerly and northwesterly winds would likely carry pollutants toward Long Valley and away from the wilderness area.

4.2.1.2 Operation and Maintenance

Operation-related air pollutant emissions would be generated from exhaust and leaks from on-site equipment and from exhaust related to off-site vehicle use.

On-Site Equipment Emissions

Fugitive N-Pentane

As described in Section 2.6.6.5, the power plant motive fluid system of vaporized n-pentane would be designed as a closed loop, although fugitive leaks of n-pentane would be expected from the valves, connections, seals, and tubes of the closed system. The fugitive n-pentane, which is considered an ROG, would be released to the atmosphere or would leak into the geothermal lines. As described in Section 2.6.6.5, n-pentane leak detectors would be installed throughout the power plant facility and would be continuously monitored. ORNI 50, LLC has estimated a maximum fugitive n-pentane leak rate for the CD-IV Project of 410 lbs/day, and has requested this amount as permit limit from the GBUAPCD. Therefore, for the purposes of this analysis, it is estimated that up to 410 lbs/day of n-pentane would be released to the atmosphere every day during operation of the CD-IV Project.

Emergency Standby Diesel Equipment

The CD-IV Project power plant would also include operation of one approximately 800 bhp diesel-fueled emergency generator to provide backup power for critical plant control systems in the event of a power outage. Similarly, the proposed power plant would include one approximately 400 bhp diesel-fueled firewater pump to provide power to the firewater pump in the event of a fire emergency. The reported specifications for these proposed stationary diesel engines would meet the required USEPA and CARB tier requirements and the CARB Airborne Toxic Control Measure (ACTM) standards. The manufacturer’s recommendations for testing and maintenance of the emergency generators would be followed, allowing up to 50 hours per year of operation for maintenance and/or testing purposes (40 CFR Part 89). Diesel combustion emissions would occur during the intermittent testing and potential emergency use of these engines. ORNI 50, LLC has tentatively selected specific equipment manufacturers and models of engines that would be used at the CD-IV power plant site that would be the same equipment that ORNI 50, LLC has proposed for the replacement M-1 plant site.

The emissions data that would be associated with the M-1 emergency standby diesel equipment have been estimated and are presented in Mono County's MP-I Replacement Project Recirculated Draft EIR, Appendix H (Mono County, 2012). These emission estimates have been peer reviewed and are considered adequate for this analysis. Therefore, this analysis uses the emergency standby diesel equipment emission estimates from the MP-I Replacement Project to represent the emergency standby diesel equipment emissions that would be associated with the CD-IV Project.

Motor Vehicle Emissions

Emissions from motor vehicles used during operation and maintenance were estimating using emission factors that were compiled by running CARB's EMFAC2011Burden Model. Emissions that would be associated with commuting workers and periodic road snow plowing are estimated using the EMFAC2011emission factors multiplied by the estimated long-term operation and maintenance-related employee vehicle trips (up to 12 one-way trips; see Section 4.16-1, *Traffic, Transportation, and Circulation*) and the estimated additional snow plowing mileage (i.e., estimated to be 20 miles per day, twice a week, for five months) that would be associated with the CD-IV Project.

Public Health Risk

Given the relatively long distance from the proposed power plant site to the closest sensitive receptor locations, health risks are assessed qualitatively and a full health risk assessment was not warranted for operation and maintenance of the CD-IV Project.

Class I Areas

It is not likely that air pollutant emissions resulting from operation and maintenance activity associated with the CD-IV Project would degrade the air quality of nearby Class I areas, including the John Muir Wilderness Area. This wilderness area is at elevations above 8,000 feet, and the CD-IV Project site is at an elevation of approximately 7,300 feet. Operational emissions would be negligible, and predominant westerly and northwesterly winds would likely carry pollutant toward Long Valley and away from the wilderness area.

4.2.1.3 Decommissioning Emissions

Decommissioning-related impacts to air resources would be substantially similar to the construction-related impacts described above, with the exception that decommissioning activities would not likely require drilling.

4.2.1.4 Impact Analysis

Independent of NEPA, federal Clean Air Act section 176 requires federal agencies that are funding, permitting, or approving an activity to ensure the activity conforms to the applicable SIP adopted to eliminate or reduce air quality violations (42 USC §7506). The study area is classified as moderate non-attainment for the federal 24-hour PM10 AAQS. In addition, although currently classified as attainment, PM2.5 concentrations in the GBVAB have exceeded the federal 24-hour

standard in recent years (see Section 3.2.1.3, *Criteria Air Pollutants*). Therefore, the applicable federal Clean Air Act conformity *de minimis* level (i.e., 100 tons per year) for PM10 and PM2.5 is used as a measure as to whether the Proposed Action or one of the Action Alternatives could result in an exceedance of a federal AAQS.

The study area is also classified as non-attainment for the state 1-hour and 8-hour ozone AAQS as well as the 24-hour PM10 AAQS. The GBUAPCD has not developed specific significance thresholds for construction or operation emissions. However, to provide a measure of whether the Proposed Action or one of the Action Alternatives could result in an exceedance of a state AAQS, construction and operation and maintenance mass exhaust and fugitive dust emissions are compared to the Imperial County Air Pollution Control District (ICAPCD) CEQA significance thresholds for ozone precursors (i.e., NO_x and ROG) and PM10 (ICAPCD, 2007). The applicable ICAPCD thresholds are identified in Table 4.2-1. The thresholds were selected for comparison, in part, because Imperial County is a rural county similar to Mono County with existing and proposed geothermal development projects. The Imperial County Air Basin is also a federal and state non-attainment area for both ozone and PM10.

TABLE 4.2-1
ICAPCD AIR QUALITY SIGNIFICANCE THRESHOLDS

Criteria Pollutant	Construction (pounds/day)	Operation (pounds/day)
Oxides of Nitrogen (NO_x)	100	55
Reactive Organic Gases (ROG)	75	55
Respirable Particulate Matter (PM10)	150	150

SOURCE: ICAPCD, 2007.

4.2.2 Project Design Measures

The analysis assumes that the following PDMs related to air resources are fully implemented:

1. *AQ-1*: ORNI 50, LLC will apply water during the construction and utilization of pads and access roads as necessary to control dust. Dust will not be discharged into the air for a period or periods aggregating more than three minutes in any one-hour that is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart.

2. *AQ-2*: ORNI 50, LLC will also comply with any requirements prescribed by the GBUAPCD concerning emissions of air pollutants from construction engines or hydrogen sulfide from operating geothermal wells. The drilling rigs will be registered in the CARB Portable Engine Registration Program.

3. *AQ-3*: ORNI 50, LLC will utilize best available equipment and design to minimize emissions of n-pentane.

4. *AQ-4*: ORNI 50, LLC will apply for an air permit to construct and operate the wells and power plant. The Project will conform to GBUAPCD requirements for controlling emissions.

4.2.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to air quality if it would:

a) Conflict with or obstruct implementation of the applicable air quality plan;

b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation;

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors);

d) Expose sensitive receptors to substantial pollutant concentrations; or

e) Create objectionable odors affecting a substantial number of people.

CEQA allows for the significance criteria established by air districts to be used to assess the impact of a project on air quality. Because the GBUAPCD does not have established significance criteria for CEQA reviews, the GBUAPCD has elected to use the ICAPCD's daily emissions CEQA significance thresholds in this analysis to determine the significance of construction and operation impacts associated with the Proposed Action and the Action Alternatives (see Table 4.2-1, above). This analysis uses the applicable ICAPCD thresholds to gauge whether the Proposed Action or an action alternative could violate an air quality standard or contribute to an existing or projected air quality violation in the study area.

4.2.4 Alternative 1: Proposed Action

4.2.4.1 Direct and Indirect Impacts

Construction

Criteria Pollutant Emissions

The maximum annual air pollutant emissions that would be generated in the GBVAB during construction of the CD-IV Project have been estimated using the methodologies described above. It is estimated that approximately the same amount of construction-related activity would occur in 2013 and in 2014, with considerably less construction-related activity occurring in 2015. Therefore, the maximum annual construction emissions represent the emissions that would occur in 2013 and 2014. The PM10 and PM2.5 emissions estimates account for reductions from standard dust control measures, such as application of water and limiting speed on unpaved roads. The estimates for ROG, NO_x, CO, SO_2, PM10, and PM2.5 exhaust include no control-related reductions. This analysis estimates that the control efficiency associated with the standard dust control measures would be 50 percent for on-site activities, and approximately 75 percent for travel on unpaved roads.

As shown in Table 4.2-2, there are no applicable General Conformity *de minimis* levels for ROG, NO_x, CO, or SO_2 because the GBVAB is in attainment of the federal AAQS for those pollutants and those pollutants have not recently exceeded the applicable federal AAQS. Therefore, there is little possibility that CD-IV Project-related emissions of ROG, NO_x, CO, or SO_2 could violate a federal AAQS. The annual emissions for PM10 and PM2.5 would be below the respective NEPA *de minimis* level of 100 tons per year. Therefore, it can be concluded that construction of the CD-IV Project would not result in or contribute to an exceedance of a federal AAQS.

TABLE 4.2-2
PROPOSED ACTION MAXIMUM ANNUAL CONSTRUCTION EMISSIONS

Emissions Source	Maximum Annual Emissions (tons/year)[a]					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
Power Plant Construction Off-road Equipment	<1	2	1	<1	<1	<1
Power Plant Construction On-road Vehicle	<1	2	6	<1	<1	<1
Power Plant Construction Exhaust Subtotal	***1***	***4***	***7***	***<1***	***<1***	***<1***
Well Construction Off-road Equipment	1	11	7	<1	<1	<1
Well Construction On-road Vehicle	<1	3	2	<1	<1	<1
Well Construction Exhaust Subtotal	***1***	***14***	***9***	***<1***	***1***	***<1***
Pipeline Construction Off-road Equipment	<1	1	1	<1	<1	<1
Pipeline Construction On-road Vehicle	<1	1	2	<1	<1	<1
Pipeline Construction Exhaust Subtotal	***<1***	***2***	***3***	***<1***	***<1***	***<1***
Total Fugitive Dust[b]	**---**	**---**	**---**	**---**	**4**	**1**
Grand Total (tons/year)	**2**	**20**	**19**	**<1**	**5**	**1**
General Conformity *de minimis* Level (tons/year)	---	---	---	---	100	100

NOTES:

[a] Exhaust and on-site fugitive dust emissions calculations and assumptions are provided in Appendix C.1.

[b] PM10 and PM2.5 emissions account for control measures (i.e., watering, 25 mph speed limit) that reduce on-site and dirt road travel dust by 50 percent and 75 percent, respectively, relative to uncontrolled emissions; other pollutant emissions do not account for emissions control reductions.

Table 4.2-3 provides the estimated maximum day air pollutant emissions that would be generated within the GBVAB during short-term construction activities associated with the CD-Project. As with the annual emissions, it was estimated that the general fugitive dust control measures would achieve an overall efficiency of 50 percent for on-site activities, and approximately 75 percent for travel on unpaved roads. As indicated in the table, the vast majority of the daily exhaust emissions would be associated with well development construction activities.

As shown in Table 4.2-3, there are no applicable ICAPCD significance criteria for CO, SO_2, or PM2.5 because the GBVAB is attainment of the state AAQS for those pollutants. Therefore, there is little possibility that the CD-IV Project-related emissions of CO, SO_2, or PM2.5 could violate a state AAQS. Although the maximum daily emissions for ROG would be below the respective

TABLE 4.2-3
PROPOSED ACTION MAXIMUM DAY CONSTRUCTION EMISSIONS

Emissions Source	Maximum Day Emissions (pounds/day)[a]					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
Power Plant Construction Off-road Equipment	3	32	27	<1	2	2
Power Plant Construction On-road Vehicles	3	20	63	<1	1	1
Power Plant Construction Exhaust Subtotal	***7***	***53***	***90***	***<1***	***3***	***2***
Well Construction Off-road Equipment	11	206	118	<1	7	6
Well Construction On-road Vehicles	3	44	26	<1	2	1
Well Construction Exhaust Subtotal	***14***	***251***	***144***	***<1***	***8***	***8***
Pipeline Construction Off-road Equipment	3	32	28	<1	2	2
Pipeline Construction On-road Vehicles	2	8	31	<1	<1	<1
Pipeline Construction Subtotal	***5***	***40***	***59***	***<1***	***2***	***2***
Total Fugitive Dust[b]	**---**	**---**	**---**	**---**	**85**	**12**
Grand Total (maximum pounds/day)	**25**	**343**	**292**	**1**	**98**	**24**
ICAPCD Significance Thresholds (lbs/day)	75	100	---	---	150	---

NOTES:

[a] Exhaust and fugitive dust emissions calculations and assumptions are provided in Appendix C.1.

[b] PM10 and PM2.5 emissions account for control measures (i.e., watering, 25 mph speed limit) that reduce on-site and unpaved road travel dust by 50 percent and 75 percent, respectively, relative to uncontrolled emissions; other pollutant emissions do not account for emissions control reductions.

applicable ICAPCD significance threshold, the maximum daily emissions of NO_x would easily exceed the respective ICAPCD significance threshold; therefore, it can be concluded that the CD-IV Project could result in or contribute to an exceedance of the state 1-hour and/or 8-hour ozone AAQS. The estimated maximum daily PM10 emissions would not exceed the ICAPCD significance threshold, indicating that CD-IV Project-related PM10 emissions would not result in an exceedance of the state PM10 24-hour AAQS.

Because the maximum daily NO_x emissions shown in Table 4.2-3 are primarily related to well drilling activities using drill rigs that would meet USEPA and CARB Tier 2 standards for off-road engines, there is no further feasible NO_x emission control technology that can be applied to the drill rigs. However, implementation of **Mitigation Measure AQ-1**[1] would reduce NO_x exhaust emissions associated with mobile off-road equipment (e.g., dozers, graders, loaders, etc.) by approximately 20 percent. This would reduce the maximum day NO_x emissions by approximately 19 pounds; however, the daily significance threshold used for this analysis would still be exceeded.

The estimated construction maximum day PM10 emissions (98pounds) do not exceed the ICAPCD significance threshold (150 pounds); however, in accordance with CEQ guidance and BLM NEPA Handbook section 6.8.4, reasonable, relevant mitigation measures that could

[1] See Section 4.2.9 for all mitigation measures.

improve a proposed project can be applied to reduce or eliminate adverse impacts whether or not the impacts are "significant" as that term is defined by NEPA. For the CD-IV Project, approximately 87 percent of the maximum daily PM10 emissions would be in the form of fugitive dust. Although PM10 emission levels would not reach the threshold established by ICAPCD, the emission estimates incorporate specific control measures that would be implemented in the field. ORNI 50, LLC has committed to implementation of PDM AQ-1 (see Section 4.2.2) to control fugitive dust; however, to strengthen the intent of PDM AQ-1 and to ensure that specific control measures would be implemented during construction that are at least as effective in controlling fugitive dust as was estimated in the emission calculations, **Mitigation Measure AQ-2** (see Section 4.2.9) is recommended.

Public Health Risk and Odors

Geothermal fluid can release various non-condensible gases such as H_2S. Hot water, steam, particulate, and/or gases that could emanate from a typical geothermal well during drilling, testing, and cleanout in the Casa Diablo Geothermal Resource Area could contain several minerals and other naturally occurring chemicals. However, most of these chemicals are present only in trace amounts and would not pose a health hazard to the surrounding environment. H_2S emissions would be the most important non-condensible gas from a health-risk and odor nuisance standpoint. The potential exists that this gas and other non-condensable gases may be emitted intermittently on a short-term and temporary basis during drilling.

During well cleanout and flow testing, geothermal fluids would likely be pumped into large open containers. H_2S may temporarily be released from the geothermal fluid for several hours during these activities. The local H_2S emissions during these activities could exceed the GBUAPCD H_2S emissions standard of 2.5 kg/hr/source and could produce an objectionable "rotten egg" odor in the immediate vicinity of each well. However, these concentrations would not be expected to pose a health hazard and would not reach far beyond the vicinity of the well under normal conditions. Potential H_2S emissions resulting from these activities would be temporary at each well development site and would occur for a relatively short period of several hours.

Construction of the CD-IV Project would also result in short-term diesel exhaust emissions from on-site heavy duty equipment and from material deliveries and debris removal. Particulate exhaust emissions from diesel-fueled engines (i.e., DPM) were identified as a TAC by the CARB in 1998. Construction of the CD-IV Project would result in the short-term generation of DPM emissions from the use of off-road diesel equipment required for site preparation and well drilling activities, and from construction material deliveries and decommissioning material removal using on-road heavy-duty trucks.

The dose to which receptors are exposed is the primary factor affecting health risk from TACs. Dose is a function of the concentration of a substance or substances in the environment and the duration of exposure to the substance. According to the Office of Environmental Health Hazard Assessment (OEHHA), health risk assessments, which determine the exposure of sensitive receptors to TAC emissions, should be based on a 70-year exposure period when assessing TACs (such as DPM) that have only cancer or chronic non-cancer health effects (OEHHA, 2003).

However, such health risk assessments should be limited to the duration of the emission-producing activities associated with the project. For the CD-IV Project, the highest DPM emissions source would be the drill rig that would have engines that would operate at each site for a combined total of 16 hours per day, for a period of approximately 30 days at each well site. The total PM2.5 emissions from on-site preparation and drilling would be approximately 0.07 ton over the 2-month well development period at each well site.[2] Because these emissions would not occur in the immediate vicinity of a sensitive receptor, and because the duration of exposure would be a small fraction of the 70-year exposure period used in health risk assessments, the health risk from the short-term DPM emissions is expected to be negligible.

The closest sensitive receptor to a CD-IV Project site is the Shady Rest Campground, approximately 0.5 mile to the west-southwest of Well Site 38-25, and the closest residences are along Trails End Road, approximately 0.8 mile southwest of Well Sites 38-25 and 50-25. Therefore, given the temporary nature of construction activities and the lack of sensitive receptors in the immediate vicinity of CD-IV Project components, health risks and odor nuisances that would be associated with the CD-IV Project are expected to be negligible.

Operation and Maintenance

Criteria Pollutants

Table 4.2-4 shows the estimated annual criteria pollutant emissions that would be generated each year during operation and maintenance of the CD-IV Project. As shown in Table 4.2-4, there are no applicable General Conformity *de minimis* levels for ROG, NO_x, CO, or SO_2 because the GBVAB is in attainment of the federal AAQS for those pollutants and those pollutants have not recently exceeded the applicable federal AAQS. Therefore, there is little possibility that the Project-related emissions of ROG, NO_x, CO, or SO_2 could result in a violation of a federal AAQS. The operation and maintenance annual emissions for PM10 and PM2.5 would be below the respective NEPA *de minimis* level of 100 tons per year. Therefore, it can be concluded that operation and maintenance of the CD-IV Project would not result in or contribute to an exceedance of a federal AAQS.

Table 4.2-5 provides the estimated maximum day air pollutant emissions that would be generated within the GBVAB during long-term operation and maintenance associated with the CD-Project. As shown in Table 4.2-5, there are no applicable ICAPCD significance threshold for CO, SO_2, or PM2.5 because the GBVAB is designated as attainment of the state AAQS for those pollutants. Therefore, there is little possibility that the CD-IV Project-related operation and maintenance emissions of CO, SO_2, or PM2.5 could violate a state AAQS. The maximum day emissions of ROG would easily exceed the respective ICAPCD significance threshold; therefore, it can be concluded that operation of the CD-IV Project could result in or contribute to an exceedance of the state 1-hour and/or 8-hour ozone AAQS. The estimated maximum day NO_x and PM10 emissions would not exceed the ICAPCD significance thresholds, indicating that Project-related NO_x and PM10 emissions would not result in an exceedance of the state PM10 24-hour AAQS.

[2] PM2.5 exhaust emissions are conservatively used here as a surrogate for DPM.

TABLE 4.2-4
PROPOSED ACTION ANNUAL OPERATION AND MAINTENANCE EMISSIONS

Emissions Source	Maximum Day Emissions (tons/year)[a]					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
Power Plant Fugitive n-pentane[b]	74.8	---	---	---	---	---
Off-site Vehicle Emissions	<0.1	0.1	0.4	<0.1	<0.1	<0.1
Emergency Generator and Firewater Pump[c]	<0.1	0.2	0.0	<0.1	<0.1	<0.1
Total (maximum pounds/day)	**74.8**	**0.3**	**0.4**	**<0.1**	**<0.1**	**<0.1**
General Conformity *de minimis* Level (tons/year)	---	---	---	---	100	100

NOTES:

[a] Exhaust and fugitive dust emissions calculations and assumptions are provided in Appendix C.1.
[b] Obtained from MPLP, 2010.
[c] Obtained from Mono County, 2012.

SOURCES: MPLP, 2010; Mono County, 2012.

TABLE 4.2-5
PROPOSED ACTION MAXIMUM DAY OPERATION AND MAINTENANCE EMISSIONS

Emissions Source	Maximum Day Emissions (pounds/day)[a]					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
Power Power Plant Fugitive n-pentane[b]	410.0	---	---	---	---	---
Off-site Vehicle Emissions	0.1	0.6	2.5	<0.1	<0.1	<0.1
Emergency Generator and Firewater Pump[c]	0.1	7.9	1.2	0.8	0.2	0.2
Total (maximum pounds/day)	**410.2**	**8.5**	**3.7**	**0.8**	**0.2**	**0.2**
ICAPCD Significance Thresholds (lbs/day)	75	100	---	---	150	---

NOTES:

[a] Exhaust and fugitive dust emissions calculations and assumptions are provided in Appendix C.1.
[b] Obtained from MPLP, 2010.
[c] Obtained from Mono County, 2012.

SOURCES: MPLP, 2010; Mono County, 2012.

As noted in Table 4.2-5, the ROG operation and maintenance emissions associated with the CD-IV Project would be almost exclusively related to fugitive n-pentane at the power plant. During major maintenance activities, n-pentane would be controlled and minimized by evacuating and compressing the n-pentane vapors, returning the n-pentane liquid to the OEC Unit and releasing the n-pentane vapors that would not condense through the n-pentane VRUs, which would adsorb nearly all of the remaining n-pentane vapors. The OEC VRUs at other facilities similar to what is proposed for the CD-IV Project have demonstrated better than 99.6 percent efficiency in controlling and recovering n-pentane emissions during normal operations (MPLP, 2010). The CD-IV Project would include state of the art equipment and best available technology

designed to limit fugitive n-pentane emissions; therefore, there is no additional feasible mitigation that can be applied to the CD-IV Project to substantially reduce the long-term fugitive ROG emissions.

Public Health Risk and Odors

Because the closest residential sensitive receptors are located approximately 1.6 miles from the proposed power plant site, and the power plant would have negligible TAC emissions (see PM2.5 levels presented in Tables 4.3-4 and 4.3-5), the health risk from exposure to DPM during CD-IV Project operation and maintenance would be negligible. Odors would not be expected during normal operations because the geothermal fluid would be contained within a closed-loop heat exchanger system and reinjected back into the geothermal reservoir.

Decommissioning

At the end of the 30-year expected life of the CD-IV Project, operation would cease and associated facilities would be decommissioned and dismantled, and the site would be restored in conformance with BLM and USFS requirements. Decommissioning activities could generate temporary air pollutant emissions similar to those that would occur during construction of the power plant and pipeline (see Tables 4.2-2 and 4.2-3, above). It should be noted that decommissioning activities would not require drilling. Therefore, decommissioning activities would likely generate annual and maximum day emissions that would be below the federal *de minimis* levels and ICAPCD significance thresholds, and it can be concluded that decommissioning activities would not result in an exceedance of a federal or state AAQS.

4.2.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the CD-IV Project (construction, operation and maintenance, and decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.2.3.

a) Conflict with or obstruct implementation of the applicable air quality plan.

The Air Quality Management Plan for the Town of Mammoth Lakes was implemented in an attempt to bring the area into compliance with federal and state PM10 air quality standards. The plan adopted regulations that phased out non-certified wood stoves and fireplaces, limited the installation of stoves and fireplaces to one certified unit per residence, prohibited trash and coal burning, and established triggers for no burn days. The CD-IV Project would not include fires of any kind (see Section 2.2.8, DPM Haz-6); therefore, construction, operation and maintenance, and decommissioning activities associated with the CD-IV Project would not conflict with or obstruct the Air Quality Management Plan for the Town of Mammoth Lakes. There would be no impact.

b) Violate any air quality standard or contribute to an existing or projected air quality violation.

As shown in Table 4.2-3, the maximum daily CD-IV Project-related construction emissions of ROG and PM10 would be below the respective significance thresholds. Therefore, CD-IV Project

emissions of ROG and PM10 would not result in or contribute to an exceedance of an applicable 1-hour, 8-hour, or 24-hour AAQS and the associated construction impacts would be less than significant. With regard to NO_x, the estimated maximum day emissions would exceed the CEQA significance threshold, indicating that CD-IV Project-related NO_x emissions could cause or contribute to an exceedance of the state ozone 1-hour or 8-hour AAQS. Implementation of Mitigation Measure AQ-1 would reduce emissions associated with off-road mobile diesel equipment; however, total maximum day emissions would still exceed the CEQA significance threshold. Therefore, the short-term construction-related NO_x impact would be considered significant and unavoidable.

The maximum day emissions that would be associated with operation and maintenance of the CD-IV Project would exceed the CEQA significance threshold for ROG, and would be below the CEQA significance thresholds for the other pollutants (see Table 4.2-5). Therefore, impacts associated with operation and maintenance of the CD-IV Project could result cause or contribute to an exceedance of the state ozone 1-hour or 8-hour AAQS. Because the CD-IV Project is proposed to include state of the art equipment and best available technology that would limit fugitive ROG (i.e., n-pentane) emissions, no additional feasible mitigation measures are available to further substantially reduce fugitive ROG emissions, and the CD-IV Project would result in a significant and unavoidable impact related to long-term fugitive emissions of n-pentane.

Decommissioning activities could generate temporary air pollutant emissions similar to those that would occur during construction of the power plant and pipeline (see Tables 4.2-2 and 4.2-3, above). Therefore, the proposed activities would likely generate annual and maximum day emissions that would be below the CEQA significance thresholds. Therefore, decommissioning activities that would be associated with the CD-IV Project would result in impacts that would be less than significant.

c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is a non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

The CD-IV Project area is designated as non-attainment of the state 1-hour and 8-hour ozone AAQS, the state 24-hour PM10 AAQS, and the federal PM10 24-hour AAQS. Construction activities associated with the CD-IV Project could have a temporary impact on regional air quality through short-term increases in ROG, NO_x, and PM10, which could be cumulatively significant when combined with other projects described in Table 4.1-1. If a project would exceed the significance thresholds identified in Table 4.2-1, its emissions would be cumulatively considerable, and if a project would not exceed the significance thresholds, its emissions would not be cumulatively considerable.

As shown in Table 4.2-3, the maximum day construction emissions for NO_x would exceed the CEQA significance threshold; however, the maximum day emissions of ROG and PM10 would not exceed the CEQA significance thresholds. Implementation of Mitigation Measure AQ-1 would slightly reduce NO_x emissions; however, the maximum day emissions would still exceed

the significance threshold. Therefore, the CD-IV Project would be cumulatively considerable with respect to short-term construction emissions of NO_x and the associated cumulative impact would be significant and unavoidable.

Long-term CD-IV Project operation and maintenance would result in negligible maximum day emissions of NO_x and PM10 (see Tables 4.2-4 and 4.2-5); however, the maximum day emissions of fugitive n-pentane would easily exceed the CEQA significance threshold for ROG. Therefore, the CD-IV Project would be cumulatively considerable with respect to long-term emissions of ROG and the associated cumulative impact would be significant and unavoidable.

Decommissioning activities would generate temporary air pollutant emissions that would be below the CEQA significance thresholds. Therefore, the short-term decommissioning-related emissions would not be cumulatively considerable and the associated cumulative impact would be less than significant.

d) Expose sensitive receptors to substantial pollutant concentrations.

Given the temporary nature of CD-IV construction activities, the low levels of long-term TACs that would be generated, and the lack of sensitive receptors in the immediate vicinity of CD-IV Project components, health risks to sensitive receptors would be negligible (see Section 4.2.4.1, above). The air quality impact of the CD-IV Project with respect to exposure of sensitive receptors to construction, operation and maintenance, and decommissioning-related emissions would be less than significant.

e) Create objectionable odors affecting a substantial number of people.

During well cleanout and flow testing, H_2S may temporarily be released from the geothermal fluid for several hours. The local H_2S emissions during these activities could produce a noticeable “rotten egg” odor (see Section 4.2.4.1). However, given the temporary nature of well cleanout and flow testing activities and the lack of sensitive receptors in the immediate vicinity of the proposed well sites, the CD-IV Project would not create odors that would affect a substantial number of people. The impact would be less than significant.

4.2.5 Alternative 2: Alternative Plant Site

4.2.5.1 Direct and Indirect Impacts

Construction and operation of the Alternative 2 power plant would result in the same air pollutant emissions as those identified in Tables 4.2-2 through 4.2-5. Therefore, same as for the Proposed Action, construction of Alternative 2 would result in the potential for short-term exceedances of the state ozone AAQS, operation and maintenance of Alternative 2 would result in the potential for long-term exceedances of the state ozone AAQS related to fugitive ROG (i.e., n-pentane) emissions, and decommissioning of Alternative 2 would not result in an exceedance of a federal or state AAQS.

However, under Alternative 2, the residence at Chance Ranch would be located approximately 0.5 mile from the power plant site, compared to approximately 1.6 miles under the Proposed Action. Although the Proposed Action would be preferred compared to Alternative 2 because the power plant site is closer to the residence at Chance Ranch under Alternative 2, the limited DPM emissions that would be associated with construction, operation and maintenance, and decommissioning of the power plant would result in negligible health risks related to DPM exposure for Alternative 2.

4.2.5.2 CEQA Significance Determination

Because emissions would be essentially the same for Alternative 2 compared with the Proposed Action, the CEQA significance determinations for Alternative 2 are the same as described above for the Proposed Action.

4.2.6 Alternative 3: Modified Pipeline Alternative

4.2.6.1 Direct and Indirect Impacts

Construction and operation of the modified pipeline under Alternative 3 would result in substantially the same air pollutant emissions as those identified in Tables 4.2-2 through 4.2-5. Therefore, same as for the Proposed Action, construction of Alternative 3 would result in the potential for short-term exceedances of the state ozone AAQS, operation and maintenance of Alternative 3 would result in the potential for long-term exceedances of the state ozone AAQS related to fugitive ROG (i.e., n-pentane) emissions, and decommissioning of Alternative 3 would not result in an exceedance of a federal or state AAQS.

Under Alternative 3, the geothermal production and injection pipeline route east of U.S. Highway 395 and north of Shady Rest Park would be modified. The Alternative 3 modified pipeline route east of U.S. Highway 395 would not be within the vicinity of any sensitive receptors; however, the modified route north of Shady Rest Park would be approximately 350 feet closer to the park than would the route under the Proposed Action. Pipeline construction activities would proceed at a linear pace and would occur in the vicinity of the park for only a few days. Therefore, although the Proposed Action would be slightly preferred compared to Alternative 3 given the closer distance from the pipeline under Alternative 3 to Shady Rest Park, the limited DPM emissions that would be associated with construction, operation and maintenance, and decommissioning of the pipeline would result in negligible health risks related to DPM exposure.

4.2.6.2 CEQA Significance Determination

Because emissions would be essentially the same for Alternative 3 compared with the Proposed Action, the CEQA significance determinations for Alternative 3 are the same as described above for the Proposed Action.

4.2.7 Alternative 4: No Action

4.2.7.1 Direct and Indirect Impacts

Under the No Action Alternative, no drilling or construction activities associated with the CD-IV project would occur, and as a result there would be no effects on air resources. The short-term construction and long-term operation air pollutant emissions described in Section 4.2.4 would not occur under the No Action Alternative; therefore, there would be no other impacts to air resources.

However, drilling of authorized geothermal exploration wells in Basalt Canyon, not associated with the CD-IV project could continue, potentially resulting in short-term effects to air resources that have been disclosed in previous NEPA and CEQA documents.

4.2.7.2 CEQA Significance Determination

Under the No Action Alternative, no drilling or construction activities associated with the CD-IV project would occur, and as a result there would be no effects on air resources.

However, drilling of authorized geothermal exploration wells in Basalt Canyon, not associated with the CD-IV project could continue and the impacts from short-term well drilling-related pollutant levels could result in pollutant emissions that have been disclosed in previous NEPA and CEQA documents.

4.2.8 Cumulative Impacts

4.2.8.1 Geographic Extent/Context

The geographic scope considered for potential cumulative impacts to regional air quality is the GBVAB. If a project would result in an increase in a criteria pollutant, or criteria pollutant precursors, of more than the respective daily mass emissions thresholds, then it also would be considered to contribute considerably to a significant cumulative impact. Alternatively, if a project would not exceed the significance thresholds, its emissions would not result in an adverse cumulative effect. See Table 4.1-1 for a summary of all cumulative projects. Any construction project could contribute to regional air quality degradation.

With regard to impacts on sensitive receptors, the geographic scope considered for potential cumulative impacts on sensitive receptors are projects located within approximately 1,000 feet of the CD-IV Project that are also located within 1,000 feet of a sensitive receptor, such as a residence. The CD-IV Project would be constructed in a remote area of Mono County, where the closest sensitive receptors (i.e., campgrounds) would be at least 0.5 mile from any component of the CD-IV Project. No projects are identified in Table 4.1-1 that meet this criterion.

4.2.8.2 Existing Cumulative Conditions

The CD-IV Project area is designated as non-attainment of the state 1-hour and 8-hour ozone AAQS, the state 24-hour PM10 AAQS, and the federal PM10 24-hour AAQS. The proposed power plant site is in located at the Casa Diablo Geothermal Complex, which is currently developed with three geothermal power plants: MP-I, MP-II, and PLES-I. The CD-IV Project would constitute the fourth geothermal power plant in the complex.

4.2.8.3 Reasonably Foreseeable Projects

There are several projects in the vicinity of the CD-IV Project that are reasonably foreseeable and could be constructed and/or operated simultaneously with the CD-IV Project, including the MP-I Replacement Project, which would replace the aging MP–I power plant with a new, more modern and efficient binary power plant (M–1) while maintaining the existing geothermal wellfield, pipeline system and ancillary facilities. In addition to geothermal projects, there are numerous development projects in the GVAB region that would contribute to degradation of regional air quality. Table 4.1-1, presented in Section 4.1.5, *Cumulative Scenario Approach*, lists cumulative projects in the vicinity of the project site and surrounding area that were used to develop this analysis of cumulative effects for air resources. Comparable data was available for the Snow Creek Master Plan, which proposes the development of 850 residential dwelling units, 400 hotel rooms/ suites, and up to 75,000 square feet for non-residential uses on a total of approximately 237 acres.

4.2.8.4 Construction and Decommissioning

Construction of the CD-IV Project would not cause a substantial impact related to the generation of odors because well drilling construction activities would be intermittent and spatially dispersed, and associated odors would dissipate quickly from the well sites. Projects in the cumulative scenario are not expected to cause odors that would intermingle with those of the CD-IV Project.

Short-term construction and decommissioning of the CD-IV Project would cause emissions that would exceed the ICAPCD significance thresholds (see Section 4.2.4.1, *Direct and Indirect Impacts*). Cumulative impacts would occur from short-term construction-related NO_x emissions when combined with the construction-related impacts of the cumulative projects described in Table 4.1-1, to the extent such projects would be constructed concurrently with the CD-IV Project. Mitigation Measure AQ-1 would reduce emissions of NO_x during CD-IV Project construction activities, but the short-term impacts related to NO_x would remain. Therefore, concurrent construction of the Proposed Action and the cumulative projects listed in Table 4.1-1would increase the likelihood that the state ozone AAQS would be exceeded. Table 4.2-6 summarizes the proposed CD-IV Project emissions along with available emissions data for cumulative projects listed in Table 4.1-1. The timing for these projects is unknown; therefore, emissions may not occur simultaneously.

TABLE 4.2-6
CUMULATIVE MAXIMUM DAY CONSTRUCTION EMISSIONS

Project	Maximum Day Emissions (pounds/day)					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
CD-IV Project[a]	25	343	292	1	98	24
MP-I Replacement[b]	11	85	52	<1	13	9
Snow Creek Phase III Building and Construction[c]	287	186	257	<1	7	NA[d]
ICAPCD Significance Thresholds (lbs/day)	75	100	---	---	150	---

NOTES:
[a] Exhaust and fugitive dust emissions summaries and calculations and assumptions for the proposed CD-IV Project are provided in Table 4.2-3 and Appendix C.1, respectively.
[b] Mono County, 2012.
[c] Town of Mammoth Lakes, 2007.
[d] PM2.5 data is not available for this project.

4.2.8.5 Operation and Maintenance

Long-term operation and maintenance of the CD-IV Project would cause emissions that would exceed the ICAPCD significance thresholds (see Section 4.2.4.1, *Direct and Indirect Impacts*). Cumulative impacts would occur from long-term operation and maintenance-related fugitive ROG emissions and associated cumulative impacts when combined with the emissions-related impacts of the cumulative projects described in Table 4.1-1. The CD-IV Project's operation and maintenance-related ROG emissions and the ROG emissions of cumulative projects could increase the likelihood that the state ozone AAQS would be exceeded. However, it should be noted that the operations of the proposed MP-I Replacement Project would result in less fugitive ROG emissions than current conditions at the aging MP-I power plant Table 4.2-7 summarizes the proposed CD-IV Project emissions along with available operation and maintenance emissions data for cumulative projects listed in Table 4.1-1. The timing for these projects is unknown and therefore emissions may not occur simultaneously.

TABLE 4.2-7
CUMULATIVE MAXIMUM DAY OPERATION AND MAINTENANCE EMISSIONS

Emissions Source	Maximum Day Emissions (pounds/day)[a]					
	ROG	NO_x	CO	SO_2	PM10	PM2.5
CD-IV Project[a]	410.2	8.5	3.7	0.8	0.2	0.2
MP-I Replacement[b]	-294.8[d]	0.12	1.19	7.91	0.84	NA
Snow Creek Operation and Maintenance[c]	170.10	145.55	1,326.47	0.95	NA	NA
ICAPCD Significance Thresholds (lbs/day)	75	100	---	---	150	---

NOTES:
[a] Emissions summaries and calculations and assumptions for the proposed CD-IV Project are provided in Table 4.2-5 and Appendix C.1, respectively.
[b] Mono County, 2012.
[c] Town of Mammoth Lakes, 2007.
[d] Net reduction in ROG compared to the old MP-I plant after taking reduction in fugitive n-pentane emissions into account.

4.2.8.6 CEQA Significance Determinations

Under CEQA, the cumulative impacts related to short-term emissions of NO_x and operational fugitive emissions of ROG would be significant and unavoidable, and cumulatively considerable. Therefore, when considered together with the emissions of other projects, the Project-specific impact under CEQA would be cumulatively considerable and the cumulative impact would be significant and unavoidable.

4.2.9 Mitigation Measures

Mitigation Measure AQ-1: ORNI 50, LLC shall develop and implement a plan that demonstrates that the mobile off-road equipment (more than 50 horsepower) to be used in the Proposed Action (i.e., owned, leased, and subcontractor vehicles) would achieve a Project wide fleet-average 20 percent NO_x reduction compared to the most recent CARB fleet average. The plan shall be approved by GBUAPCD prior to the commencement of construction activities. Acceptable options for reducing emissions include the use of late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, and/or other options as they become available.

Mitigation Measure AQ-2: ORNI 50, LLC shall develop a fugitive dust control plan to be implemented during construction of the Proposed Action. The plan shall be submitted to the GBUAPCD for review and approval prior to the commencement of construction activities. The plan shall include, but not be limited to the following dust control measures:

- All on-site unpaved roads and off-site unpaved access roads shall be effectively stabilized to control dust emissions using water or chemical stabilizer/suppressant.
- All ground disturbance, including land clearing, grubbing, scraping, excavation, grading, and cut & fill activities shall effectively control fugitive dust emissions by utilizing application of water or by presoaking.
- Limit traffic speed on unpaved access roads to 15 mph.
- Suspend excavation and grading activity when gusts produce wind speeds exceeding 20 mph.

4.2.10 Residual Impacts after Mitigation Incorporated

There would be a residual substantial and significant unavoidable impact related to short-term construction emissions of NO_x and long-term operation emissions of fugitive ROG (i.e., n-pentane) after mitigation has been incorporated.

4.3 Biological Resources – Vegetation

4.3.1 Methodology for Analysis

This analysis of potential impacts of the Proposed Action and Alternatives to vegetation resources relies on a literature review, biological reconnaissance survey and coordination with appropriate permitting agencies including the USFWS and CDFG. A literature review was conducted to determine the federal and state-listed endangered, threatened, rare, and special-status plant species that have potential to occur within the Project vicinity. The literature review included a search of the CNDDB Electronic Inventory for the nine USGS 7.5' topographic quadrangles that surround the Project as well as a review of the USFWS List of Federal Endangered and Threatened Species that may be Affected by Projects in Mono County, CA. Literature related to BLM- and USFS-listed Sensitive species and noxious weeds was also reviewed. Impacts are identified and evaluated based on relevant BLM and Forest Service standards, policies, and guidelines. This discussion is based, in part, upon information from these sources:

1. Focused botanical surveys performed in 2002, 2008, 2009, and 2010 (Paulus, 2002, 2009a; 2009b; 2009c; 2009d; 2009e; 2009f; 2010);

2. A delineation of wetlands and waters of the U.S. (Paulus, 2012);

3. Noxious Weed Risk Assessment, Upper Basalt Geothermal Exploration Project (USFS Inyo National Forest, 2005a);

4. Biological Evaluation Sensitive Plant Species; Upper Basalt Geothermal Exploration Project, Inyo National Forest (Environmental Management Associate, Inc., 2005);

5. Amended Biological Evaluation Sensitive Plant Species; Upper Basalt Geothermal Exploration Project, Inyo National Forest (USFS Inyo National Forest, 2005b);

6. The California Natural Diversity Database (CNDDB) (CDFG, 2012);

7. The California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (CNPS, 2012); and

8. CalFlora (2012).

This section analyzes potential impacts to vegetation resources from construction, operation and maintenance, and decommissioning. This analysis addresses potential direct, indirect, and cumulative impacts of the CD-IV Project to special-status plant species, sensitive natural communities and other vegetation resources.

Direct impacts are those resulting from the CD-IV Project and occur at the same time and place. Indirect impacts are caused by the CD-IV Project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the proposed action. The potential impacts discussed in this analysis are those most likely to be associated with CD-IV Project construction, operation and maintenance, and decommissioning. Impact analyses typically

characterize effects to plant communities as temporary or permanent, with a permanent impact referring to areas that are developed or otherwise precluded from restoration to a pre-project state.

4.3.1.1 Native Vegetation Communities

Vegetation communities in the study area include Jeffrey Pine forest, Sagebrush Scrub, Wright's Buckwheat Dwarf scrub, and Singleleaf Pinyon woodland. To determine the potential for construction and operations activities to cause direct effects on native vegetation communities, the proposed construction areas were compared with maps of vegetation communities. Potential indirect effects on native vegetation communities were identified through the same means.

4.3.1.2 Federal and State Jurisdictional Wetlands and Waters of the U.S.

To determine the potential for construction and operations activities to cause direct effects on federal and state jurisdictional wetlands and waters of the U.S. the proposed construction areas were compared with maps of these features. Potential indirect effects were identified through the same means.

4.3.1.3 Special-Status Plants

Special-status plants in the study area include documented populations of pine fritillary. To determine the potential for construction and operations activities to cause direct effects on special-status plants, the proposed construction areas were compared with maps of these species. Potential indirect effects were identified through the same means.

4.3.1.4 Invasive Weeds

Invasive weeds in the study area include black mustard, cheatgrass, bull thistle, orchardgrass, tansy mustard, red-stem filaree, curly dock, Russian thistle, and common mullein. Construction and operation methods were examined to determine the potential for these activities to lead to the spread of these species.

4.3.2 Project Design Measures

The analysis assumes that the following PDMs related to vegetation resources are fully implemented:

Biological Resources

1. *BIO-3*: After construction is complete, erosion control measures including revegetation and periodic maintenance activities will be implemented. Disturbed areas that will not be used after construction will be revegetated with the proper seed mixture and planting procedures prescribed by the USFS. Any topsoils enriched in organic material stockpiled from previously disturbed areas (see **Mitigation Measure GEO-1**)[1] may be applied to enhance areas to be reclaimed by revegetation.

[1] See Section 4.3.9 below for all mitigation measures.

Noxious Weeds

2. *BIO-4*: During construction, prior to entering and upon exiting the CD-IV Project area, all trucks and construction equipment that will operate off of previously existing roads shall be washed to remove soil and plant parts. A central washing facility will be provided for this purpose, either at equipment area at Casa Diablo on private land, or at a location approved by the authorized officer.

3. *BIO-5*: All materials used in erosion control and/or rehabilitation efforts (e.g. straw bales, seeds, etc.) on the CD-IV Project will be certified as being free of noxious weed materials.

4. *BIO-6*: New non-native species introduced as a result of the CD-IV Project, will be eradicated (i.e., 0 percent cover). Where this standard is not met, appropriate weed control measures will be implemented in order to comply with the standard for a period of three years following CD-IV Project completion. (This measure is supplemented by **Mitigation Measure VEG-2** – see Section 4.3.9 below)

5. *BIO-7*: With the exception of cheatgrass, all non-native weed species already present in the Project area will account for no more than 5 percent total of the relative cover of the disturbed areas, including roadsides at the end of a 3-year evaluation period following completion of revegetation measures. Weed control will be implemented immediately following implementation of the CD-IV Project, and throughout the CD-IV Project life to meet this standard.

6. *BIO-8*: Cheatgrass is largely absent from the forested portions of the Project area. In order to maintain this condition, cheatgrass will be removed from all areas where ground disturbance occurs west of drill sites 56-25, 57-25 or 58-25. Appropriate weed control measures will be implemented as necessary, in order to prevent the invasion and spread of cheatgrass, throughout the life of the project, and for a period of three years following CD-IV Project completion.

Protection of Erosion and Surface Waters

1. *HYD-1*: Appropriate erosion control measures will be used to control any offsite discharges, and the Project will adopt any relevant LRWQCB and USFS best management practices to prevent soil erosion, including the preparation of a SWPPP.

2. *HYD-2*: To the extent possible, the pipeline route and any access roadways shall be located outside of any riparian conservation areas delineated by the USFS.

3. *HYD-3*: Existing roads will be evaluated and properly graded and repaired in areas that show evidence of enhanced erosion.

4. *HYD-4*: Exposed, disturbed soils in construction areas will be watered to minimize wind erosion and dust. Topsoil piles will be covered to minimize erosion during wind storms. See also AQ-1.

5. *HYD-5*: A site drainage and runoff management plan will be prepared. All new access roads will comply with the plan to minimize erosion and off-site sedimentation. Off-site stormwater will be intercepted in ditches and channeled around the well sites to energy dissipaters as necessary to minimize erosion.

6. *HYD-6*: The pipeline route will not be cleared or graded to minimize soil disturbance.

7. *HYD-7*: The CD-IV Project will obtain coverage under, and comply with, the California Construction General Storm Water Permit.

4.3.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to biological resources if it would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

e) Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance; or

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Only those CEQA significance criteria related to vegetation, riparian habitat, sensitive natural communities, and state and federal jurisdictional areas (i.e., criteria a, b, c and e) are addressed in this section. Those criteria with aspects that pertain to wildlife resources, which include criteria a, d, e, and f, are analyzed in Section 4.4, *Biological Resources – Wildlife*.

The project site is not located in an area covered by an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, so Significance Criteria (f) is not addressed further in the impact analysis presented in this section.

4.3.4 Alternative 1: Proposed Action

4.3.4.1 Direct and Indirect Impacts

Potential direct impacts on vegetation include disruption, trampling, or removal of rooted vegetation resulting in a reduction in the total acres of native vegetation and actions that unequivocally cause a reduction of total numbers of plants and/or reduction or loss of total area, diversity, vigor, structure, or function of vegetative habitat. Direct impacts also could include

decreased plant vigor or health from reduced water availability or dust accumulation on photosynthetic surfaces.

Indirect impacts can occur later in time or be farther removed in distance while still being reasonably foreseeable and related to the project. Potential indirect impacts of the CD-IV Project include the introduction of invasive species by various vectors or conditions that compete with native species and can result in habitat degradation.

Native Vegetation Communities

Construction

Construction activities associated with the Proposed Action would result in direct temporary and permanent losses of native vegetation. These losses would occur through vegetation clearing, grading, or other surface disturbance (e.g., driving over vegetation). Jeffrey Pine Forest and Sagebrush Scrub are the dominant native vegetation communities in the study area. The project site also supports smaller areas of Wright's Buckwheat Dwarf Scrub and Singleleaf Pinyon Woodland along with mechanically and thermally disturbed areas. Direct impacts to these communities include the permanent loss of native plant communities and fragmentation from adjacent or nearby native vegetation communities. Other temporary indirect impacts from the Proposed Action could occur to surrounding vegetation communities from grading activities disturbing soils and creating air-born, fugitive dust, which may disrupt photosynthesis and other metabolic processes, or sedimentation to or erosion of vegetated areas. The vegetation community at the proposed power plant and substation site is approximately 100 percent Jeffrey pine forest. Construction of the power plant would require removal of up to 6.5 acres of trees and other vegetation. An additional 0.25 acres would be cleared for construction of the substation. The transmission line connection from the power plant substation to the existing SCE Casa Diablo Substation would be 649 feet long. Prior to construction the alignment would be cleared of trees for an area wide enough (less than 50 feet) for construction equipment access and line clearance (maximum of 0.75 acres). The transmission line would be supported by 3 to 6 wooden poles, approximately 40 feet high. No new access roads would be required for the CD-IV power plant site.

Up to 16 production and injection wells are proposed in 18 potential well locations. Fourteen of the wells would be located in the Basalt Canyon Area and two wells would be located southeast of the proposed power plant east of U.S. Highway 395. During construction, each well site would be approximately 2.5 acres to provide access for drilling equipment, mud pits, and a containment basin for drill cuttings. New well pads would require vegetation clearing, earthwork, drainage, and other improvements necessary for efficient and safe operation and fire prevention within an approximately 2.5 acre area for construction. The permanent disturbance area would be approximately 0.4 acres for the finished well pad. Clearing would include removal of organic material, trees, stumps, brush, and slash. If all 16 wells are required, 40 acres of vegetation would be cleared during well construction. Of these 40 acres, 33.6 acres would be restored following construction, leaving 6.4 acres permanently cleared of vegetation. Vegetation communities cleared for well construction would consist of either Jeffrey pine forest or Sagebrush Scrub (see Table 3.3-1). Short permanent access roads from existing roads to the actual well sites would be

constructed where proposed well pads are not immediately adjacent to existing roads. These new access roads would be 15 feet wide, with a turning radius of no less than 50 feet. An estimated 4,072 linear feet (1.4 acres of area) of new access roads would be constructed. Construction of these access roads would be accomplished by clearing brush and grading the surface to construct a roadway; gravel may be added where needed.

No new permanent access roads will be constructed for maintenance of the pipelines. Where the pipeline is not immediately adjacent to an access road, pipeline construction equipment would "catwalk" over the top of the existing vegetation to avoid the need to grade the pipeline route or create an access road. Vehicle access to these off-road construction areas would be limited to that specifically necessary for construction. No vehicles would be allowed to turn or drive in any area beyond a 40-foot wide temporary construction corridor along the pipeline route. Personal vehicles and vehicles not in immediate use during construction would be parked either on existing well pads or at locations along existing access roads which would not impede continued public access.

The production and injection system pipeline corridors would use previously disturbed ground along existing access roads to the fullest extent practical. Construction corridors would be less than 40 feet wide, although expansion joints/loops may have a wider corridor. Few, if any, trees likely would be cut or removed during construction of the pipeline in the Jeffrey Pine Forest plant community. Only in the densest areas would individual trees need to be removed to create the construction corridor. Travel outside the construction corridors would be strictly limited to designated turnout areas and access roads. After construction, the corridor would be revegetated in accordance with an approved USFS revegetation plan, seed mix, and monitoring plan. Although the exact length of production and injection pipelines would depend upon which production and injection wells would ultimately be developed, ORNI 50, LLC estimates that the total alignment for the Proposed Action would total approximately 5.68 miles, of which up to 3.5 miles could consist of double pipeline (this equates to a total of 9.2 miles of pipeline placed along 5.68 miles of alignment).

Impacts to vegetation would occur almost entirely in the Jeffrey Pine Forest and Sagebrush Scrub communities, with additional impacts in the mechanically and thermally disturbed areas. Jeffrey Pine Forest and Sagebrush Scrub are common in the project vicinity. Project activities would not impact the Wright's Buckwheat Dwarf Scrub or the Singleleaf Pinyon Woodland communities.

Tables 4.3-1 and 4.3-2 present a comparison of the three actions alternatives' potential construction impacts to native plant communities.

The CD-IV Project includes several PDMs aimed at protecting and reducing impacts to vegetation resources. PDM BIO-3 includes post-construction revegetation of areas not needed for operation of the project. PDM HYD-6 protects vegetation along pipeline routes by prohibiting clearing and grading to minimize soil disturbance. Indirect impacts to surrounding vegetation communities from grading activities disturbing soils and creating air-born, fugitive dust would be reduced by implementation of PDM HYD-4 which requires watering of exposed soils in construction areas to minimize erosion and dust.

TABLE 4.3-1
ACRES OF VEGETATION DISTURBED (acres)[a]

	Alternative 1 – Proposed Action	Alternative 2 – Plant Site Alternative	Alternative 3 – Modified Pipeline Alternative
Power Plant Site	6.5 acres	7.3 acres	6.5 acres
Substation	0.25 acres	0.25 acres	0.25 acres
Transmission Line (Estimated 50 feet wide corridor)	0.75 acres	5.61 acres	0.75 acres
Geothermal Pipeline (temporary) (Estimated 40 feet wide corridor)	27.5 acres	26.9 acres	26.3 acres
Geothermal Pipeline (permanent)	pipeline piers and footings only	pipeline piers and footings only	pipeline piers and footings only
Well Field (temporary)	33.6 acres	33.6 acres	33.6 acres
Well Field (permanent)	6.4 acres	6.4 acres	6.4 acres
Well Field Access Roads	1.4 acres	1.4 acres	1.4 acres
Total Acres Disturbed (Temporary)	**61.1 acres**	**60.5 acres**	**59.9 acres**
Total Acres Disturbed (Permanent)	**15.3 acres**	**20.96 acres**	**15.3 acres**

NOTE:
[a] Estimated Acreages

TABLE 4.3-2
VEGETATION COMMUNITIES DISTURBED (acres)[a]

Vegetation Community	Alternative 1 – Proposed Action	Alternative 2 – Plant Site Alternative	Alternative 3 – Modified Pipeline Alternative
Jeffrey Pine Forest	36.86 acres	36.50 acres	36.24 acres
Sagebrush Scrub	39.56 acres	44.96 acres	38.96 acres

NOTE:
[a] Estimated Acreages

In addition to the implementation of PDMs protecting native vegetation communities, impacts to native vegetation communities would be reduced through the implementation of **Mitigation Measures VEG-1 and VEG-2**, which identify measures to avoid, reduce, or mitigate impacts to native vegetation communities.

Operation and Maintenance

As with construction, use and maintenance/plowing of access roads during O&M activities for the Proposed Action could result in indirect impacts to vegetation communities as a result of dust and surface disturbance.

Decommissioning

At the end of power plant operations, the CD-IV Project would prepare and implement a Site Abandonment-Reclamation Plan in conformance with BLM and USFS requirements. The Plan would describe the proposed equipment dismantling and site restoration program in conformance with the USFS requirements in effect at the time of abandonment. Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of the facilities. Thus, the direct removal of native vegetation communities is not anticipated for decommissioning activities.

Federal and State Jurisdictional Areas

Construction

Direct impacts to potentially jurisdictional features in the study area are not expected. Project facilities are not planned for those areas identified during vegetation surveys that support vegetation typically associated with wetlands. RCAs in the study area will be avoided through implementation of PDM HYD-2, which requires pipelines and access roadways to be located outside of any delineated RCAs. These drainage systems do not support riparian or wetland species.

Construction of the project facilities near potentially jurisdictional features may result in a discharge of sediments downstream of these sites. Increased sedimentation to these features could lead to decreases in water quality and subsequent impacts to the biological community dependent on these features. Implementation of PDM HYD-1 would reduce these indirect impacts to potentially jurisdictional features. PDM HYD-1 would require appropriate erosion control measures and USFS best management practices to prevent soil erosion, including the preparation of a Storm Water Pollution Prevention Plan.

Operation and Maintenance

No direct impacts are expected to federal and state jurisdictional areas from operation and maintenance of the power plant and facilities. As with construction, maintenance/plowing of access roads during O&M activities for the Proposed Action could result in indirect impacts to federal and state jurisdictional areas as a result of erosion.

Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of the facilities. Thus, impacts to federal and state jurisdictional areas are not anticipated for decommissioning activities.

Special-Status Plants

Construction

No federal or state-listed plant species occur within the study area, and so none would be affected. Permanent direct impacts would occur to one non-listed special-status plant species that is documented in the study area, pine fritillary (CNPS Rare Plant Rank 4.3). The proposed action could affect populations at Well Pad sites 77-25 and 66-25. As the species is somewhat cryptic,

it is possible that more plants are present and that the populations extend into adjacent similar forest habitat.

Direct impacts to pine fritillary include the loss of plants during site grading, accidental crushing of plants during construction including during site clearing and grubbing, and from vehicle staging atop plant populations. There is an additional chance that new special-status plant populations, likely of the species already identified on-site, could be located on the Project site or linear corridors prior to construction. If present, these populations also could be directly affected. The CD-IV Project includes several PDMs aimed at protecting and reducing impacts to vegetation resources. PDM BIO-3 includes post-construction revegetation of areas not needed for operation of the project. PDM HYD-6 protects vegetation along pipeline routes by prohibiting clearing and grading to minimize soil disturbance.

Because pine fritillary is a CNPS Rare Plant Rank 4 species, no additional mitigation measures are necessary for impacts to this species. CNPS Rare Plant Rank 4 species constitute a watch list of plants of limited distribution or plants infrequent throughout a broader area in California. These plants receive no additional protection. Very few of the plants constituting CNPS Rare Plant Rank 4 meet the definitions of §1901, Chapter 10 (Native Plant Protection Act) or §2062 and 2067 (CESA) of the CDFG Code, and few, if any, are eligible for state listing.

Indirect impacts to special-status plants may occur within and outside the Project disturbance area during and following construction. Potential indirect effects to special-status plants include: facilitating the introduction and spread of non-native invasive plant species; fragmenting plant populations and potentially disrupting gene flow; disruption of pollinators; increased risk of fire; and disruption of photosynthesis and other metabolic processes from fugitive dust during construction and operation.

Indirect impacts to surrounding vegetation communities from grading activities disturbing soils and creating air-born, fugitive dust would be reduced by implementation of PDM HYD-4. The Proposed project includes several PDMs aimed at reducing impacts associated with noxious weed species (PDMs BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8). The PDMs would help prevent new infestations from becoming established in the Project area and would help control the spread of existing populations.

Operation and Maintenance

As with construction, use of access roads and maintenance/plowing during O&M activities for the Proposed Action could result in indirect impacts to special-status plant species as a result of dust and disturbance.

Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of the facilities. Thus, impacts to special-status plant species are not anticipated for decommissioning activities.

Noxious Weeds

Construction

Invasive, noxious weeds are threats to vegetation resources. They can displace native plants (including special-status species that are present in the study area), increase the threat of wildfire, and supplant foods that are important to herbivorous species (including special-status species that are present in the study area). Vehicles and construction equipment are the primary conduits for the spread of many invasive, noxious weeds. Construction activities and soil disturbance associated with the Proposed Action could indirectly introduce new invasive, noxious weeds to the study area and could further spread invasive, noxious weeds that are already present in the study area.

The CD-IV Project includes several PDMs aimed at reducing impacts associated with noxious weed species (PDMs BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8). The PDMs would help prevent new infestations from becoming established in the Project area and would help control the spread of existing populations. This would be accomplished through prevention of outside seed sources (BIO-4, BIO-5), eradication of new non-native species populations (BIO-6), monitoring (BIO-7), and removal of cheatgrass in specific areas (BIO-8). **Mitigation Measure VEG-2** would also reduce impacts from noxious weeds by requiring the preparation of a comprehensive weed management plan.

Operation and Maintenance

The maintenance of access roads both within and outside the Project site boundary has the potential to introduce invasive plant species into disturbed areas and facilitate the spread of noxious weeds. Vehicles and crews inadvertently could track in clinging seeds and/or parts of noxious weeds, thus facilitating their spread. The application of PDMs BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8 would reduce these impacts.

Decommissioning

As with construction, vehicles and construction equipment associated with decommissioning activities for the Proposed Action could indirectly introduce new invasive, noxious weeds to the study area and could further spread invasive, noxious weeds that are already present in the study area. The application of PDMs BIO-4, BIO-5, BIO-6, BIO-7, and BIO-8 would reduce these impacts.

4.3.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.2.2.

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Construction

As described above, the Proposed Action is anticipated to result in temporary and/or permanent impacts to individuals or populations of pine fritillary observed within the survey area. These impacts, however, would not be significant. While this species have been identified as special-status, and the Proposed Action would impact it, the low level of impact would be *less than significant* and mitigation is, therefore, not required.

Operation and Maintenance

As described above, use and maintenance/plowing of access roads during O&M activities for the Proposed Action could result in indirect impacts to special-status plant species as a result of dust and disturbance. With implementation of PDM HYD-4, these impacts would be *less than significant*.

Decommissioning

Impacts to special-status plant species are not anticipated for decommissioning activities. Therefore, there is *no impact.*

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.

Construction, Operation and Maintenance, and Decommissioning

The Proposed Action would not result in a significant impact to any sensitive vegetation communities/habitats or CDFG jurisdictional areas.

c) Have a substantial adverse effect on federally protected wetlands as defined by §404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Construction

As discussed above, direct impacts to potentially jurisdictional features in the study area are not expected. Construction activities may result in indirect impacts to features downstream of the study area. With implementation of PDM HYD-1, these impacts would be *less than significant*.

Operation and Maintenance

As discussed above, direct impacts to potentially jurisdictional features in the study area are not expected. Maintenance/plowing of roads may result in indirect impacts to features downstream of the study area. With implementation of PDM HYD-1, these impacts would be *less than significant*.

Decommissioning

The Proposed Action would not result in a significant impact to any federally protected wetlands during decommissioning.

e) Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance.

Construction, Operation and Maintenance, and Decommissioning

The CD-IV Project would not conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance, and it is consistent with the Conservation/Open Space Element of the Mono County General Plan and the Resource Management and Conservation Element of the Town of Mammoth Lakes General Plan.

4.3.5 Alternative 2: Plant Site Alternative

4.3.5.1 Direct and Indirect Impacts

Native Vegetation Communities

Potential impacts to native vegetation communities during construction, operation and decommissioning of Alternative 2 would be similar in nature as described for the Proposed Action, although impacts to specific community types would vary slightly. The total acreage of impacts to native vegetation communities would increase under Alternative 2 (see Table 4.3-1). Construction of the power plant under Alternative 2 would require removal of up to 7.3 acres of trees and other vegetation. An additional 0.25 acres would be cleared for construction of the substation. As in the Proposed Action, there would be no impacts to Wright's Buckwheat Dwarf Scrub, a community considered sensitive by the CDFG. The transmission line would require the removal of up to 5.61 acres of native vegetation (4,888 feet long by a maximum of 50 feet wide). Although the exact length of production and injection pipelines would depend upon which production and injection wells would ultimately be developed, ORNI 50, LLC estimates that the total alignment for Alternative 2 would total approximately 5.54 miles, of which up to 3.9 miles could consist of double pipeline (this equates to a total of 9.3 miles of pipeline placed along 5.54 miles of alignment). Impacts to native vegetation communities from construction of the well field and associated access roads would be the same as those described under the Proposed Action (6.4 acres of permanent disturbance for the well field and 1.4 acres for the associated access roads).

The types of impacts that would occur under Alternative 2 similarly would result in the direct and permanent loss of all vegetation communities within the disturbance footprint, and indirect impacts to vegetation resources would be similar to those discussed for the Proposed Action. Implementation of PDMs designed to protect native vegetation communities would reduce potential impacts to vegetation communities, but impacts would not be completely avoided.

Federal and State Jurisdictional Areas

Potential impacts to federal and state jurisdictional areas during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of PDMs designed to protect federal and state jurisdictional areas would reduce potential impacts to these areas, but impacts would not be completely avoided.

Special-Status Plants

Potential impacts to special-status plants during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of PDMs designed to protect native vegetation communities would reduce potential impacts to special-status species, but impacts would not be completely avoided.

Noxious Weeds

Potential impacts from the introduction, establishment, and spread of noxious weeds during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of PDMs that aim to prevent or minimize the introduction, establishment, and spread noxious weed species would reduce potential impacts, but impacts would not be completely avoided.

4.3.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Project. Potential impacts on vegetation resources of Alternative 2 would remain less than significant.

4.3.6 Alternative 3: Modified Pipeline Alternative

4.3.6.1 Direct and Indirect Impacts

Native Vegetation Communities

Potential impacts to native vegetation communities during construction, operation and decommissioning of Alternative 3 would be similar in nature, though of slightly less magnitude as described for the Proposed Action. The total acreage of impacts to native vegetation communities would decrease under Alternative 3 (see Table 4.3-1). Impacts to native vegetation from construction of the power plant, transmission line, well field, and well field access roads would be the same as described for the Proposed Action. The modification in pipeline corridor lengths would lead to slightly less disturbance and removal of vegetation as compared to the Proposed Action. Although the exact length of production and injection pipelines would depend upon which production and injection wells would ultimately be developed, ORNI 50, LLC estimates that the total alignment for Alternative 3 would total approximately 5.42 miles, of which up to 3.7 miles could consist of double pipeline (this equates to a total of 9.1 miles of pipeline placed along 5.42 miles of alignment).As in the Proposed Action, there would be no impacts to Wright’s Buckwheat Dwarf Scrub, a community considered sensitive by the CDFG.

The types of impacts that would occur under Alternative 3 similarly would result in the direct and permanent loss of all vegetation communities within the disturbance footprint, and indirect impacts to vegetation resources would be similar to those discussed for the Proposed Action. Implementation of PDMs designed to protect native vegetation communities would reduce potential impacts to vegetation communities, but impacts would not be completely avoided.

Federal and State Jurisdictional Areas

Potential impacts to federal and state jurisdictional areas during construction, operation and decommissioning of Alternative 3 would be the same as described for the Proposed Action. Implementation of PDMs designed to protect federal and state jurisdictional areas would reduce potential impacts to these areas, but impacts would not be completely avoided.

Special-Status Plants

Potential impacts to special-status plants during construction, operation and decommissioning of Alternative 3 would be similar in nature, though of slightly less magnitude as described for the Proposed Action. The reduction in pipeline corridor lengths would lead to slightly less disturbance and removal of vegetation as compared to the Proposed Action. Implementation of PDMs designed to protect native vegetation communities would reduce potential impacts to special-status species, but impacts would not be completely avoided.

Noxious Weeds

Potential impacts from the introduction, establishment, and spread of noxious weeds during construction, operation and decommissioning of Alternative 3 would be similar in nature, though of slightly less magnitude as described for the Proposed Action. Implementation of PDMs that aim to prevent or minimize the introduction, establishment, and spread noxious weed species would reduce potential impacts, but impacts would not be completely avoided.

4.3.6.2 CEQA Significance Determination

Despite the reduction in pipeline routes, the CEQA significance determinations for impacts of Alternative 3 to vegetation resources would be identical to those of the Proposed Action (less than significant).

4.3.7 Alternative 4: No Action

4.3.7.1 Direct and Indirect Impacts

Under this alternative, the BLM would not approve the proposed CD-IV Project. Direct and indirect impacts related to the construction, operation and decommissioning of the power plant or pipelines would not occur.

However, in Basalt Canyon up to 11 additional wells may be drilled for exploratory purposes, which were analyzed in previous NEPA documents, and are not part of the CD-IV project,

although they occur at the same potential well sites. However, the five potential additional wells (up to 16 for the Proposed Action) would not be constructed.

If Alternative 4 were implemented, no changes would be implemented on the power plant site and the existing environmental setting described in Draft EIS/EIR Chapter 3 would be maintained except for potential exploratory well construction in Basalt Canyon. As a no-development alternative, the No Action would result in no changes to conditions related to vegetation resources; therefore, no impact would occur.

4.3.7.2 CEQA Significance Determination

Alternative 4 would result in no impacts to vegetation resources.

4.3.8 Cumulative Impacts

4.3.8.1 Geographic Extent/Context

The geographic scope of vegetation resources impacts encompasses the plant habitats of affected species in the region, including Jeffrey pine forest, Sagebrush Scrub, single-leaf pinyon woodland, and Wright's buckwheat dwarf scrub, as well as aquatic habitat in the Mammoth Creek watershed and other downstream watersheds. The Project area is located within or adjacent to federal, state, and county lands that are largely undeveloped and support native vegetation communities. In addition, development associated with the Town of Mammoth Lakes abuts the study area to the south and east.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resources being evaluated. The geographic scope of this analysis is based on the nature of the geography surrounding the Project area and the characteristics and properties of each resource. In addition, each project would have its own implementation schedule, which may or may not coincide or overlap with the CD-IV Project schedule. This is a consideration for short-term impacts from the CD-IV Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the CD-IV Project.

4.3.8.2 Existing Cumulative Conditions

Population growth and continuing development pressure in the Town of Mammoth Lakes and the region have brought about substantial changes to, and effects on, natural resources. Similarly, recreation, land management, and other land uses have led to comparable effects on natural resources. Consequently, modification, alteration, and/or destruction of vegetation, special status plant species, federal and state jurisdictional areas, and the proliferation of invasive, noxious weeds are occurring throughout the region. Future growth and development in the analysis area will likely continue these impacts.

Vegetation communities are largely similar in the analysis area and consist primarily of a variety of scrublands and singleleaf pinyon woodlands at lower elevations and coniferous forests at higher elevations. Occasional montane meadow habitats dot the higher elevations, with open grasslands occurring sporadically at lower elevations. Riparian woodlands occur along the wetter drainages. Potential federally jurisdictional wetlands and waters of the U.S. as well as CDFG jurisdictional habitats are limited in the study area; however, it is likely that jurisdictional habitats occur throughout the analysis area.

The study area supports one special status plant species, although the species is not federal or state listed. It is expected that the analysis area, particularly undeveloped lands, would also support some number of special-status plant species, some of which could be federal or state listed. In fact, the CNDDB shows a number of special-status species occurring in the analysis area.

Invasive, noxious weeds are present throughout the analysis area, although their numbers vary depending on the level of land disturbance. Cheatgrass, the most invasive, noxious weed found in the study area, has an overall Cal-IPC rating of high, and its level of invasiveness is ranked moderate (Table 3.3-1; Cal-IPC, 2006). This species may pose the biggest threat to vegetation resources in the analysis area.

4.3.8.3 Reasonably Foreseeable Projects

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to the cumulative conditions for vegetation resources in the cumulative analysis area. Table 4.1-1, presented in Section 4.1.5, Cumulative Scenario Approach, lists cumulative projects in the vicinity of the project site and surrounding area and was used to develop this analysis of cumulative effects for vegetation resources. Most of these projects have either undergone independent environmental review pursuant to NEPA and/or CEQA or will do so prior to approval. Even if environmental review has not been completed for the cumulative projects described in Table 4.1-1, their effects were considered in the cumulative impacts analyses in this EIS/EIR.

Projects identified on the cumulative projects list on Table 4.1-1 that could result in cumulative vegetation impacts include:

1. MP-I Replacement Project
2. MP-II Project
3. PLES-I Project
4. New Airport Terminal
5. Waterford Bridges Project
6. Old Mammoth Place
7. Search and Rescue Facility
8. Snowcreek Master Plan
9. Mammoth View Project

4.3.8.4 Construction, Operations and Maintenance, and Decommissioning

Construction, operations and maintenance, and decommissioning activities would result in temporary and permanent losses of native vegetation. Despite measures to protect and remediate losses, construction of the Project would cause both temporary (during construction from vegetation clearing) and permanent (displacement of vegetation with project features such as the power plant site and well pad sites) impacts to vegetation communities as described in Section 4.3.4. Most of the projects identified in Table 4.1-1 also would result in temporary and permanent losses of native vegetation through grading and clearing activities to construct roads, utility infrastructure, and commercial, industrial, and residential developments. Permanent losses of vegetation associated with the Proposed Action combined with losses associated with past, present and future projects are considered significant. However, the CD-IV Project and the other projects would be required to mitigate impacts to sensitive vegetation communities. With implementation of such measures, the CD-IV Project's contribution to a significant cumulative impact to sensitive vegetation communities would be rendered less than cumulatively considerable.

As discussed above, impacts to one special-status plant species would result from implementation of project-related construction and decommissioning. However, these impacts would be less than significant and mitigation is, therefore, not required. Nevertheless, measures have been proposed to minimize the effects of the CD-IV Project to these sensitive plant species. The projects listed in Table 4.1-1 also would likely impact special-status plant species. As such, when combined with similar impacts of past and future projects, these incremental impacts would create a cumulative impact. However, the CD-IV Project's contribution to a significant cumulative impact to special-status plant species would be rendered less than cumulatively considerable.

Implementation of the project would not result in impacts to jurisdictional features and would therefore not contribute to an adverse cumulative effect.

As discussed above, the CD-IV Project's construction, operations and maintenance, and decommissioning activities would result in ground disturbance which has the potential to result in the introduction of invasive, non-native, and noxious plant species. Invasive, non-native, or noxious plant species exist within the analysis area as a result of natural events such as wildfires as well as from past and ongoing residential, commercial and industrial development. Many of the projects identified in Table 4.1-1 that would clear native vegetation would result in similar impacts. As such, when combined with similar impacts of past and future projects, these incremental impacts would create a cumulative impact. However, based on the less than significant impact from CD-IV Project's contribution to invasive weeds, the CD-IV Project's contribution to a significant cumulative impact from the introduction and spread of invasive weeds would be rendered less than cumulatively considerable.

As discussed above, the CD-IV Project's construction, operations and maintenance, and decommissioning activities could result in increased levels of airborne dust that may settle on surrounding vegetation. Increased levels of dust on plants can significantly impede the plants' photosynthetic capabilities and degrade the overall vegetation community. CD-IV Project

construction practices such as regular watering to control dust during clearing, grading, earth-moving, excavation, or other construction activities would reduce the amount of dust settling on surrounding vegetation. If construction from projects listed in Table 4.1-1 occurs at the same time as construction of the CD-IV Project, dust from these projects would combine to significantly impact plants' photosynthetic capabilities and degrade the overall vegetation community. The likelihood that intensive dust generating activities of nearby projects would occur concurrently with those of the CD-IV Project is considered low. Therefore the potential for impacts of the CD-IV Project to combine with the impacts of the projects in Table 4.1-1 to result in a cumulative significant impact is also considered low.

4.3.8.5 CEQA Significance Determinations

As described above, the CD-IV Project's contribution to a significant cumulative impact on sensitive vegetation communities, special-status plant species, the introduction and spread of invasive weeds, and dust-related impacts would be rendered less than cumulatively considerable and, therefore, not significant.

4.3.9 Mitigation Measures

Mitigation Measure VEG-1: ORNI 50, LLC shall undertake the following measures to manage the construction site and related facilities in a manner to avoid or minimize impacts to vegetation resources:

1. ***Limit Disturbance Areas.*** The boundaries of all disturbed areas (including staging areas, access roads, and sites for temporary placement of spoils) shall be delineated with stakes and flagging prior to construction activities. Spoils and topsoil shall be stockpiled in disturbed areas lacking native vegetation that do not provide habitat for special-status species. The stockpiles shall not be placed in areas with existing weed populations. All disturbances, CD-IV Project vehicles and equipment shall be confined to the flagged areas. All personal vehicles shall be parked off-site or at existing MPLP facilities. All above ground pipelines and transmission lines shall be installed using low pressure tracked equipment to minimize impacts on vegetation. Understory vegetation and surface soils may be trampled during pipeline and transmission line installation but not removed. All Jeffrey pine trees in the installation routes outside of the footprint of the power plant site and the well pad sites shall be preserved where feasible. For construction activities outside of the plant site (transmission line, pipeline alignments, well pad sites) access roads, pulling sites, and storage and parking areas shall be designed, installed, and maintained with the goal of minimizing impacts to native plant communities and sensitive biological resources.

2. ***Minimize Road Impacts.*** New and existing roads that are planned for construction, widening, or other improvements shall not extend beyond the flagged impact area as described above. All vehicles passing or turning around would do so within the planned impact area or in previously disturbed areas. Where new access is required outside of existing roads or the construction zone, the route shall be clearly marked (i.e., flagged and/or staked) prior to the onset of construction.

3. ***Implement Erosion Control Measures.*** Standard erosion control measures shall be implemented for all phases of construction and operation where sediment run-off from exposed slopes threatens to enter "Waters of the State". All disturbed soils and roads within

the Project site shall be stabilized to reduce erosion potential, both during and following construction. Areas of disturbed soils (access and staging areas) that slope toward a drainage shall be stabilized to reduce erosion potential. Water used for dust suppression purposes will not come from Casa Diablo power plant geothermal injection fluids.

4. ***Revegetation of Temporarily Disturbed Areas.*** Per PDM BIO-3, ORNI 50, LLC shall prepare and implement a Revegetation Plan to restore all areas subject to temporary disturbance to pre-Project grade and conditions. Temporarily disturbed areas within the Project area include, but are not limited to: the transmission line corridor, construction staging areas for well pad sites, and temporary access roads. The Revegetation Plan shall include a description of topsoil salvage and seeding techniques and a monitoring and reporting plan. The following success standards shall be met at the end of the third growing season following seed application.

    a. Success standards for revegetation in the Jeffrey pine forest are as follows:

        i. At least 1 tree, 1 shrub, and 6 perennial native grasses and/or forbs per 4 square meters will be established on site.

        ii. Perennial grasses will account for at least 10 percent of the relative cover.

        iii. All non-native weed species that are already present in the area will account for no more than 5 percent total of the relative cover at the end of a three year evaluation period. New non-native species introduced as a result of the project will be eradicated (i.e., 0 percent cover).

    b. Success standards for revegetation in the Sagebrush Scrub are as follows:

        i. At least 3 shrubs and 8 perennial native grasses and/or forbs per 4 square meters will be established on site.

        ii. Perennial grasses will account for at least 10 percent of the relative cover.

        iii. All non-native weed species that are already present in the area will account for no more than 5 percent total of the relative cover at the end of a three year evaluation period. New non-native species introduced as a result of the project will be eradicated (i.e., 0 percent cover).

5. ***Landscaping.*** Any vegetation planted for landscaping or visual shielding purposes shall be reviewed by USFS and BLM personnel prior to installation.

Mitigation Measure VEG-2: Weed Management Plan. ORNI 50, LLC shall implement a Weed Management Plan that meets the approval of BLM and the USFS. The objective of the Weed Management Plan shall be to prevent the introduction of any new weeds and the spread of existing weeds as a result of Project construction, operation, and decommissioning. The Weed Management Plan shall include at a minimum the following information: specific weed management objectives and measures for each target non-native weed species; baseline conditions; a map of existing weed populations; weed risk assessment and measures to prevent the introduction and spread of weeds; monitoring and surveying methods; and reporting requirements.

The Plan would be consistent with BLM and USFS practices and would be implemented by ORNI 50, LLC to reduce the potential for the introduction of invasive species during construction, operation and maintenance, and decommissioning of the CD-IV Project. The draft plan would be

reviewed and approved by the BLM and the USFS. The following measures are required in the Plan and would be implemented by ORNI 50, LLC to monitor and control invasive species:

1. ***Preventative Measures During Construction.*** Equipment Cleaning: To prevent the spread of weeds into new habitats prior to entering the Project work areas, construction equipment and personal vehicles shall be cleaned of dirt and mud that could contain weed seeds, roots, or rhizomes. Equipment shall be inspected to ensure it is free of any dirt or mud that could contain weed seeds and the tracks, feet, tires, and undercarriage shall be carefully washed, with special attention paid to axles, frame, cross members, motor mounts, underneath steps, running boards, and front bumper/brush guard assemblies. Other construction vehicles (e.g. pick-up trucks) and vehicles from different areas of the project that frequently enter and exit the site shall be inspected and washed on an as-needed basis. A vehicle log shall be maintained at the washing facility to document vehicle cleaning.

    a. All vehicles shall be washed off-site when possible. Should off-site washing prove infeasible, an on-site cleaning station shall be set up to clean equipment before it enters the work area. Either high-pressure water or air shall be used to clean equipment and the cleaning site shall be situated away from any sensitive biological resources. If possible, water used to wash vehicles and equipment shall be collected and re-used. Before re-using the vehicle wash water, any vegetative matter or soil should be removed.

    b. Site Soil Management: Ground disturbance shall be limited to the minimum necessary for construction activities, using dust suppressants to minimize the spread of seeds. Disturbed vegetation and topsoil shall be re-deposited at or near the removal area to eliminate the transport of soil-borne noxious weed seeds, roots, or rhizomes. Areas of topsoil removal should be surveyed for weeds pre-project. If weeds are present, topsoil should not be re-used for revegetation purposes. BLM-approved dust suppressants (e.g. water and/or palliative) shall be minimized on the site as much as possible, but shall be used during construction to minimize the spread of airborne weed seeds, especially during very windy days.

    c. Weed-free Products: Any use of hay or straw bales on the Project site shall be limited to certified weed-free material. Other products such as gravel, mulch, and soil may also carry weeds and these products, too, shall be certified weed-free. If needed, mulch shall be made from the local, on-site native vegetation cleared from the Project area. Soil shall not be imported onto the Project site from off-site sources.

2. ***Containment and Control Measures.*** When Project monitoring (see below) indicates that invasive species are spreading, invasive species shall be removed using mechanical or manual removal methods. During eradication activities, care shall be taken to have the least effect on native plant species. Chemical control is not included as part of these containment and control measures because site specific information on target weed species are not known at this time.

3. ***Monitoring.*** Baseline weed conditions shall be assessed during the pre-construction phase of the CD-IV Project, during pre-construction surveys and staking and flagging of construction areas. A stratified random sampling technique shall be used to identify and count the extent of weeds on the site.

    Monitoring shall take place each year during construction, and annually for the lifespan of the Project following the completion of construction. The purpose of annual monitoring shall be to determine if weed populations identified during baseline surveys have increased

in density or are spreading as a result of the CD-IV Project. With the exception of cheatgrass, all non-native weed species already present in the Project area will account for no more than 5 percent total of the relative cover of the disturbed areas, including roadsides. Control methods shall be implemented when measurable weed increases, as well as visually verified increases, are detected during monitoring.

General management and monitoring of the Project area shall be conducted by designated site personnel each year during both the germinating and early growing season (November through April) to eliminate new weed individuals prior to seed set. Throughout construction and long-term monitoring, personnel shall be trained to identify weedy and native species and work with a trained vegetation monitor to determine where elimination is necessary.

4. ***Reporting*.** Results of monitoring and management efforts shall be included in annual reports. Copies of these reports shall be kept on file at the site. Copies of each annual report shall be sent to the BLM and USFWS for review and comment. BLM and USFS shall use the results of these reports to determine if any additional monitoring or control measures are necessary.

5. ***Success Criteria*.** Weed control shall be ongoing on the Project site for the life of the CD-IV Project, but plan success shall be determined by BLM and USFS after three years of operations monitoring through the reporting and review process. Success criteria shall be defined as the following:

    a. non-native weed species that are already present in the area shall account for no more than 5 percent total of the relative cover at the end of a three year evaluation period.

    b. New non-native species introduced as a result of the project shall be eradicated (i.e., 0 percent cover).

4.3.10 Residual Impacts after Mitigation Incorporated

Following implementation of mitigation measures provided in Section 4.3.9 as well as all suitable PDMs, all adverse impacts on vegetation resources resulting from construction, operations and maintenance, and decommissioning of the CD-IV Project and Alternatives would be avoided or substantially reduced.

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4.4 Biological Resources – Wildlife

4.4.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to general wildlife, special-status species, and mule deer migration. Impacts are identified and evaluated based on relevant BLM and Forest Service standards, policies, and guidelines. This analysis relies on a literature review, biological reconnaissance survey and coordination with appropriate permitting agencies including the USFWS and CDFG. A literature review was conducted to determine the federal and state-listed endangered, threatened, rare, and special-status plant species that have potential to occur within the Project vicinity. The literature review included a search of the CNDDB Electronic Inventory for the nine USGS 7.5' topographic quadrangles that surround the Project (CDFG, 2012) and review of the USFWS List of Federal Endangered and Threatened Species that may be Affected by Projects in Mono County, CA (USFWS, 2012). Literature related to BLM- and USFS-listed Sensitive species was also reviewed. Studies and other information provided by ORNI 50, LLC also were reviewed, including the following:

1. Final Biological Evaluation for Casa Diablo IV (CD-IV) Geothermal Development Project (AMEC E&I, Inc., 2012);

2. Draft Project Management Indicator Species Report, Casa Diablo IV (CD-IV) Geothermal Development Project (MACTEC Engineering, 2010);

3. Deer Track-Count Survey Results, Geothermal Expansion Project, Mammoth Lakes, CA (MACTEC Engineering and Consulting, 2011);

4. Fall 2011 Resident Deer Survey for the Casa Diablo, Basalt Canyon, and Upper Basalt Geothermal Areas (Paulus, 2011a);

5. Fall 2011 Migratory Deer Survey for the M-1 Project Site at the Casa Diablo Geothermal Area (Paulus, 2012a);

6. Fall 2011 Migratory Deer Survey for the Casa Diablo, Basalt Canyon, and Upper Basalt Geothermal Areas (Paulus, 2012b); and

7. Focused botanical surveys performed in 2008, 2009, and 2010 (Paulus, 2009a; 2009b; 2009c; 2009d; 2009e; 2009f; 2010).

This section analyzes potential impacts to wildlife resources from CD-IV Project construction, operation and maintenance, and decommissioning. This analysis addresses potential direct, indirect, and cumulative impacts of the CD-IV Project to general wildlife, special-status species, and mule deer migration.

Direct impacts are those resulting from the CD-IV Project and occur at the same time and place. Indirect impacts are caused by the CD-IV Project, but can occur later in time or farther removed in distance while still reasonably foreseeable and related to the proposed action. The potential

impacts discussed in this analysis are those most likely to be associated with CD-IV Project construction, operation and maintenance, and decommissioning.

4.4.1.1 General Wildlife and Habitat

This analysis evaluates the potential for implementation of the Proposed Action and Alternative to cause impacts to general wildlife and their habitats by comparing the proposed construction areas to maps of general wildlife habitats. In addition, construction and operation methods and activities were analyzed to determine what impacts their execution could have on general wildlife and their habitats.

4.4.1.2 Special-Status Species

Special-status wildlife with the potential to occur in the study area include northern goshawk, greater sage-grouse, pallid bat, Townsend's big-eared bat, western white-tailed jackrabbit, Sierra Nevada red fox, and Sierra marten. In addition, Owens tui chub and Owens sucker have the potential to occur immediately downstream of the study area. To determine the potential for CD-IV Project implementation to cause direct effects on special-status wildlife, the proposed construction areas were compared with maps of these species habitats. In addition, construction and operation methods and activities were analyzed to determine what impacts their implementation could have on special-status wildlife and their habitats.

4.4.1.3 Mule Deer Migration

Jim Paulus, Ph.D., conducted both resident and migratory deer surveys of the Casa Diablo, Basalt Canyon and Upper Basalt areas (Paulus, 2011a; Paulus 2012b) as well as a site specific migratory deer survey of the proposed M-I Replacement Project site (Paulus 2012a). The relevant findings of these surveys were integrated into the assessment of the impacts of the CD-IV Project on mule deer migration provided in this section.

4.4.2 Project Design Measures

The analysis assumes that the following PDMs related to biological resources are fully implemented:

Biological Resources

1. *BIO-1*: A qualified wildlife biologist will walk the pipeline route once each year for the first three years following completion of construction to survey for any signs that the pipeline is impeding wildlife movement. If such evidence is found, the USFS may require ORNI 50, LLC to clear one or more areas under the pipeline of at least 16 inches height, or sufficient to allow wildlife to pass under the pipeline, at the points where movement is impeded.

2. *BIO-2*: After construction is complete, erosion control measures including revegetation and periodic maintenance activities will be implemented. Disturbed areas that will not be used after construction will be revegetated with the proper seed

mixture and planting procedures prescribed by the USFS. Any topsoils enriched in organic material stockpiled from previously disturbed areas (see GEO-1) may be applied to enhance areas to be reclaimed by revegetation.

Noxious Weeds

3. *BIO-3*: During construction, prior to entering and upon exiting the Project area, all trucks and construction equipment that will operate off of previously existing roads shall be washed to remove soil and plant parts. A central washing facility will be provided for this purpose, either at the ORNI 50, LLC equipment area at Casa Diablo on private land, or at a location approved by the authorized officer.

4. *BIO-4*: All materials used in erosion control and/or rehabilitation efforts (e.g. straw bales, seeds, etc.) on the CD-IV Project will be certified as being free of noxious weed materials.

5. *BIO-5*: New non-native species introduced as a result of the CD-IV Project, will be eradicated (i.e., 0 percent cover). Where this standard is not met, appropriate weed control measures will be implemented in order to comply with the standard for a period of three years following CD-IV Project (this measure is supplemented with **Mitigation Measure VEG-2**[1] in Section 4.3.9, *Biological Resources - Vegetation*).

6. *BIO-6*: With the exception of cheatgrass, all non-native weed species already present in the CD-IV Project area will account for no more than 5 percent total of the relative cover of the disturbed areas, including roadsides at the end of a 3-year evaluation period following completion of revegetation measures. Weed control will be implemented immediately following implementation of the CD-IV Project, and throughout the CD-IV Project life to meet this standard.

7. *BIO-7*: Cheatgrass is largely absent from the forested portions of the Project area. In order to maintain this condition, cheatgrass will be removed from all areas where ground disturbance occurs west of drill sites 56-25, 57-25 or 58-25. Appropriate weed control measures will be implemented as necessary, in order to prevent the invasion and spread of cheatgrass, throughout the life of the project, and for a period of three years following CD-IV Project completion.

Protection of Erosion and Surface Waters

8. *HYD-1*: Appropriate erosion control measures will be used to control any offsite discharges, and the CD-IV Project will adopt any relevant LRWQCB and USFS best management practices to prevent soil erosion, including the preparation of a SWPPP.

9. *HYD-2*: To the extent possible, the pipeline route and any access roadways shall be located outside of any riparian conservation areas delineated by the USFS.

10. *HYD-4*: Exposed, disturbed soils in construction areas will be watered to minimize wind erosion and dust. Topsoil piles will be covered to minimize erosion during wind storms. See also AQ-1.

11. *HYD-6*: The pipeline route will not be cleared or graded to minimize soil disturbance.

[1] See Section 4.4.9 below for all mitigation measures.

Noise

12. *NOI-1*: Mufflers will be used on all drilling rig engines.

13. *NOI-2*: Construction noise will be minimized through operational practices which avoid or minimize those practices which may typically generate greater noise levels, or generate distinctive impact noise.

4.4.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to biological resources if it would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service;

c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

e) Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance; or

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional or state habitat conservation plan.

Only those CEQA significance criteria related to wildlife (i.e., criteria a, d, e, and f) are addressed in this section. Those criteria with aspects that pertain to vegetation, riparian habitat, sensitive natural communities, and state and federal jurisdictional areas, which include criteria a, b, c, and e, are analyzed in Section 4.3, *Biological Resources – Vegetation*.

The project site is not located in an area covered by an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan, so Significance Criteria (f) is not addressed further in the impact analysis presented in this section.

4.4.4 Alternative 1: Proposed Action

4.4.4.1 Direct and Indirect Impacts

General Wildlife and Habitats

Construction

The permanent and temporary removal of habitat would have a direct effect on wildlife species through habitat loss (see below for separate discussions of impacts on special-status wildlife species and wildlife movement and breeding). Impacts include the permanent removal of 6.5 acres of habitat on the power plant site, as well as the installation of exclusion fence that would preclude most terrestrial wildlife species from using the power plant site. An additional 0.25 acres would be cleared at the site of the substation. The transmission line connection from the power plant substation to the existing SCE Casa Diablo Substation would be 649 feet long. Prior to construction the alignment would be cleared of trees for an area wide enough (less than 50 feet) for construction equipment access and line clearance (maximum of 0.75 acres). The transmission line would be supported by 3 to 6 wooden poles, approximately 40 feet high. No new access roads would be required for the CD-IV power plant site.

Up to 16 production and injection wells are proposed in 18 potential well locations. Fourteen of the wells would be located in the Basalt Canyon Area and two wells would be located southeast of the proposed power plant east of Highway 395. During construction, each well site would be approximately 2.5 acres to provide access for drilling equipment, mud pits, and a containment basin for drill cuttings. New well pads would require vegetation clearing, earthwork, drainage, and other improvements necessary for efficient and safe operation and fire prevention within an approximately 2.5 acre area for construction. The permanent disturbance area would be approximately 0.4 acres for the finished well pad. Clearing would include removal of organic material, trees, stumps, brush, and slash. If all 16 wells are required, 40 acres of vegetation would be cleared during well construction. Of these 40 acres, 33.6 acres would be restored following construction, leaving 6.4 acres permanently cleared of vegetation. Vegetation communities cleared for well construction would consist of either Jeffrey pine forest or big sagebrush scrub (see Table 4.3-2). Short permanent access roads from existing roads to the actual well sites would be constructed where proposed well pads are not immediately adjacent to existing roads. These new access roads would be 15 feet wide, with a turning radius of no less than 50 feet. An estimated 4,072 linear feet (1.4 acres of area) of new access roads would be constructed. Construction of these access roads would be accomplished by clearing brush and grading the surface to construct a roadway; gravel may be added where required for safety.

The production and injection system pipeline corridors would use previously disturbed ground along existing access roads to the fullest extent practical. Construction corridors would be less than 40 feet wide, although expansion joints/loops may have a wider corridor. Few, if any, trees likely would be cut or removed during construction of the pipeline in the Jeffrey Pine Forest plant community. Only in the densest areas would individual trees need to be removed to create the construction corridor. Travel outside the construction corridors would be strictly limited to designated turnout areas and access roads. After construction, the corridor would be revegetated

in accordance with an approved USFS revegetation plan, seed mix, and monitoring plan Although the exact length of production and injection pipelines would depend upon which production and injection wells would ultimately be developed, ORNI 50, LLC estimates that the total alignment for the Proposed Action would total approximately 5.68 miles, of which up to 3.5 miles could consist of double pipeline (this equates to a total of 9.2 miles of pipeline placed along 5.68 miles of alignment). The pipelines would include overpasses and underpasses to allow for wildlife movement across the pipeline corridors (these are discussed in more detail under **Mitigation Measure WIL-6**).

Impacts to wildlife habitat would occur almost entirely in the Jeffrey pine forest and big sagebrush scrub communities, with additional impacts in the mechanically and thermally disturbed areas. Jeffrey pine forest and big sagebrush scrub are common in the project vicinity. CD-IV Project activities would not impact the Wright's buckwheat dwarf scrub or the singleleaf pinyon woodland communities. The CD-IV Project includes several PDMs aimed at protecting and reducing impacts to wildlife and their habitats. PDM BIO-2 includes post-construction revegetation of areas not needed for operation of the project. PDM HYD-6 protects vegetation along pipeline routes by prohibiting clearing and grading to minimize soil disturbance.

Construction of the CD-IV Project would increase noise, night lighting, and fugitive dust that could disturb common and special-status wildlife species near the construction area. Many species are sensitive to visual and noise disturbances that could cause wildlife to alter foraging and/or breeding behavior and avoid suitable habitat in adjacent areas. Night lighting also could attract wildlife to the site, disrupting their normal pattern of behavior. During construction, nighttime task lighting would be used only as necessary. Excessive noise would be controlled through the implementation of PDM NOI-1 and NOI-2, which would reduce impacts to wildlife from noise disturbances. In addition, indirect impacts to wildlife from grading activities disturbing soils and creating air-born, fugitive dust would be reduced by implementation of PDM HYD-4.

As discussed in Section 4.3, *Biological Resources – Vegetation*, project construction also has the potential to introduce invasive plant species outside of the Project site, which could result in the degradation of wildlife habitat outside of the power plant site and linear corridors. The CD-IV Project includes several PDMs aimed at reducing impacts associated with noxious weed species (PDMs BIO-3, BIO-4, BIO-5, BIO-6, and BIO-7). The PDMs will help prevent new infestations from becoming established in the Project area and will help control the spread of existing populations.

There is potential for wildlife to become trapped in lined well site basins. A lined well site basin is a temporary lined excavation used during the drilling and testing of each new well. Water can accumulate in the basin and attract rodents and other small terrestrial wildlife to the well site basin from which they cannot escape. The storage of water in lined wellfield basins would continue to attract wildlife and has the potential for similar impacts on wildlife as a result of the wellfield expansion associated with new geothermal development. The existing wellfield would be expanded by the addition of new wells and well sites to provide the additional geothermal fluid needed to support the proposed CD-IV power plant. This impact could be significant if future

lined well site basins are constructed in a manner which prevents wildlife from escaping from the basins. The following impact mitigation measure is required for Mono County approved projects and should be considered as a requirement by federal agencies as a stipulation for approval of geothermal projects on National Forest System land in the vicinity of Casa Diablo Hot Springs. To ensure that impacts to wildlife relative to lined well site basins are minimized fully, **Mitigation Measure WIL-2** will be implemented (see Section 4.4.9). **Mitigation Measure WIL-2** would require that water that may accumulate in geothermal well site basins during precipitation events is removed daily. Alternatively, this mitigation would require the basins to be designed with earthen ramps that trapped wildlife could use to escape. This mitigation will prevent wildlife from becoming trapped in lined well site basins.

In addition to the implementation of PDMs protecting wildlife and their habitats, impacts to native habitats would be reduced through the implementation of **Mitigation Measures VEG-1 and VEG-2** (see Section 4.3.9, *Biological Resources – Vegetation*), which identify measures to avoid, reduce, or mitigate impacts to native vegetation communities.

Operation and Maintenance

Once construction of the Proposed Action is completed, noise and human activity are expected to be similar to pre-project conditions. There are three existing geothermal power plants in the vicinity of the proposed power plant site which currently produce ambient noise levels that are expected to be similar to the proposed power plant. The introduction of a new noise source at the proposed power plant site could disrupt wildlife in the general vicinity of the site. There are existing production wells in the Basalt Canyon area that currently producing ambient noise. Levels associated with new production wells are expected to be similar to the existing wells. Production wells would have electric-powered pumps that would generate a steady hum in the immediate area around the well. Maintenance of the production wells and access roads will result periodic increases in noise and disturbance levels. However, this is expected to be similar to pre-project conditions. Secondary noise and disturbance sources in the Project area include occasional off-road vehicles (e.g., four wheel drive vehicles, all terrain vehicles, motorcycles/dirt bikes, and snowmobiles) as well as an informal target shooting range to the northeast of the geothermal complex.

As discussed in Section 4.3, *Biological Resources – Vegetation*, the maintenance of access roads both within and outside the Project site boundary has the potential to introduce invasive plant species into disturbed areas and facilitate the spread of noxious weeds. Vehicles and crews inadvertently could track in clinging seeds and/or parts of noxious weeds, thus facilitating their spread. This could result in the degradation of wildlife habitat outside of the power plant site and linear corridors. The application of PDMs BIO-3, BIO-4, BIO-5, BIO-6, and BIO-7 would reduce these impacts.

The pipelines would be a physical obstruction that could impede wildlife movement. The pipeline would be constructed on supports that provide an average of 12 to 18 inches of clearance between the ground and the bottom of the pipeline. The overall outside diameter of the finished pipe would range from 12 to 28 inches. Therefore the minimum height of the top of the pipe would be approximately 24 inches from ground level and the maximum height would be approximately

46 inches from ground level. The pipeline also would be constructed with multiple below-ground crossings (of existing roadways). Most wildlife known to frequent the area (jackrabbits, cottontail rabbits, ground squirrels, least chipmunks, kangaroo rats and wood rats) would be easily able to cross under the pipeline. Adult deer would be able to jump over the pipeline (Paulus, 2011b), as is the case with the existing geothermal pipelines in the Casa Diablo area. However, young deer may not jump over the pipeline, and they typically require at least 16 inches clearance to go under a fence (Paulus, 2011b). Although there would be numerous places where the pipeline would be at least 16 inches above the ground (as discussed above, the average ground clearance would range from 12 to 18 inches), application of PDM BIO-1 would ensure that the pipeline did not substantially impede the movement of deer and other wildlife. PDM BIO-1 would require annual surveys along pipeline routes to investigate for signs that the pipelines are impeding wildlife movement and to provide adequate clearance for migration if evidence of obstruction is found.

Geothermal fluids could be accidentally released to the environment as a result of spills on the well sites or power plants, pipeline rupture or uncontrolled releases from the wells ("well blowouts"). However, application of PDM HYD-8 through HYD-13 would ensure that any potential spills, leaks or ruptures would limit release of geothermal fluids to levels that would not adversely affect biological resources.

Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of CD-IV Project facilities. Thus, the direct removal of wildlife habitat is not anticipated for decommissioning activities. Potential direct and indirect effects to wildlife populations during decommissioning are similar to those described for the construction phase of the CD-IV Project and include wildlife disturbance from noise, light, or dust, and the introduction of invasive plant species by various vectors. Revegetation of the site and removal of facilities would ultimately re-establish wildlife habitat in disturbed portions of the project area.

Special-Status Species

The following paragraphs discuss the potential environmental consequences of the CD-IV Project on those listed and sensitive wildlife species identified in Section 3.4.1.4 as having either some potential habitat within the study area, or having some potential to be adversely affected by the Project.

Construction

Owens tui-chub. Construction of the Proposed Action would not result in impacts to Owen's tui-chub or its habitat, which occur about 2 miles east of the Project site.

Owens sucker. Construction of the Proposed Action would not result in impacts to Owens sucker or its habitat, which occur about 2 miles east of the Project site.

Northern goshawk. The Jeffrey pine stands in the western portion of the study area around Shady Rest Park are suitable northern goshawk nesting and foraging habitat. Northern goshawk

PACs have been established by the USFS under the SNFPA within these portions of the study area. Five known northern goshawk nest sites have been identified in this portion of the study area that are believed to be associated with one pair of goshawks which return seasonally. Northern goshawk calls and nest surveys were conducted during the spring/summer of 2010. No northern goshawk detections were made during the three survey periods, and no nest sites, whitewash or plucking posts were located during the nest surveys.

Under the Proposed Action, construction activities may result in some increased disturbance to goshawks such as displacement during foraging and or nesting. These impacts would be temporary and associated only with the northwest portion of the Project area (individual well pads require approximately 2 months to construct, and would be built during two June through November work periods). This area contains the Shady Rest Park, an area used for recreation which contributes existing noise disturbance. Goshawks nesting in suitable habitat outside of the study area could potentially forage and or roost in suitable habitat areas within the study area. An increase in disturbance associated with construction may result in disturbances to goshawk foraging patterns and/or juvenile dispersal patterns.

Under the Proposed Action, direct effects to goshawk habitat include the removal of trees to develop well pad sites and pipeline routes. Tree removal would be minimized to the amount necessary for construction. The Proposed Action would result in disturbance of approximately 36.86 acres of Jeffrey pine forest habitat. The behavior and local distribution of common prey species (e.g., rodents, passerine birds) could be temporarily affected by construction activities; this could influence foraging activities and patterns of northern goshawks. Potential disruptions of prey populations and foraging opportunities would occur locally and over short periods, and are therefore not likely to affect a significant portion of any individual's foraging range.

The Biological Evaluation (BE) for the CD-IV Project concluded that it may affect an individual goshawk's ability to forage in the area of construction, primarily in the northwest portion, but is not likely to result in a trend toward Federal listing or loss of viability (AMEC E&I, Inc., 2012). To ensure that impacts to nesting northern goshawk are minimized fully, **Mitigation Measure WIL-1** (see Section 4.4.9) will be implemented. This mitigation measure would limit construction activities in suitable goshawk habitat to outside the breeding season (if feasible); alternatively, pre-construction surveys for nesting goshawk will be performed prior to the start of construction activities. If active nests are discovered, buffers would be established protecting the nesting goshawks from construction impacts.

A northern goshawk was recently observed to have perished in a lined geothermal well site basin. The subject basin was located in the Casa Diablo geothermal wellfield west of U.S. Highway 395. As discussed above, water can accumulate in the basin and attracted rodents and other small terrestrial wildlife to the well site basin from which they cannot escape. This can lead to other wildlife, including goshawk, getting trapped in the lined well basin site. This impact could be significant if future lined well site basins are constructed in a manner which prevents wildlife from escaping from the basins. The following impact mitigation measure is required for Mono County approved projects and should be considered as a requirement by federal agencies as a

stipulation for approval of geothermal projects on National Forest System land in the vicinity of Casa Diablo Hot Springs. To ensure that impacts to goshawk relative to lined well site basins are minimized fully, **Mitigation Measure WIL-2** will be implemented. **Mitigation Measure WIL-2** would require that water that may accumulate in geothermal well site basins during precipitation events is removed daily. Alternatively, this mitigation would require the basins to be designed with earthen ramps that trapped wildlife could use to escape. This mitigation will prevent wildlife from becoming trapped in lined well site basins.

Greater sage-grouse. The study area contains suitable habitat for sage-grouse with sagebrush, perennial grasses and bitterbrush being the predominant vegetation. The potential sage-grouse habitat is of marginal quality due to the low density of the sagebrush, the presence of interspersed Jeffrey pines and the lack of herbaceous cover. Sage-grouse typically prefer dense, contiguous stands of sagebrush with little to no overstory. Grouse have been observed within a 0.25-mile distance from the study area's southern edge. Surveys for possible sage-grouse nest and lek sites were conducted in June 2010. No signs of sage-grouse were observed during these surveys. Habitat modifications, especially those associated with the U.S. Highway 395 and SR 203 corridors and the existing Casa Diablo Geothermal Complex, have reduce the likelihood that sage-grouse use the scrub habitats available in the study area. The highways and existing geothermal development are now significant barriers to emigration from the known local use areas.

Under the Proposed Action, direct impacts to sage-grouse during construction of the pipelines and some of the well pad sites would occur due to the permanent loss of potential (but marginal) nesting and foraging habitat. Construction activities may result in some increased disturbance to sage-grouse such as displacement during foraging. However, direct effects to nesting sage-grouse would be minimal due to the marginal quality and limited availability of suitable nesting habitat in the study area. Sage-grouse nest site and leks have not been found during surveys for the CD-IV Project. Indirect impacts include the introduction and spread of invasive vegetation species.

The BE concluded that the CD-IV Project may affect individuals, but would not likely to result in a trend toward federal listing or loss of viability (AMEC E&I, Inc., 2012). Similarly, the MIS Report concluded that the Proposed Action is not expected to have a significant direct, indirect or cumulative effect on greater sage-grouse habitat in the Project Area. The loss of approximately 39.56 acres of sagebrush habitat will not alter the existing bioregional trend for sagebrush habitat in the Project area nor will it lead to a change in the distribution of greater sage-grouse across the Sierra Nevada bioregion (MACTEC, 2010). Although no sage-grouse or sage-grouse nests or leks have been found within the study area, the implementation of **Mitigation Measure WIL-7** will ensure that no active nests or leks are affected by the Project. Following implementation of this measure, there would be no residual impacts to sage-grouse.

Pallid bat and Townsend's big-eared bat. Suitable roosting habitats such as cliffs (pallid bat) and caves (Townsend's big-eared bat) are not found within the project area. No bat roosts are known to occur within or adjacent to the Proposed Action; therefore, impacts to bat roosts are not anticipated. The habitats within the study area could be used for foraging habitat. The Proposed Action would result in disturbance of approximately 36.86 acres of Jeffrey pine forest habitat,

which is suitable foraging habitat for these bat species. Both bat species are nocturnal feeders. The Proposed Action would result in direct and indirect impacts to bat species if construction activities disrupt nighttime foraging habits. Although the majority of construction and maintenance activities would occur during daylight hours, potential disturbance to bats would occur around well pads during the nocturnal drilling activities.

The BE concluded that the CD-IV Project may affect individuals, but would not likely result in a trend toward federal listing or loss of viability for either species (AMEC E&I, Inc., 2012). Potential roosting sites (cliffs or caves) would not be affected by the Project. Both species feed at night, and construction activities may disrupt foraging behavior during nocturnal drilling and construction. However, the Project site and surrounding area supports extensive suitable foraging habitats for these species and the potential disruption to foraging bats is expected to be minimal. The pipeline would not interfere with the species ability to forage.

Western white-tailed jackrabbit. Suitable habitat is present in the study area. This species could potentially use the scrub habitats in the study area for burrowing and foraging. The availability of trees and other high perches for predators diminishes the value of this habitat for western white-tailed jackrabbit. Construction activities and the loss of a small amount of scrub habitat would not have a negative effect on this highly mobile species.

Sierra marten. Suitable marten habitat exists in the northwestern portion of the study area in the mixed conifer area of Jeffery pine. The majority of the Jeffrey pine stands within the study area provide marginal quality habitat for marten due to the relative lack of snags, downed logs and large trees. Marten tracks have been seen in the vicinity of the Shady Rest Park and in association with the Jeffery pine stands. Photo point studies of the Rhyolite area have detected marten in the area to the north of the study area. However, the lack of dense, multi-storied, multi-species late seral conditions (abundant downed logs, snags and large diameter trees) make it unlikely marten use the area for denning, resting and/or sustained foraging. Marten presence in the area is expected to be infrequent and used primarily while traversing between areas of more suitable habitat. Based on these conditions, it is not anticipated that active den or resting sites would be affected by the Proposed Action.

The BE concluded that the CD-IV Project may affect individuals, but would not likely result in a trend toward federal listing or loss of viability (AMEC E&I, Inc., 2012). Similarly, the MIS Report concluded that the Proposed Action is not expected to have a significant direct, indirect or cumulative effect on Sierra marten habitat in the Project area. The loss of approximately 36.86 acres of Jeffrey pine forest habitat will not alter the existing bioregional trend in the Project area nor will it lead to a change in the distribution of Sierra marten across the Sierra Nevada bioregion (MACTEC, 2010). Because the majority of the Jeffrey Pine Forest habitat within the study area is marginal quality for marten due to the relative lack of snags, downed logs and large trees, the BE recommended **Mitigation Measure WIL-3** to improve the quality of the habitat. Following implementation of this measure, there should be no residual impacts to American marten habitat from construction of the Proposed Action.

Sierra Nevada red fox. Although the Sierra Nevada red fox is associated with subalpine habitats above 5,000 feet in the Sierra Nevada range, little is known regarding their current range and distribution. The Project site does contain habitat suitable for this species, but the most recent confirmed sighting in the region occurred nearly 25 years ago. Given its nature to avoid contact with humans, it is unlikely that construction related activities would pose a negative impact on this species. Habitat removal due to construction would not have an impact on Sierra Nevada red fox.

Migratory Birds. Habitats in the project area such as Jeffrey pine forest and big sagebrush scrub provide suitable nesting and foraging habitat for migratory birds. The Proposed Action would result in direct and indirect impacts to nesting bird species protected under Fish and Game Code §§3503.5 and 3511, and the Migratory Bird Treaty Act. Under the Proposed Action, construction activities may result in some increased disturbance to migratory birds such as displacement during foraging and or nesting. Under the Proposed Action, direct effects to migratory bird habitat include the removal of trees and shrubs to develop the power plant, transmission line, substation, well pad sites and pipeline routes. Vegetation removal would be minimized to the amount necessary for construction. The Proposed Action would result in the disturbance of approximately 76.42 acres of potentially suitable habitat for migratory birds. These disturbances could cause nest abandonment and death of young or loss of reproductive potential at active nests located in or near the study area. Impacts may occur through the removal of vegetation and/or through vehicle and foot traffic or excessive noise associated with construction. **Mitigation Measure WIL-1** will be implemented to reduce impacts to migratory and nesting birds. This mitigation measure would limit construction activities in suitable habitat to outside the breeding season (if feasible); alternatively, pre-construction surveys for migratory birds will be performed prior to the start of construction activities. If active nests are discovered, buffers would be established protecting the nesting birds from construction impacts.

Operation and Maintenance

Impacts from operation and maintenance of the Proposed Action to most special-status wildlife species are similar to those described for general wildlife species (see below for exceptions). Once construction of the Proposed Action is completed, noise and human activity are expected to be similar to pre-project conditions. There are three existing geothermal power plants in the vicinity of the proposed power plant site which currently produce ambient noise levels that are expected to be similar to the proposed power plant. There are existing production wells in the Basalt Canyon area that currently producing ambient noise. Levels associated with new production wells are expected to be similar to the existing wells. Maintenance of the production wells and access roads will result periodic increases in noise and disturbance levels. However, this is expected to be similar to pre-project conditions. Secondary noise and disturbance sources in the study area include occasional off-road vehicles (e.g., four wheel drive vehicles, all terrain vehicles, motorcycles/dirt bikes, and snowmobiles) as well as a target shooting range to the northeast of the geothermal complex.

As discussed in Section 4.3, *Biological Resources – Vegetation*, the maintenance of access roads both within and outside the Project site boundary has the potential to introduce invasive plant species into disturbed areas and facilitate the spread of noxious weeds. Vehicles and crews

inadvertently could track in clinging seeds and/or parts of noxious weeds, thus facilitating their spread. This could result in the degradation of wildlife habitat outside of the power plant site and linear corridors. The application of PDMs BIO-3, BIO-4, BIO-5, BIO-6, and BIO-7 would reduce these impacts.

Owen's Tui Chub. There is no Owens tui chub habitat available in the study area. Native Owens tui chub populations occur in the "warm water" (mixed cold and thermal) AB springs and the CD springs of the Hot Creek State Fish Hatchery located approximately 2 miles east of the Project site. These springs have been designated by the USFWS as critical habitat for the Owens tui chub. Operation of the Proposed Action would increase the existing extraction of geothermal water from the Long Valley geothermal reservoir from additional deeper wells in Basalt Canyon. All of the produced fluid would be returned to the reservoir via reinjection. Because the geothermal reservoir has been shown to be connected to the surface waters and sensitive hot springs or other geothermal features in the south-southeastern caldera, these features, including the springs at the Hot Creek State Fish Hatchery, may be affected by the additional development of the geothermal reservoir. However, as described in Section 4.7, historical monitoring data, modeling forecasts, and temperature of thermal features suggest that little change to the quantity, quality or temperature of these geothermal features would occur under the Proposed Action.

Recent studies of spring flow, temperature and water chemistry at the Fish Hatchery have shown that minimal temperature changes have occurred in the mixed thermal and non-thermal warm springs in response to geothermal development at Casa Diablo. Changes in discharge occurred during 1984 and 1995 when alterations in the geothermal production scheme occurred at the same time that the region also experienced a long-term drought, which affected all parts of the hydrologic system. Total net changes in temperature at the two main Hot Creek Fish Hatchery springs during the most significant period of geothermal development at Casa Diablo (1988-2003) were less than 2ºF A(1.1^{o}C). Although greater temporary temperature declines have occurred during this time period (approximately4°F (2.2^{o}C) in 1995), these changes were apparently related to high winter precipitation, greater snow melt runoff, and higher than normal cold groundwater flow rates during the spring and summer. Furthermore, changes in hot spring inlet temperatures have not been accompanied by changes in chemistry of the water which would indicate a change in thermal inflow, suggesting that conductive heating in the rocks is buffering temperature of inflow to the springs. Thus it is difficult to identify the smaller effects of geothermal development on the Hatchery springs relative to natural climatic effects because climatic variations and geothermal reservoir changes have both occurred simultaneously. Hatchery spring temperatures are apparently buffered by conductive heat from hot rocks in the subsurface to water along the water's flow path, thus buffering potential impacts on temperature from changes in thermal water discharge (EGS, 2012).

Although the CD-IV project is forecast to reduce the thermal outflow to Hatchery Springs by about 17 percent, the thermal water fraction is a very small part (less than 5 percent) of the total flow so the forecast impact to the combined cold and thermal discharge at the springs is forecast to be reduced by less than 1 percent, which is not likely to be measureable relative to climatic effects. In addition, conductive buffering of the temperature would minimize potential temperature changes.

Based on this assessment there would be limited potential for adverse impacts on the Owens tui chub or its critical habitat as a result of operation of the Proposed Action. In addition, under PDM GEO-5, ORNI 50 LLC commits to continuing to operate the existing geothermal projects in conformance with the Plans of Operation for Development, Injection and Utilization, approved by the BLM and USFS, as well as in conformance with monitoring through the Long Valley Hydrologic Advisory Committee, and remedial action programs, which are designed to prevent, or mitigate, potential hydrothermal impacts to the Owens tui chub critical habitat, Hot Creek Hatchery and Hot Creek Gorge springs from geothermal operations conducted on federal geothermal leases in the Mono-Long Valley KGRA. ORNI 50 LLC also commits to operating the proposed geothermal project in conformance with these requirements.

Owens Sucker. There is no available habitat for Owens sucker in the study area, though suitable habitat for this species exists downstream of the study area in Mammoth Creek, and this habitat may be impacted indirectly by the project as described above for Owens tui chub. However, as described in Section 4.7, historical monitoring data, modeling forecasts, and temperature of thermal features suggest that little change to the quantity, quality or temperature of the hydrologic features that outflow to potential Owens sucker habitat would occur under the Proposed Action. Based on this assessment there would be no potential for adverse impacts on the Owens sucker or its habitat as a result of operation of the Proposed Action.

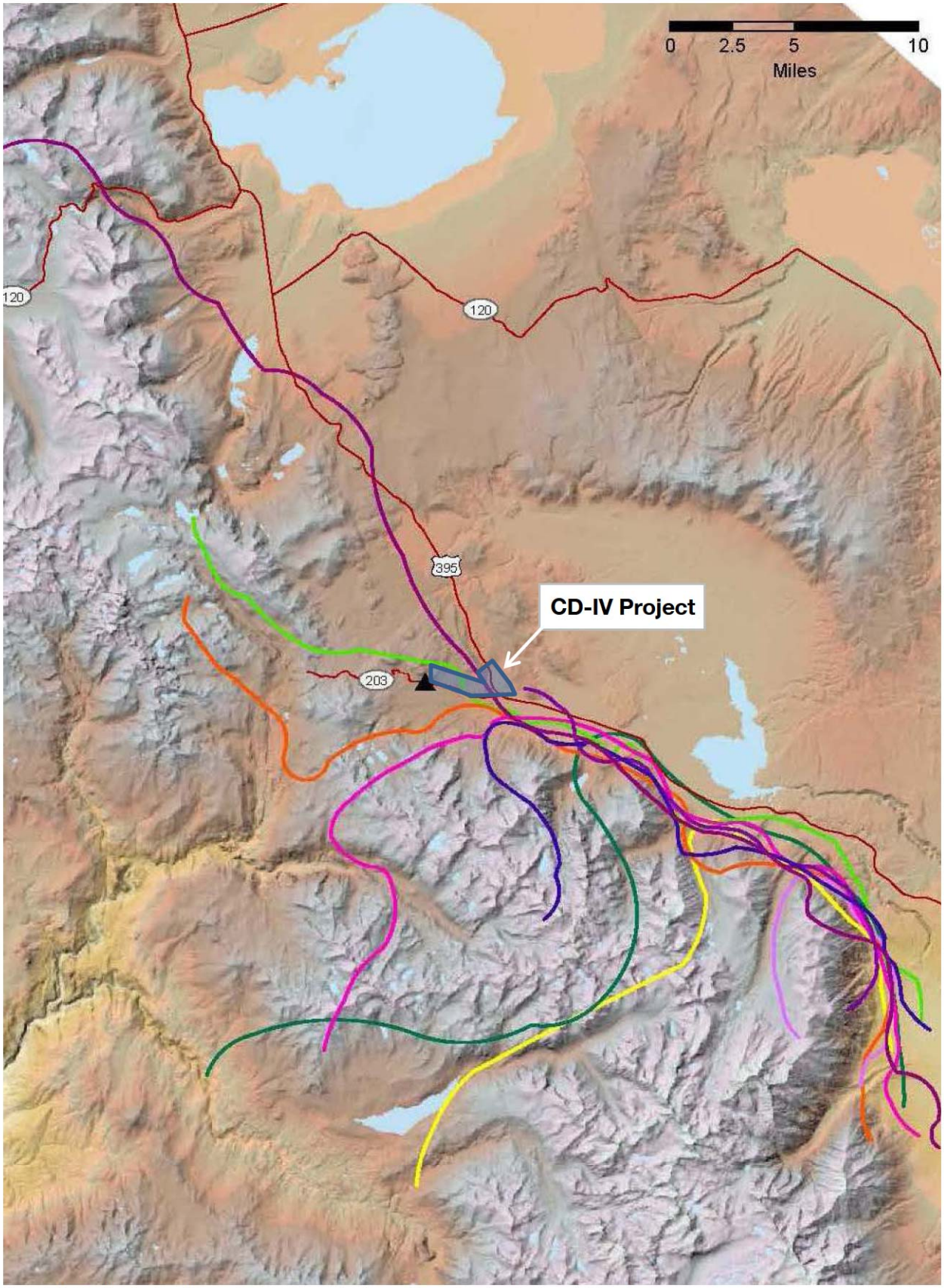
Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of CD-IV Project facilities. Thus, the direct removal of wildlife habitat is not anticipated for decommissioning activities. Potential direct and indirect effects to wildlife populations during decommissioning are similar to those described for the construction phase of the CD-IV Project and include wildlife disturbance from noise, light, or dust, and the introduction of invasive plant species by various vectors. Revegetation of the site and removal of facilities would ultimately restore wildlife habitat values in the area.

Mule Deer Migration

Construction

The location of the CD-IV Project is located within the spring and fall migration route of the identified Round Valley herd and the Casa Diablo herd (see Figure 4.4-1). Recent population estimates of these herds put the total for the Round Valley herd at 2,194 animals and the Casa Diablo herd at 2,805 animals. Characteristics of the vegetation in the study area meet known habitat requirements for deer that enter the area to hold or forage as residents, or who pass through the area during normal migration. Paulus (2011a) has recently documented “resident” mule deer use of the study area for forage, cover, resting, and rearing of fawns during the period August 5 through October 4. Paulus (2012b) also documented movement patterns from October 8 through December 6 that confirm that local mule deer migration routes to their distant winter ranges cross through the study area in Casa Diablo and Basalt Canyon, as suggested by several previous studies of the general area (Kucera, 1988; Taylor, 1988; Kerns, 2003; Monteith et al., 2009).



Round Valley Herd migration routes as mapped using radio collared mule deer. Taken from Monteith, et al., 2009. Two routes show migrating deer passing through the CD-IV Project Area.

SOURCE: ESA

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Figure 4.4-1
Deer Migration Routes

The study area does contain important browse species, such as bitterbrush. Construction of the CD-IV Project would remove some habitat important for foraging, but the most important and limiting aspect of the CD-IV Project would relate to the study area being utilized as a deer movement corridor. Based on deer track crossing studies performed in 2011 (MACTEC, 2011; Paulus 2011a; 2012a; 2012b), migrating deer travel down slope through Jeffrey pine forest north of the study area, crossing Upper Basalt and Basalt Canyons, and through the Casa Diablo Geothermal Complex to reach the meadow and riparian communities associated with Mammoth Creek to the southwest. Migrating deer currently pass east of the existing power plant locations and between the MP-I and MP-II power plants in the Casa Diablo area.

Potential interactions between deer and proposed project elements arise from the unproven but reasonable notions that migrating deer will not exhibit tolerance to new power plant noise and activity and will not readily adapt to movement across new aboveground pipelines associated with geothermal energy production. Members of the resident deer population in summer and early fall 2011 used habitats that are available near existing facilities in the study area uniformly, indicating adaptation (Paulus, 2012b). Migratory deer, however, may not remain long enough to adapt and may be thwarted in their habitat usage for movement along traditional paths by any new installation of linear barriers. The most notable of these would be the aboveground pipeline proposed to cross through the western portion of Casa Diablo, bisect Basalt Canyon, and then enter the eastern portion of Upper Basalt. Interactions that could redirect deer onto U.S. Highway 395 or into areas of increased predation could be minimized by undergrounding the proposed pipeline and avoiding erecting any new linear barrier at these locations. Additional passages of this nature could be provided nearer to the highway. Tracks mapped at the seven existing 30-50 ft underground sections of the Basalt Canyon Pipeline by Paulus (2011a; 2012b) demonstrate that deer used this type of passage during both the residency and migration periods in 2011. Migrating deer readily leap the existing Basalt Canyon Pipeline wherever it crosses their path as a single aboveground pipe, and will even stoop to pass under a single pipeline where it is elevated slightly more than the existing standard (Paulus, 2011b), so proactive design that emphasizes single pipe with either underground or overhead passages will likely benefit deer that are not able to otherwise tolerate or adapt to the Proposed Action. In addition, the vertical expansion loops will permit wildlife crossings. The proposed Project contains sections of parallel pipe alignments in several locations. Table 4.4-1 shows the lengths of double pipelines by alternative (lengths include existing single pipeline).

TABLE 4.4-1
LENGTHS OF PARALLEL PIPELINE CONSTRUCTION BY ALTERNATIVE

	Alt 1 Proposed Project	Alt 2 Plant Site Alternative	Alt 3 Modified Pipeline Alignment	Alt 4 No Action
Parallel Pipeline Length	3.5 miles	3.9 miles	3.7 miles	0

NOTE:
[1] Includes the existing production pipeline not associated with the CD-IV project.

Under the Proposed Action, where the pipeline would cross an existing road, the pipeline would be installed underground. These underground sections (shown in Figure 4.4-2) would provide for areas where deer could cross multiple pipelines without having to jump consecutive pipes.

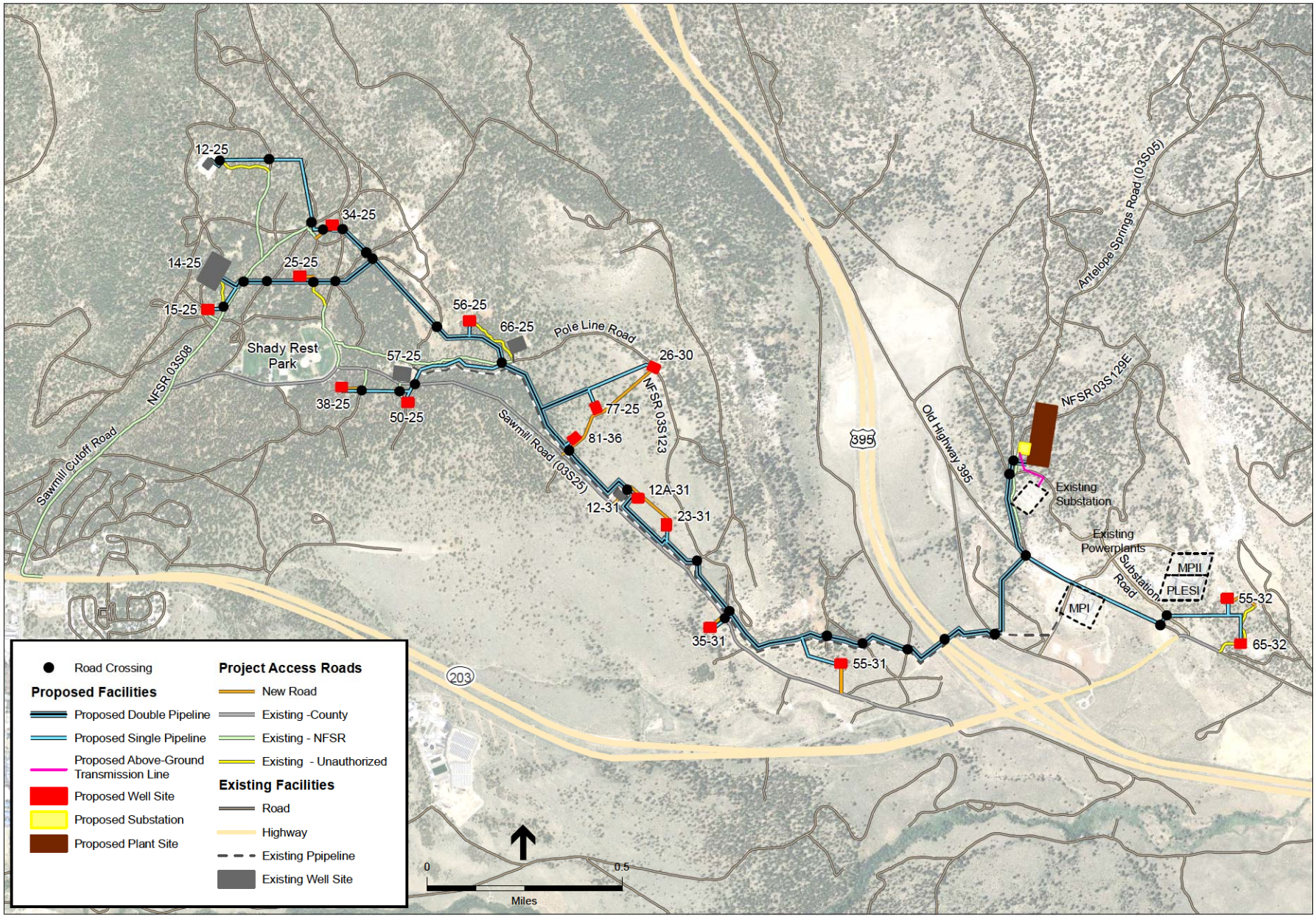
The location of the new power plant and the pipelines running south of it in the Proposed Action would introduce new barriers to mule deer migration moving downslope from north to south to access meadow and riparian communities associated with Mammoth Creek. It is not known whether this would force some migrating deer further west and closer to U.S. Highway 395 where they would be subject to increased mortality due to vehicular collisions. To avoid this potential risk, it would be important to avoid erecting any temporary barriers used during construction that could re-direct deer further to the west and near the U.S. Highway 395 corridor. There is abundant habitat east of the power plant site that could be utilized by migrating deer. Also, implementation of **Mitigation Measure WIL-4** would provide deer a pipeline crossing south of the proposed plant site. This would reduce but not eliminate the threat to migrating deer that this segment of pipeline poses.

The biological survey assessment of deer movement through the existing MP-I Project area concluded that partial closure of the movement corridors located between the existing MP-I and MP-II/PLES-I plant sites for the proposed M-I plant site would not substantially change the use of the movement corridor by resident deer (Paulus, 2012a). Upon investigation of other regularly used paths of movement from the habitat north of the Casa Diablo area to Mammoth Creek, it was observed that resident deer exhibit tolerance for the existing power plants, following the perimeter fencing closely despite the noise and activity in these geothermal areas of operation, as if to reach water by the shortest path (Paulus, 2012a). There are not sufficient data to speculate how migrating deer would respond to the new barriers associated with the Proposed Action. If movement patterns of either resident or migratory deer are thwarted by the increase in noise, lighting and traffic at this corridor, the animals could be redirected to the west of the Casa Diablo Geothermal Complex and possibly onto U.S. Highway 395 with increased frequency. The deer could alternatively be redirected to the east of the existing facilities, where existing high-traffic deer trails exist with no additional known threats. Based upon usage data generated by the fall 2011 track study, it is estimated that up to 40 summer-resident deer, up to 100 migrating deer, and up to 15 winter-resident deer could be redirected through or around the Casa Diablo Geothermal Complex in one direction or the other (Paulus, 2012a). This would be a “worst case” impact, as resident deer have demonstrated tolerance to the same types of potential deterrence that are proposed.

PDM BIO-1 will be implemented to determine if new pipelines are impeding wildlife movement, including migrating deer. In addition, **Mitigation Measures VEG-1, WIL-4, WIL-5, and WIL-6** would further reduce the adverse affects of the Proposed Action on mule deer or mule deer movement through the Project area. These mitigation measures provide migratory crossings and movement corridors for deer while also protecting foraging habitat.

Operation and Maintenance

Operation and maintenance of the Proposed Action are not expected to impact mule deer migration patterns over those discussed above for construction.



SOURCE: USFS, 2011; Ormat, 2011; NAIP, 2010

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Figure 4.4-2

Proposed Project Road Crossings

Decommissioning

At the end of the expected life of the proposed power plant, wells, and pipelines, the equipment and facilities would be properly dismantled and the site would be restored to pre-project land uses. Revegetation of the site and removal of facilities would ultimately restore habitat for mule deer in the area.

4.4.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the CD-IV Project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.2.2.

a) Have a substantial adverse effect, either directly, or through habitat modifications on any species identified as a candidate, sensitive, or special status in local or regional plans, policies, or regulations or by the CDFG or the USFWS.

Construction

As described above, the Proposed Action is anticipated to result in temporary and/or permanent impacts to individuals or habitat of northern goshawk, greater sage-grouse, pallid bat, Townsend's big-eared bat, and Sierra marten. Under CEQA, these impacts would be considered significant. However, implementation of PDMs related to biological resources as well as **Mitigation Measures WIL-1, WIL-2, WIL-3, and WIL-7** would reduce these impacts to *less than significant.*

Operation and Maintenance

As described above, once construction of the Proposed Action is completed, noise and human activity are expected to be similar to pre-project conditions. Operations and maintenance of project facilities has the potential to introduce invasive plant species into disturbed areas and facilitate the spread of noxious weeds. This could result in the degradation of special-status wildlife species habitat outside of the power plant site and linear corridors. The application of PDMs BIO-3, BIO-4, BIO-5, BIO-6, and BIO-7 would reduce these impacts to *less than significant*.

Operation of the Proposed Action has the potential to impact Owens tui chub and Owen sucker habitats. As discussed above, increasing geothermal fluid production in the geothermal reservoir is not anticipated to cause adverse impacts to springs, surface waters, and other hydrologic surface features that could provide habitat to these species. Existing monitoring programs under the oversight of the Long Valley Hydrologic Advisory Committee would be expanded to include monitoring for the Proposed Action, in accordance with PDM GEO-5. Potential impacts would be less than significant.

Decommissioning

Impacts to special-status wildlife species are not anticipated for decommissioning activities. Therefore, there is *no impact.*

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Construction

As described above, the Proposed Action is anticipated to result in temporary and/or permanent impacts to migrating mule deer and other wildlife species. Under CEQA, these impacts would be considered significant. However, implementation of PDM BIO-1 as well as **Mitigation Measures WIL-4 through WIL-6** would reduce these impacts to *less than significant.*

Operation and Maintenance

Operation and maintenance of the Proposed Action are not expected to impact mule deer migration patterns over those discussed above for construction. Under CEQA, these impacts would be considered significant. However, implementation of PDM BIO-1 as well as **Mitigation Measures WIL-4 through WIL-6** would reduce these impacts to *less than significant.*

Decommissioning

At the end of the expected life of the proposed power plant, wells, and pipelines, the equipment and facilities would be properly dismantled and the site would be restored to pre-project land uses. Revegetation of the site and removal of facilities would restore mule deer habitat in the area.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

Construction, Operation and Maintenance, and Decommissioning

The CD-IV Project would not conflict with any local policies or ordinances protecting biological resources, and it is consistent with the Conservation/Open Space Element of the Mono County General Plan and the Resource Management and Conservation Element of the Town of Mammoth Lakes General Plan.

4.4.5 Alternative 2: Plant Site Alternative

4.4.5.1 Direct and Indirect Impacts

General Wildlife and Habitat

Potential impacts to general wildlife and their habitats during construction, operation and decommissioning of Alternative 2 would be similar in nature as described for the Proposed Action, although impacts to specific habitat types would vary slightly but not in a way that would result in impacts substantially different from the Proposed Action. The types of impacts that would occur under Alternative 2 similarly would result in the direct and permanent loss of all

habitats within the disturbance footprint, and indirect impacts to general wildlife and their habitats would be similar to those discussed for the Proposed Action. Implementation of PDMs and mitigation measures protecting wildlife and their habitats would reduce potential impacts, but impacts would not be completely avoided.

Special-Status Species

Construction

Potential impacts to special-status wildlife species during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of PDMs and mitigation measures designed to protect special-status wildlife would reduce potential impacts to special-status species, but impacts would not be completely avoided.

Operation and Maintenance

Once the CD-IV Project is completed, noise and human activity are expected to be similar to pre-project conditions. Potential impacts to special-status wildlife species during operation of Alternative 2 would be the same as described for the Proposed Action. Implementation of PDMs and mitigation measures designed to protect special-status wildlife would reduce potential impacts to special-status species.

Decommissioning

Decommissioning is anticipated to only directly affect areas that were previously disturbed during installation of CD-IV Project facilities. Thus, the direct removal of wildlife habitat is not anticipated for decommissioning activities. Potential direct and indirect effects to wildlife populations during decommissioning are similar to those described for the construction phase of the CD-IV Project and include wildlife disturbance from noise, light, or dust, and the introduction of invasive plant species by various vectors. Revegetation of the site and removal of facilities would ultimately restore wildlife habitat in the area.

Mule Deer Migration

Construction, Operations and Maintenance

Potential impacts to mule deer migration patterns during construction and operation and maintenance of Alternative 2 would be similar in nature as described for the Proposed Action, although impacts to migratory deer in the vicinity of the Casa Diablo Geothermal Complex would vary slightly and likely be reduced. Alternative 2 would place the location of the proposed power plant site to the east of the existing MP-II power plant. This would in effect shift impacts to migratory deer in the vicinity of the Casa Diablo Geothermal Complex to the east away from U.S. Highway 395. This could potentially reduce the mortality of deer due to vehicle collisions as compared to the Proposed Action. Under Alternative 2, however, there are 0.4 miles more of double pipelines compared to the Proposed Action which could result in slightly increased impedance to deer movement.

Under Alternative 2, same as the Proposed Action, where the pipeline would cross an existing road, the pipeline would be installed underground. These underground sections (shown in Figure 4.4-3) would provide for areas where deer could cross multiple pipelines without having to jump consecutive pipes. PDM BIO-1 will be implemented to determine if new pipelines are impeding wildlife movement, including migrating deer. In addition, **Mitigation Measure WIL-4** through WIL-6 would further reduce the adverse affects of Alternative 2 on mule deer or mule deer movement through the Project area.

Decommissioning

At the end of the expected life of the proposed power plant, wells, and pipelines, the equipment and facilities would be properly dismantled and the site would be restored to pre-project land uses. Revegetation of the site and removal of facilities would ultimately restore mule deer habitat and movement corridors in the area.

4.4.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts of Alternative 2 on wildlife would remain less than significant.

4.4.6 Alternative 3: Modified Pipeline Alternative

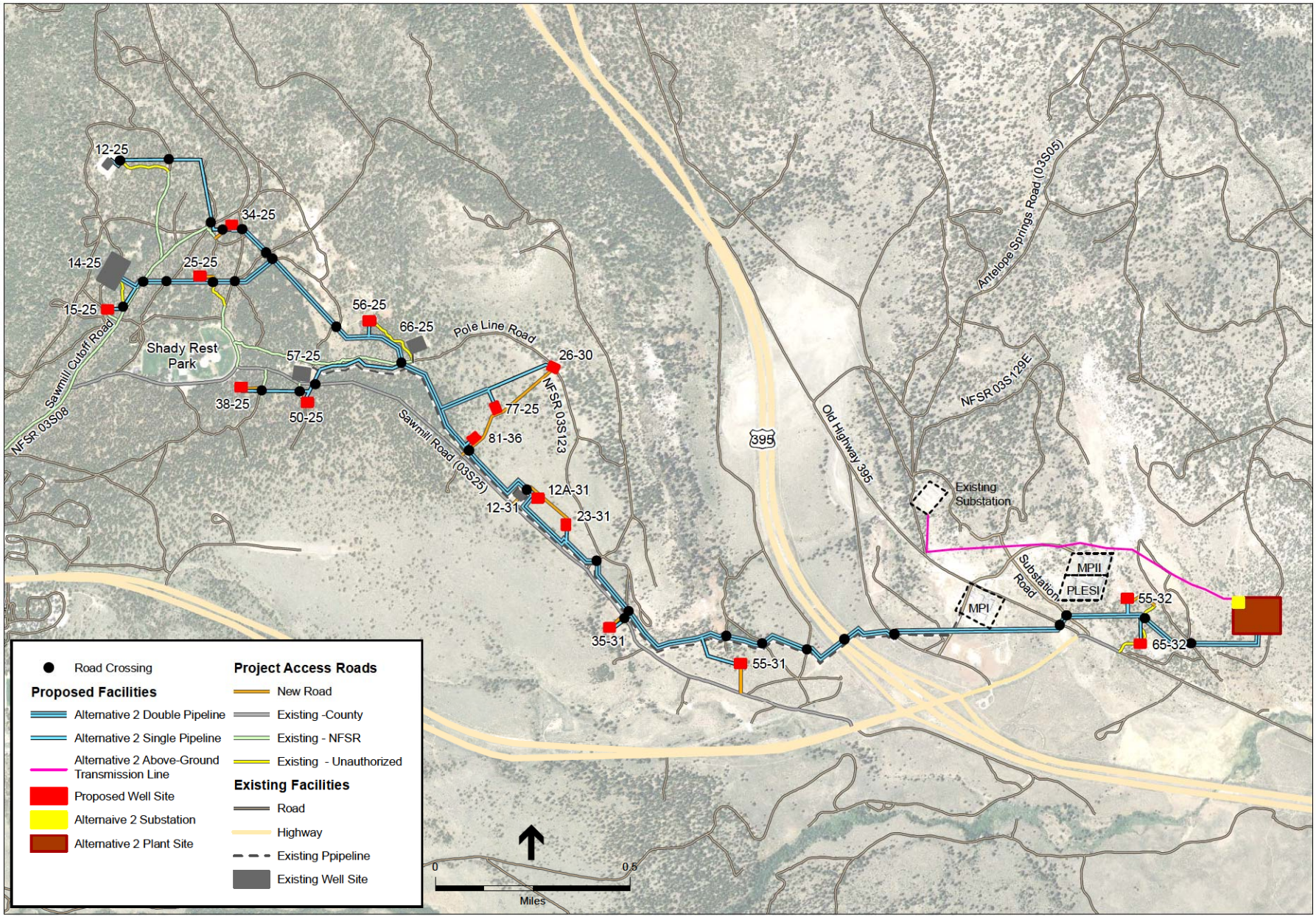
4.4.6.1 Direct and Indirect Impacts

General Wildlife and Habitat

Potential impacts to general wildlife and their habitats during construction, operation and decommissioning of Alternative 3 would be similar in nature, although impacts to specific habitat types would vary slightly but not in a way that would result in impacts substantially different from the Proposed Action. The decrease in pipeline corridor lengths would lead to slightly less disturbance and removal of habitats as compared to the Proposed Action. The types of impacts that would occur under Alternative 3 similarly would result in the direct and permanent loss of all habitats within the disturbance footprint, and indirect impacts to general wildlife and their habitats would be similar to those discussed for the Proposed Action. Implementation of PDMs and mitigation measures protecting wildlife and their habitats would reduce potential impacts, but impacts would not be completely avoided.

Special-Status Species

Potential impacts to special-status wildlife species during construction, operation and decommissioning of Alternative 3 would be similar in nature, though of slightly smaller magnitude as described for the Proposed Action. The decrease in pipeline corridor lengths would lead to slightly less disturbance and removal of habitat as compared to the Proposed Action. Implementation of PDMs and mitigation measures designed to protect native vegetation communities would reduce potential impacts to special-status species, but impacts would not be completely avoided.



SOURCE: USFS, 2011; Ormat, 2011; NAIP, 2010

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Figure 4.4-3

Road Crossings for Alternative 2

Mule Deer Migration

Construction, Operations and Maintenance

Potential impacts to mule deer migration patterns from construction and operations and maintenance of Alternative 3 would be similar in nature and magnitude as described for the Proposed Action.

Under Alternative 3, same as the Proposed Action, where the pipeline would cross an existing road, the pipeline would be installed underground. These underground sections (shown in Figure 4.4-4) would provide for areas where deer could cross multiple pipelines without having to jump consecutive pipes.

PDM BIO-1 will be implemented to determine if new pipelines are impeding wildlife movement, including migrating deer. In addition, **Mitigation Measures WIL-4 through WIL-6** would further reduce the adverse affects of Alternative 3 on mule deer or mule deer movement through the Project area.

Decommissioning

At the end of the expected life of the proposed power plant, wells, and pipelines, the equipment and facilities would be properly dismantled and the site would be restored to pre-project land uses. Revegetation of the site and removal of facilities would benefit mule deer in the area.

4.4.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts of Alternative 3 would remain less than significant.

4.4.7 Alternative 4: No Action

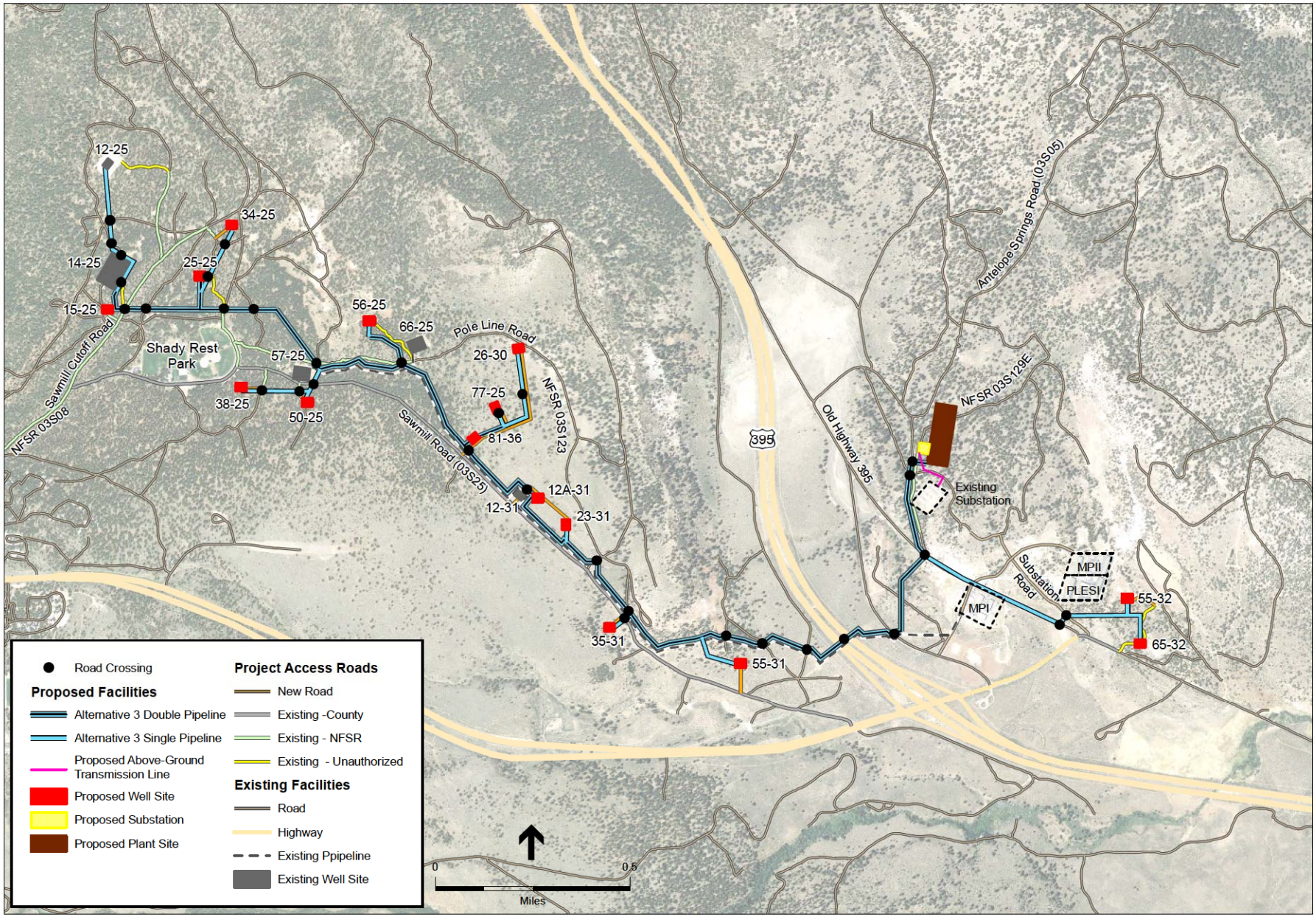
4.4.7.1 Direct and Indirect Impacts

Under this alternative, the BLM would not approve the CD-IV Project. Direct and indirect impacts related to the construction, operation and decommissioning of the power plant or pipelines would not occur.

If Alternative 4 were implemented, no changes would be implemented on the power plant site and the existing environmental setting described in Draft EIS/EIR Chapter 3 would be maintained. As a no-development alternative, the No Action Alternative would result in no changes to conditions related to wildlife resources; therefore, no impact would occur.

4.4.7.2 CEQA Significance Determination

Alternative 4 would result in no impacts to wildlife resources.



SOURCE: USFS, 2011; Ormat, 2011; NAIP, 2010

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Figure 4.4-4

Alternative 3 Road Crossings

4.4.8 Cumulative Impacts

4.4.8.1 Geographic Extent/Context

The geographic scope of wildlife resources impacts encompasses the wildlife habitats of affected species in the region, including Jeffrey pine forest, big sagebrush scrub, singleleaf pinyon woodland, and Wright's buckwheat dwarf scrub, as well as aquatic habitat in the Mammoth Creek watershed and other downstream watersheds. The Project area is located within or adjacent to federal, state, and county lands that are largely undeveloped and support native vegetation communities. In addition, development associated with the Town of Mammoth Lakes abuts the Project area to the south and east.

The analysis of cumulative effects considers a number of variables including geographic (spatial) limits, time (temporal) limits, and the characteristics of the resources being evaluated. The geographic scope of this analysis is based on the nature of the geography surrounding the Project area and the characteristics and properties of each resource. In addition, each project will have its own implementation schedule, which may or may not coincide or overlap with the CD-IV Project schedule. This is a consideration for short-term impacts from the CD-IV Project. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the CD-IV Project.

4.4.8.2 Existing Cumulative Conditions

Land uses in the cumulative analysis area historically have been altered by human activities, resulting in conversion of undeveloped land and habitat loss, fragmentation, and degradation. Future growth and development in the analysis area will likely continue these impacts. General threats to common and special-status wildlife species in the cumulative effects study area include the fragmentation of habitat from roads and urban or rural development, the effects of historic livestock grazing on wildlife forage structure and availability, and agricultural development.

Wildlife habitats are largely similar in the analysis area and consist primarily of a variety of scrublands and singleleaf pinyon woodlands at lower elevations and coniferous forests at higher elevations. Occasional montane meadow habitats dot the higher elevations, with open grasslands occurring sporadically at lower elevations. Riparian woodlands occur along the wetter drainages. Potential federally jurisdictional wetlands and waters of the U.S. as well as CDFG jurisdictional habitats are limited in the study area; however, it is likely that jurisdictional habitats occur throughout the analysis area.

The study area supports habitats for a variety of special-status wildlife species. It is expected that the cumulative analysis area, particularly undeveloped lands, would also support some number of special-status wildlife species, some of which could be federal or state listed. In fact, the CNDDB shows a number of special-status species occurring in the analysis area.

4.4.8.3 Reasonably Foreseeable Projects

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to the cumulative conditions for wildlife resources in the cumulative analysis area. Table 4.1-1, presented in Section 4.1.5, *Cumulative Scenario Approach*, lists cumulative projects in the vicinity of the project site and surrounding area and was used to develop this analysis of cumulative effects for wildlife resources. Most of these projects have either undergone independent environmental review pursuant to NEPA and/or CEQA or will do so prior to approval. Even if environmental review has not been completed for the cumulative projects described in Table 4.1-1, their effects were considered in the cumulative impacts analyses in this EIS/EIR.

Projects identified on the cumulative projects list on Table 4.1-1 that could result in cumulative wildlife impacts include (among others):

1. MP-I Replacement Project
2. MP-II Project
3. PLES-I Project
4. New Airport Terminal
5. Waterford Bridges Project
6. Old Mammoth Place
7. Search and Rescue Facility
8. Snowcreek Master Plan
9. Mammoth View Project
10. Sawmill Cutoff Road Reconstruction Project
11. Shady Rest Park

4.4.8.4 Construction, Operations and Maintenance, and Decommissioning

General Wildlife and Habitats

Direct impacts to wildlife as a result of the Proposed Action includes temporary and permanent loss of habitat along with the displacement and/or potential mortality of wildlife species that are poor dispersers such as snakes, lizards, and small mammals. Similarly, the list of cumulative projects implemented in undeveloped areas would have the potential to result in similar impacts. However, the combined effect of impacts to non-sensitive wildlife species from the Proposed Action and impacts of the cumulative projects is not considered to be significant because these species are common and wide-ranging over the entire study area and are expected to recover from these losses given the large populations within the region.

Construction, operations and maintenance, and decommissioning activities would result in temporary and permanent losses of wildlife habitats including 36.86 acres of Jeffery pine forest and 39.56 acres of big sagebrush scrub. Despite measures to protect and remediate losses, construction of the CD-IV Project would cause both temporary (during construction from vegetation clearing) and permanent (displacement of habitats with project features such as the power plant site and well pad sites) impacts to habitats communities as described in Section 4.4.4. Most of the projects identified in Table 4.1-1 also would result in temporary and permanent losses of wildlife habitats through grading and clearing activities to construct roads, utility infrastructure, and commercial, industrial, and residential developments. However, the CD-IV Project and the other projects would

be required to mitigate impacts to sensitive wildlife habitats. With implementation of such measures, the CD-IV Project's contribution to a significant cumulative impact to sensitive wildlife habitats would be rendered less than cumulatively considerable.

Special-Status Species

Implementation of the Proposed Action would result in impacts to listed or sensitive wildlife species, including: northern goshawk, sage-grouse, other sensitive avian species, Sierra marten, and bats. Impacts to these species would be the result of direct loss of suitable habitat (76.42 acres of habitat), direct loss of known locations of individuals, or indirect effects due to human disturbance or changes in habitat quality during construction and O&M. Implementation of the mitigation measures described below would mitigate these impacts. However, wildlife species that are listed or considered to be sensitive are already considered to be compromised, partly or completely (depending on the species) as a result of past and continued human activity and development throughout the region.

As such, any cumulative activities that would considerably contribute to adverse affects on wildlife species would be considered significant. Therefore, although localized impacts of the Proposed Action to the aforementioned species may be considered less than significant, when combined with similar impacts of past, present, and future projects, these impacts would considerably contribute to a cumulative impact for these species. Implementation of PDMs and mitigation measures related to biological resources would reduce the Proposed Action's contribution to these impacts.

Habitat Connectivity and Wildlife Movement

As discussed above, CD-IV Project impacts on wildlife movement corridors would be mitigated to less than significant. However, under the cumulative development scenario some residual impacts to wildlife movement are likely to remain even following the application of mitigation measures. Permanent CD-IV Project facilities create a wildlife movement barrier that will alter but not likely impede the movement of mule deer or other highly mobile species.

The effects of proposed and future actions on habitat connectivity and wildlife movement are likely to remain following mitigation, even after the application of mitigation measures. This cumulative impact is due to the residual effects of habitat fragmentation and impaired connectivity. It is expected that mule deer habitat located north and east of CD-IV Project facilities will continue to provide habitat connectivity for mule deer and other migratory wildlife. With substantial habitat connectivity remaining following the cumulative development scenario, the reduced size of the movement corridor presents an adverse impact to the migratory wildlife. Direct and indirect effects to mule deer will be reduced and mitigated through the application of PDM BIO-1 and the implementation of **Mitigation Measures WIL-4 through WIL-6**. Consequently, the CD-IV Project's cumulative contribution to the loss of mule deer habitat connectivity and wildlife connectivity in general would be rendered less than cumulatively considerable.

4.4.8.5 CEQA Significance Determinations

As described above, the CD-IV Project's contribution to a significant cumulative impact on general wildlife and special-status wildlife species would be rendered less than cumulatively considerable and, therefore, not significant.

4.4.9 Mitigation Measures

Mitigation Measure WIL-1: Avoid Active Nesting Season. To avoid and minimize impacts to tree and shrub nesting species, the following measures shall be implemented by ORNI 50, LLC according to the timeframes shown below;

1. If feasible, conduct all tree and shrub removal and grading activities during the non-breeding season (generally September 1 through January 31).

2. If grading and tree removal activities are scheduled to occur during the breeding and nesting season (February 1 through August 31), pre-construction surveys shall be performed prior to the start of project activities.

Conduct Pre-construction Nesting Bird Surveys. If construction, grading or other project-related activities are scheduled during the nesting season (February 1 to August 31), pre-construction surveys shall be conducted prior to the initiation of construction by a qualified wildlife biologist to identify active hawk nests within ½-mile of proposed construction activities and nests of other species within 250 feet of proposed construction activities. The surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of each phase of construction. The results of the survey would be emailed to CDFG, USFS, and USFWS at least three days prior to construction. Surveys would be conducted by a qualified biologist in accordance with the following protocols:

1. Surveys for northern goshawk shall include at least two preconstruction surveys (separated by at least two weeks).

2. Surveys for other migratory bird species shall take place no less than 14 days and no more than 30 days prior to the beginning of each phase of construction that would be located within 250 feet of suitable nesting habitat.

If the pre-construction surveys do not identify any nesting raptors or other nesting migratory bird species within areas potentially affected by construction activities, no further mitigation would be required. If the pre-construction surveys do identify nesting raptors or other nesting bird species within areas that may be affected by site construction, the following measures shall be implemented.

Avoid Active Bird Nest Sites. Should active nest sites be discovered within areas that may be affected by construction activities, additional measures shall be implemented as described below, prior to the initiation of construction.

***Northern Goshawk and other Migratory Birds*:** If active nests are found, project-related construction impacts shall be avoided by establishment of appropriate no-work buffers to limit

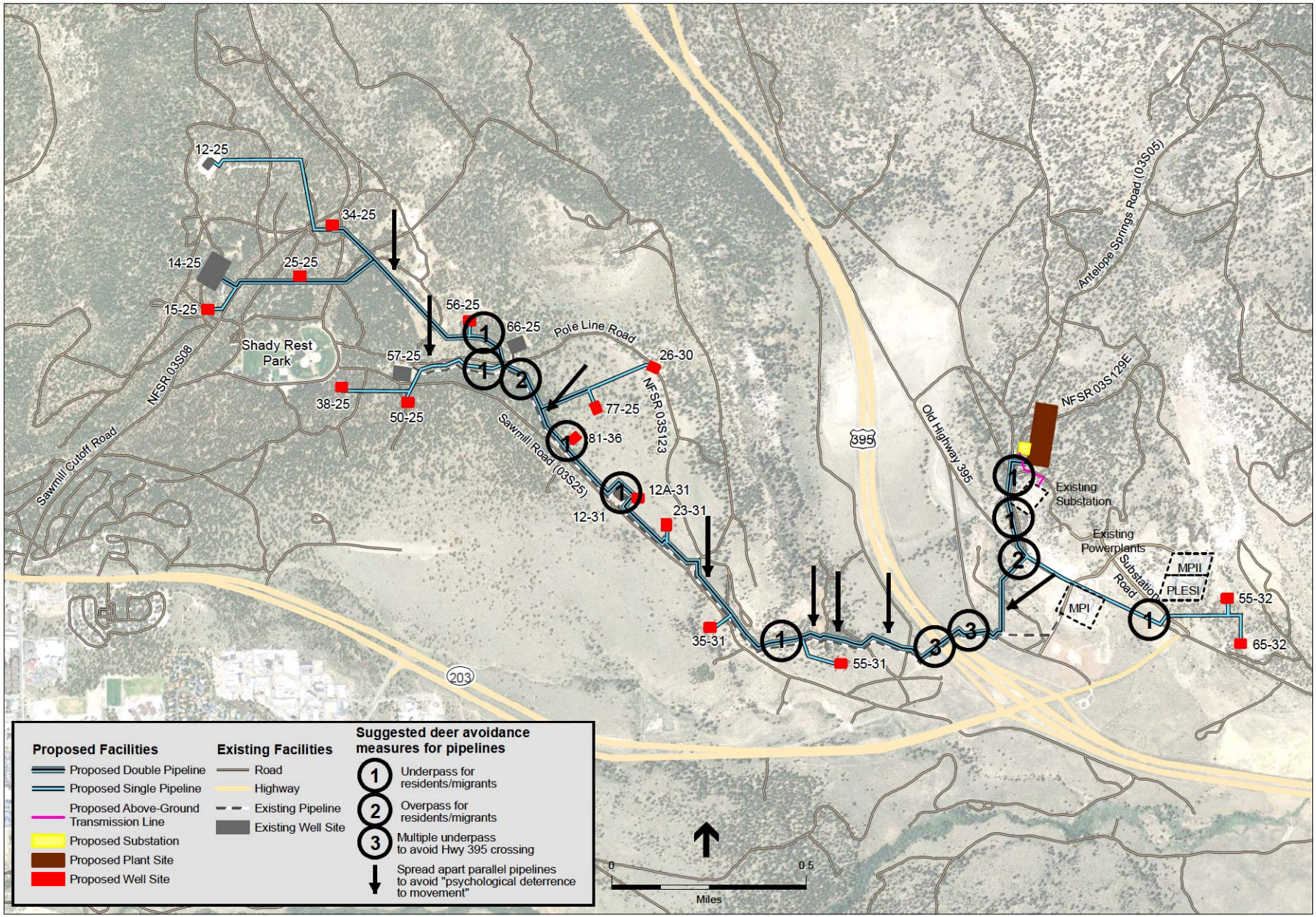
project-related construction activities near the nest site. The size of the no-work buffer zone shall be determined in consultation with the CDFG, USFS, and USFWS although a 500-foot buffer would be used when possible. For northern goshawk nests, the buffer should be 1/4 mile. The no-work buffer zone shall be delineated by highly visible temporary construction fencing. In consultation with CDFG, USFS, and USFWS, monitoring of nest activity by a qualified biologist may be required if the project-related construction activity has potential to adversely affect the nest or nesting behavior of the bird. No project-related construction activity shall commence within the no-work buffer area until a qualified biologist and CDFG, USFS, and USFWS confirms that the nest is no longer active.

Mitigation Measure WIL-2: Water which may accumulate in geothermal well site basins from precipitation shall be removed to a standing depth of 2 inches from the respective basins on a daily basis or as soon as operationally feasible; and liquids deposited into the basins shall either be removed daily to a standing depth of 2 inches, or the basins shall be made wildlife escapable by creating earthen ramps at slopes of 1:3 or less at intervals of 100 feet apart or less around the perimeter of the standing depth of the liquid stored in the basin. The basins shall be monitored during well drilling to determine if these measures are effective. If monitoring determines that these measures are ineffective in preventing wildlife from drowning in the basins, an alternative deterrent or escape structure such as netting will be implemented. Alternatives for providing equally effective measures which would allow wildlife to escape unharmed from the well site basins may be authorized subject to USFS, USFS, and CDFG approval.

Mitigation Measure WIL-3: Within the Jeffrey pine forest habitat within the Project area, retain as many snags, downed logs, coarse woody debris and brush piles as possible to provide Sierra marten hunting and denning opportunities.

Mitigation Measure WIL-4: (This mitigation measure only applies to Alternatives 1 and 3) A new deer crossing shall be constructed over the proposed pipeline running south of the power plant site between the existing substation and the existing MP-I power plant to enhance mule deer and other wildlife movement through the Project area. The new crossing will be designed with input from the CDFG but will resemble the existing crossing at the SCE easement.

Mitigation Measure WIL-5: The proposed pipelines running parallel to the existing Basalt Canyon pipeline shall be installed underground in alignment with the existing underground sections in order to provide a clear visual corridor for migrating deer. The underground sections shall be a minimum of 30 feet in length. In most cases these segments occur at existing roads, which mule deer habitually use for movement. Segments that are parallel to the existing Basalt Canyon pipeline in areas where there are currently no underground segments shall be installed underground at a prescribed frequency. These underground segments shall be located in alignment with suspected traditional migratory routes (see Figure 4.4-1). At this time, constructing underground segments in the existing Basalt Canyon pipeline is not proposed, as deer readily pass over the single pipeline. In addition to these underground segments, overhead pipeline segments shall be installed at high movement areas identified to the immediate south of Highway 395 and between well pad sites 57-25 and 66-25 (see Figure 4.4-5). These overhead



SOURCE: USFS, 2011; Ormat, 2011; NAIP, 2010

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Figure 4.4-5

Deer Avoidance Measures

segments shall be of sufficient height to allow wildlife to pass under the pipeline. It should be noted that these proposed migratory crossing requirements should be viewed primarily as conceptual and should be used to guide final design of the pipelines.

Mitigation Measure WIL-6: ORNI50, LLC shall prepare and implement a Migratory Deer Monitoring Plan that meets the approval of BLM and USFS. The objective of the Migratory Deer Monitoring Plan shall be to monitor the pipeline routes for evidence of movement corridors not currently identified. The migratory deer monitoring shall follow the methodology used for the deer track crossing studies performed in 2011 (Paulus 2011a; 2012a; 2012b). If previously unidentified movement corridors are found during monitoring, remedial actions, such as installation of earthen ramps over the pipeline, shall be implemented in order to facilitate deer crossings.

Mitigation Measure WIL 7: ***Conduct Pre-construction Sage-Grouse Lek Surveys.*** If construction, grading or other project-related activities are scheduled during the breeding season (February 15 to May 1), pre-construction surveys shall be conducted prior to the initiation of construction by a qualified wildlife biologist to identify sage-grouse leks and nests within ½-mile of proposed construction activities. The surveys shall be conducted no less than 14 days and no more than 30 days prior to the beginning of each phase of construction. Survey protocols shall be approved by the CDFG, USFS, and the USFWS in advance of field surveys. If the pre-construction surveys do not identify any sage-grouse leks within areas potentially affected by construction activities, no further mitigation would be required. If active leks are found, project-related construction impacts shall be avoided by establishment of appropriate no-work buffers to limit project-related construction activities near the lek site. The size of the no-work buffer zone shall be determined in consultation with the CDFG, USFS, and USFWS, although a 500-foot buffer would be used when possible. The no-work buffer zone shall be delineated by highly visible temporary construction fencing. In consultation with CDFG, USFS, and USFWS, monitoring of lek activity by a qualified biologist may be required if the project-related construction activity has potential to adversely affect the lek or mating behavior of the sage-grouse. No project-related construction activity shall commence within the no-work buffer area until a qualified biologist and CDFG, USFS, and USFWS confirms that the lek is no longer active.

4.4.10 Residual Impacts after Mitigation Incorporated

Following implementation of mitigation measures provided in Section 4.4.9 as well as all suitable PDMs, all adverse impacts on wildlife resources resulting from construction, operations and maintenance, and decommissioning of the CD-IV Project and Alternatives would be avoided or substantially reduced.

4.5 Climate Change

4.5.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and alternatives focuses on the possible impacts related to GHG emissions and climate change. The methodology to assess impacts related to GHG emissions and climate change under NEPA is continuing to evolve as consensus forms as to how best to evaluate such effects at both proposed action-specific and cumulative levels. The CEQ published draft guidance on February 18, 2010, for federal agencies to improve their consideration of the effects of GHG emissions and climate change in their evaluation of proposals for federal actions under NEPA. For example, the CEQ proposes that agencies should consider the direct and indirect GHG emissions from a proposed action and its alternatives and quantify and disclose those emissions in the environmental document (40 CFR 1508.25). The CEQ further recommends that agencies consider mitigation measures to reduce proposed action-related GHG emissions from all phases and elements of the proposed action and alternatives over their expected life, subject to reasonable limits based on feasibility and practicality.

4.5.1.1 GHG Emissions

Construction Emissions

Total construction emissions were estimated using Project-specific information identified in the application for the CD-IV Project (MPLP, 2010), as well as other information provided by ORNI 50, LLC (Ormat, 2011). Appendix C.2, *GHG Emission Estimates*, contains the direct and indirect emissions estimates calculations and all of the assumptions used to estimate the construction GHG emissions that would be associated with the CD-IV Project. For the purposes of the GHG emissions analysis, construction emissions that would be associated with the CD-IV Project are described in terms of three main activity source types, including: power plant construction, well development construction, and pipeline construction.

For each of the construction activity sources, the following information was compiled based on available data and conservative assumptions:

1. A list of the types of off-road construction equipment and on-road vehicles to be used;
2. The number of pieces of each type of off-road equipment and on-road vehicles;
3. Daily equipment and vehicle usage rates in terms of hours per day or miles traveled per day for each piece of off-road equipment and on-road vehicles, respectively;
4. The horse-power (hp) rating for each type of off-road equipment used; and
5. Daily water use rates for the indirect emissions estimates.

Off-Road Equipment

The combustion of diesel fuel to provide power for the operation of various equipment results in the generation of GHGs. Off-road construction equipment diesel fuel consumption rates for calendar

year 2013 in the GBVAB were estimated using CARB's new Offroad 2011 emissions model. The fuel consumption factors for the specific pieces of construction equipment were estimated for calendar year 2013. GHG emissions for off-road construction equipment were estimated by multiplying the total diesel fuel consumed by each piece of equipment by CO_2, N_2O, and CH_4 emission factors obtained from The Climate Registry (TCR) (TCR, 2011) for diesel fuel combustion. N_2O and CH_4 emissions were multiplied by their respective global warming potentials and added to the CO_2 emissions to obtain CO_2e emissions.

On-Road Motor Vehicle Exhaust Emissions

GHG emissions from motor vehicles used during construction were estimated using the same general methodology described for criteria pollutants from construction vehicles (see Section 4.2.1.1, *Construction Emissions*). Since the EMFAC2007 model provides GHG emission factors only for CO_2 emissions, N_2O and CH_4 emission factors for gasoline and diesel combustion were obtained from TCR (2011). GHG emissions in the form of CO_2e were calculated by multiplying the estimated total miles travelled by Project-related worker vehicles and haul trucks by the GHG emission factors, then multiplying the N_2O and CH_4 emissions by their respective global warming potential, and then adding the CO_2, N_2O, and CH_4 emissions.

Indirect Emissions

Indirect GHG emissions would result from water use for dust control and other construction activities (including well drilling) associated with construction of the Project. These emissions were estimated using daily water use information identified in Section 2.2, Alternative 1 – *Applicant Proposed Action*, and electrical consumption and electrical grid emission factors that include fossil fuel-fired power plants from the CEC and TCR (CEC, 2005; and TCR, 2011), respectively. Based on CEC use factors, it is estimated approximately 250 kWh of electricity would be required for every million gallons of water used (CEC, 2005).

Non-condensable Gases

Proposed well testing would result in minor emissions of non-condensable gases (including CO_2) that are associated with the geothermal fluid. During well cleanout and flow testing, geothermal fluids would likely be pumped into large open containers. CO_2 may temporarily be released from the geothermal fluid for several hours during these activities. The analysis assumes four hours of flow testing per well and a CO_2 emission rate of 0.378 metric ton per hour of release based on well venting data provided by ORNI 50, LLC (MPLP, 2010).

Operation and Maintenance Emissions

Vehicle Exhaust

The GHG emissions from motor vehicles used during operation were estimated using the same methodology described above for GHG emissions from construction phase motor vehicles. Emissions that would be associated with commuting workers and periodic road snow plowing are estimated using the EMFAC2011emission factors multiplied by the estimated long-term operation and maintenance-related employee vehicle trips (up to 12 one-way trips; see Section 4.16-1, *Traffic, Transportation, and Circulation*) and the estimated additional snow

plowing mileage (i.e., estimated to be 20 miles per day, twice a week, for five months) that would be associated with the Project.

Emergency Standby Diesel Equipment

The CD-IV Project power plant would include operation of one approximately 800 bhp diesel-fueled emergency generator to provide backup power for critical plant control systems in the event of a power outage. Similarly, the proposed power plant would include one approximately 400 bhp diesel-fueled firewater pump to provide power to the firewater pump in the event of a fire emergency. The manufacturer's recommendations for testing and maintenance of the emergency generators would be followed, allowing up to 50 hours per year of operation for maintenance and/or testing purposes (40 CFR Part 89). GHG emissions from diesel combustion that would occur during the intermittent testing and potential emergency use of these engines were estimated using the same methodology (i.e., Offroad2011 fuel consumption and TCR diesel fuel emission factors) as described above to estimate the off-road equipment emissions.

Electrical Equipment Fugitive SF_6

Emissions of SF_6 could be released into the atmosphere due to equipment failure or leakage from electrical equipment such as circuit breakers and switches containing SF_6. The calculations for SF_6 emissions were based on the conservative assumptions that SF_6-containing equipment would include one 33 kV circuit breaker installed for each of the two proposed OECs and the GISs at each of the eight production well pads. Based on other electrical infrastructure projects of similar voltage (CPUC, 2010), it estimated that each of the 33 kV breakers would contain 60 pounds of SF_6 and the GISs at each production well pad would have SF_6 capacities of approximately 30 pounds, for a total of 360 pounds of SF_6.

The SF_6-containing equipment may be hermetically sealed, which are "designed to be gas-tight and sealed for life" (CARB, 2011). Emissions of SF_6 from hermetically sealed circuit breaker can only occur from equipment failure as there is no ability for the user to refill or extract SF_6 due to the factory seal. Because it is not known whether hermetically sealed equipment would be used for the CD-IV Project, a USEPA SF_6 published leak rate of up to 1.0 percent for electrical equipment manufactured in and after 1999 (USEPA, 2006) was used for estimates to provide a conservative upper bound estimate of fugitive SF_6, resulting in 3.6 pounds of fugitive SF_6 per year. Consistent with state, federal, and international standards (CCAR, 2006), a global warming potential of 23,900 was used for SF_6.

Non-condensable Gases

It is assumed that proposed well maintenance would require up to 100 hours of well venting per power plant unit, which would result in minor emissions of non-condensable gases (including CO_2) that are associated with the geothermal fluid. At approximately 600,000 lb/hr of resource per well, the GHG emissions related to well venting would be 37.8 metric tons CO_2e emissions per year for each power plant (MPLP, 2010).

Carbon Sequestration

Implementation of the CD-IV Project would result in direct temporary and permanent losses of Jeffrey pine forest and Sagebrush Scrub, which sequester carbon on an annual basis. The impact of reduced carbon uptake that would result due to the CD-IV Project is assessed qualitatively because there are no known reliable factors available related to the existing annual rate of carbon sequestration applicable to the existing forest and shrub.

Fossil Fuel-Based Energy Displacement

The reduction in GHG emissions by electricity displacement was estimated by assuming the CD-IV Project would displace electricity on the existing electrical grid that includes electricity from fossil fuel-fired power plants continuously over the 30 year life of the CD-IV Project. The CD-IV Project would have a net output of 33 MW and would run continuously, potentially generating over 288,000 MWh annually. An emission factor from TCR for the regional electrical grid was used to estimate the displaced indirect emissions.

Decommissioning Emissions

At the end of the 30-year project life, the CD-IV Project above and below ground components would be dismantled and removed. The well bores would be plugged with clean drilling mud and cement sufficient to ensure that fluids would not move across aquifers. The well heads (and any other equipment) would be removed, the casings cut off at least six feet below ground surface, and the well sites reclaimed. Typically, above ground equipment would be dismantled and removed from the site. Some below ground facilities may be abandoned in place. The surface of the site would then be restored to conform to approximate pre-Project land uses. Decommissioning activities could generate temporary emissions of GHG similar to those that would occur during construction of the CD-IV Project (see above).

4.5.1.2 GHG Emissions Impact Analysis

Independent of NEPA, but pursuant to 40 CFR Part 98, *Mandatory Reporting of Greenhouse Gases Rule*, USEPA requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2e emissions per year (USEPA, 2011a). In addition, pursuant to 40 CFR Part 52, *Proposed Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule*, the USEPA recently mandated to apply PSD and Title V requirements to facilities whose stationary source CO_2e emissions exceed 100,000 tons per year (USEPA, 2011b). For the purposes of a conservative NEPA analysis, estimated GHG emissions for the Project and alternatives are compared to the federal GHG mandatory emissions reporting threshold of 25,000 metric tons per year to determine whether the GHG emissions would contribute substantially to global climate change.

4.5.1.3 Climate Change

Agencies under the DOI, such as BLM, are required to consider potential impact areas associated with climate change, including potential changes in flood risk, water supply, sea level rise, wildlife habitat and migratory patterns, invasion of exotic species, and potential increases in wildfires. In

addition to global warming, climate change also is expected to result in a suite of additional potential changes that could affect the natural environment, in a manner that is relevant to the Project. The potential for climate change to affect the CD-IV Project is discussed qualitatively.

4.5.2 Project Design Measures

There are no PDMs proposed measures to reduce GHG emissions.

4.5.3 CEQA Significance Criteria

Based on CEQA Guidelines sections 15064.4 and 15064.7(c), as well as Appendix G, a project would cause adverse impacts associated with GHG emissions if it would:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

CEQA allows for the significance criteria established by the applicable air district to be used to assess the impact of a project relative to GHG emissions; however, the GBUAPCD has not established any significance criteria.

The SCAQMD has adopted an operational significance threshold of 10,000 metric tons CO_2e per year for stationary/industrial sources (SCAQMD, 2008). The SCAQMD-adopted GHG significance thresholds are intended for long-term operational GHG emissions; however, the SCAQMD has developed guidance for the determination of significance of GHG construction emissions that recommends that total emissions from construction be amortized over 30 years and added to operational emissions and then compared to the applicable significance threshold (SCAQMD, 2008). For a conservative impact analysis of the CD-IV Project and Alternatives, the CEQA analysis also includes a comparison of Project emissions to the threshold of 10,000 metric tons using the SCAQMD's guidance with regard to the assessment of construction-related GHG emissions.

There are no Mono County climate action plans, policies, or regulations that would be applicable to the Project. However, the Project's potential to conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions is assessed by examining any potential conflicts with the GHG reduction goals set forth in AB 32, including the potential for the Project to conflict with any of the 39 Recommended Actions identified by CARB in its Climate Change Scoping Plan and/or any associated adopted regulations.

4.5.4 Alternative 1: Proposed Action

4.5.4.1 Direct and Indirect Impacts

Construction

Table 4.5-1 shows the GHG emissions estimated to be generated by CD-IV Project construction activities, which are expected to occur in two separate 8-month phases in 2013 and 2014, followed by 2 months of additional well development and pipeline work in 2015. As shown in Table 4.5-1, the CD-IV Project would generate a total of approximately 8,278 metric tons CO_2e. Refer to Section 4.5.1, *Methodology for Analysis*, for a discussion of the methods used to estimate each of the construction emissions sources.

TABLE 4.5-1
PROPOSED ACTION TOTAL GHG EMISSIONS FROM CONSTRUCTION

Construction Emissions Source	Construction Emissions (total metric tons)			
	CO_2	N_2O	CH_4	CO_2e
Power Plant - Off-road Equipment	284.8	<0.1	<0.1	287.3
Power Plant - On-road Vehicle	1,466.9	<0.1	0.2	1,480.5
Power Plant - Water Use	0.3	<0.1	<0.1	0.3
Power Plant - Subtotal	***1,751.9***	***<0.1***	***0.3***	***1,768.2***
Well Development - Off-road Equipment	2,688.2	0.1	0.2	2,712.6
Well Development - On-road Vehicle	3,131.0	<0.1	0.1	3,137.0
Well Development - Water Use	0.3	<0.1	<0.1	0.3
Well Development - Flow Testing	21.2	---	---	21.2
Well Development - Subtotal	***5,840.6***	***0.1***	***0.2***	***5,871.1***
Pipeline - Off-road Equipment	136.2	<0.1	<0.1	137.4
Pipeline - On-road Vehicle	495.1	<0.1	0.1	500.9
Pipeline - Water Use	0.8	<0.1	<0.1	0.8
Pipeline - Subtotal	**632.0**	**<0.1**	**0.1**	**639.1**
Grand Total (metric tons)	**8,224.5**	**0.1**	**0.6**	**8,278.4**

Operation and Maintenance

Direct and Indirect Emissions

Table 4.5-2 shows the estimated annual GHG emissions that would be directly and indirectly generated each year related to operation and maintenance of the CD-IV Project for fossil fuel combustion sources, fugitive SF_6 emission sources, non-condensable gas leaks at the power plants, and indirect emissions related to electricity and water usage. The total estimated annual operation and maintenance emissions that would be associated with the CD-IV Project is approximately 149 metric tons CO_2e. For a discussion of the methods used to estimate each of the operation and maintenance emissions sources, see Section 4.5.1, *Methodology for Analysis*.

TABLE 4.5-2
PROPOSED ACTION ANNUAL GHG EMISSIONS FROM OPERATIONS

Operational Sources	Annual CO_2e Emissions (metric tons)
On-road Vehicle Emissions	20.9
Emergency Stand-by Diesel Engines	13.2
Fugitive SF_6 Emissions	39.0
Non-Condensable Gas Leaks	75.6
Total Annual Operation GHG	**148.6**

Carbon Sequestration

Construction activities associated with the CD-IV Project would result in temporary and permanent losses of Jeffrey pine forest and Sagebrush Scrub, which sequester carbon on an annual basis. Construction of the power plant would require the disturbance of up to 6.5 acres of trees and other vegetation. An additional 0.25 acre would be cleared for construction of the substation. The transmission line connection from the power plant substation to the existing SCE Casa Diablo Substation would be approximately 500 feet long. Prior to construction, the alignment would be cleared of trees for an area wide enough to permit passage of trenching equipment and above ground transmission lines. As this vegetation currently acts as a carbon sink, its removal would diminish the amount of carbon sequestration that currently occurs on the Project site. However, the beneficial impacts of the CD-IV Project to offset GHG emissions from non-renewable energy sources would far exceed the impacts of altering the vegetation cover at the Project site (see *Fossil Fuel-Based Energy Displacement* discussion below).

Fossil Fuel-Based Energy Displacement

The proposed renewable source of energy that would be associated with the CD-IV Project could displace electricity generated by fossil fuel combustion with lower GHG-emitting electricity for consumers. The reduction in GHG emissions by electricity displacement was estimated by assuming that the CD-IV Project would displace electricity from the existing regional electric grid that includes electricity from fossil fuel-fired power plants, continuously over the 30 year life of the CD-IV Project. The CD-IV Project would have a net output of 33 MW and would run continuously, generating approximately 288,000 MWh annually. Overall, the CD-IV Project would be expected to displace over 89,000 metric tons of CO_2e per year, for the 30 year life of the CD-IV Project.

Decommissioning

The expected life of the proposed power plant operation is 30 years. At the end of the useful life of the CD-IV Project, equipment and facilities would be properly abandoned. Decommissioning would include dismantling the power plants and well fields. The geothermal wells would be abandoned in conformance with the well abandonment requirements of the USFS and BLM. The wells would be plugged and abandoned and the gathering system pipe would be recycled or taken to a landfill or other alternative that may exist at the time. Decommissioning activities could generate temporary emissions of GHG similar to those that would occur during construction of the CD-IV Project (see above), with the exception that decommissioning activities would not likely require drilling.

Impact Summary

As described above, short-term CD-IV Project-related construction activities would result in much higher levels of GHG emissions compared to long-term operations of the CD-IV Project. Based on the emission estimates presented in Table 4.5-1 (above), the total emissions related to construction activities would be approximately 8,278 metric tons over approximately two years, which would be approximately 4,139 metric tons per year. This would be below USEPA's GHG mandatory emissions reporting threshold of 25,000 metric tons per year.

For a conservative analysis, this discussion also compares CD-IV Project emissions, including the total construction and decommissioning GHG emissions amortized over 30 years and added to the operation and maintenance emissions, to the USEPA's GHG mandatory emissions reporting threshold. As shown in Table 4.5-3, the sum of annual operation GHG emissions (including direct and indirect emissions) and the amortized construction and decommissioning GHG emissions would be up to 557 tons (505 metric tons) CO_2e per year, which would be below the USEPA's GHG mandatory emissions reporting threshold.

TABLE 4.5-3
PROPOSED ACTION TOTAL ANNUAL AMORTIZED GHG EMISSIONS

Emission Sources	Annual CO_2e Emissions	
	tons	metric tons
30-year Amortized Construction Emissions	304.2	275.9
Total Direct and Indirect Annual Operation Emissions	163.9	148.6
30-year Amortized Decommissioning Emissions	88.5	80.2
Amortized Construction + Annual Operation	**556.5**	**504.8**

SOURCES: ESA, 2012.

In addition, assuming that at full build-out the Project would produce approximately 288,000 MWh of electricity per year that would displace existing electricity on the regional electrical grid that includes electricity from fossil fuel-fired power plants, the Project would displace over 89,000 metric tons of CO_2e annually, resulting in a net reduction of over 88,000 metric tons CO_2e per year.

4.5.4.2 Climate Change Effects on the Project

In addition to global warming, climate change also is expected to result in a suite of additional potential changes that could affect the natural environment, including hydrologic resources (e.g., sea level rise and flooding), water resource availability, and impacts to biological resources. However, given the nature and location of the CD-IV Project, the additional effects of climate change would not be expected to be relevant to the CD-IV Project.

4.5.4.3 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the CD-IV Project (construction, operation and maintenance, and decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.5.2.

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

As shown in Table 4.9-3, the sum of annual CD-IV Project operation and maintenance GHG emissions (including direct and indirect emissions) and the amortized CD-IV Project construction and decommissioning GHG emissions would be up to 557 tons (505 metric tons) CO_2e per year. This would be below the SCAQMD's annual CO_2e CEQA threshold of 10,000 metric tons CO_2e. In addition, the CD-IV Project could displace electricity from the existing regional electrical grid that includes electricity generated from fossil fuel-fired power plants equivalent to an estimated 89,000 metric tons of CO_2e annually, resulting in a net reduction of more than 88,000 metric tons CO_2e per year. Therefore, GHG emissions associated with the CD-IV Project would cause a less than significant effect on the environment.

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of greenhouse gases.

The CD-IV Project has been evaluated relative to its potential to conflict with certain GHG reduction goals set forth in AB 32, including the 39 Recommended Actions identified by CARB in its Climate Change Scoping Plan. Table 3.5-1, *Recommended Actions of Climate Change Scoping Plan*, presents the 39 Recommended Actions identified to date by CARB in its Climate Change Scoping Plan. Of the 39 measures identified, those that would be considered to be applicable to the CD-IV Project would primarily be those actions related to transportation, the RPS, and high global warming potential gases. Consistency of the CD-IV Project with these measures has been evaluated by each source-type measure below.

Scoping Plan Measure T-7: Heavy-Duty Vehicle GHG Emission Reduction (Aerodynamic Efficiency). This measure would require existing trucks and trailers to be retrofitted with the best available technology and/or CARB-approved technology. This measure has been identified as a Discrete Early Action, which means that it began to be enforceable starting in 2010. Technologies that reduce GHG emissions and improve the fuel efficiency of trucks may include devices that reduce aerodynamic drag and rolling resistance. The requirements apply to California and out-of-state registered trucks that travel to California. This measure requires fleet owners of in-use trucks and trailers to comply through a phase-in schedule starting in 2010 and achieve 100 percent compliance by 2014. Heavy-duty vehicles used for hauling during construction of the CD-IV Project would be required to be compliant with the regulations associated with Scoping Plan Measure T-7; therefore, the potential for the CD-IV Project to conflict with compliance of this recommended action would be negligible and associated impacts would be less than significant.

Scoping Plan Measure E-3: Renewables Portfolio Standard (RPS). The RPS promotes multiple objectives, including diversifying the electricity supply. Increasing the RPS to 33 percent is designed to accelerate the transformation of the electricity sector. The CD-IV Project would add renewable geothermal energy to the electricity supply, and so would be consistent with this recommended action.

Scoping Plan Measure H-6: High Global Warming Potential Gas Reductions from Stationary Sources – SF_6 Leak Reduction and Recycling in Electrical Applications. This measure would reduce emissions of SF_6 within the electric utility sector and at particle accelerators by requiring the use of best achievable control technology for the detection and repair of leaks and the recycling of SF_6. On June 17, 2011, the approved Final Regulation Order associated with Scoping Plan Measure H-6 for reducing SF_6 emissions from gas insulated switchgear became effective. The regulation establishes maximum annual SF_6 emission rates for gas insulated switchgear, starting in 2011 at 10 percent of the owners' total equipment capacity. The emission rates will steadily decline by one percent per year until 2020, at which time the maximum annual SF_6 emission rate would be set at 1 percent. The regulation also requires gas insulated switchgear owners to annually report their SF_6 emissions and emission rate to CARB (CARB, 2011).

The CD-IV Project would include installation of new circuit breakers at each of the new OECs and GISs at each proposed production well pad. The SF_6-containing equipment was not assumed to be hermetically sealed to prevent the escape of SF_6 into the atmosphere because ORNI 50, LLC has not made a formal commitment to use hermetically sealed circuit breakers. Therefore, **Mitigation Measure GHG-1** (See Section 4.5.9 below) is recommended to ensure the use of hermetically sealed circuit breakers for the Project. Implementation of **Mitigation Measure GHG-1** would ensure that there would little potential for the CD-IV Project to conflict with compliance of this regulation and associated impacts would be less than significant.

4.5.5 Alternative 2: Plant Site Alternative

4.5.5.1 Direct and Indirect Impacts

Under this Alternative, the CD-IV power plant and related facilities would be located east of the existing Casa Diablo Geothermal Complex. Potential impacts to climate change would be similar in nature as described for the Proposed Action. Short-term construction and long-term operation and maintenance activities would result in similar overall GHG emissions compared to the construction emissions that would result for the Proposed Action (see Tables 4.5-1 through 4.5-3).

4.5.5.2 CEQA Significance Determination

Because emissions would be essentially the same for Alternative 2 compared with the Proposed Action, the CEQA significance determinations for Alternative 2 are the same as described above for the Proposed Action. Potential impacts of Alternative 2 would be less than significant.

4.5.6 Alternative 3: Modified Pipeline Alternative

4.5.6.1 Direct and Indirect Impacts

Construction and operation of the modified pipeline under Alternative 3 would result in substantially the same impacts to climate change as those identified for the Proposed Action (see Tables 4.5-1 through 4.5-3).

4.5.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 3 would be less than significant.

4.5.7 Alternative 4: No Action

4.5.7.1 Direct and Indirect Impacts

Under the No Action Alternative, long-term GHG emissions in the vicinity of the Project site would not be expected to change from existing conditions. Alternative 4 would not displace the generation of GHG emissions from existing fossil fuel-fired power plants compared to implementation of the Proposed Action.

However, drilling of authorized geothermal exploration wells, not part of the CD-IV project in Basalt Canyon could continue resulting in similar short-term drilling-related GHG emissions as would occur under the Proposed Action (see Table 4.5-2).

4.5.7.2 CEQA Significance Determination

Alternative 4 would cause a less than significant impact and would provide no benefit related to GHG emissions.

4.5.8 Cumulative Impacts

GHG emissions are inherently a cumulative concern, in that the significance of GHG emissions is determined based on whether such emissions would have a cumulatively considerable impact on global climate change; therefore, the geographic scope of cumulative impacts related to GHG emissions and climate change is global. The CD-IV Project would result in short-term GHG emissions during construction and decommissioning and limited long-term GHG emissions during operations and maintenance, and would result in a long-term reduction of carbon sequestration at the site. However, the CD-IV Project could result in a long-term net reduction of approximately 88,000 metric tons CO_2e year by displacing electricity from fossil fuel-fired power plants, and therefore would not conflict with the state's GHG reduction goals. Virtually all of the cumulative projects described in Table 4.1-1, could contribute to global warming due to the generation of short-term and/or long-term GHG emissions. Table 4.5-4 below summarizes GHG emissions data for the CD-IV Project and available emissions data for cumulative projects,

TABLE 4.5-4
CUMULATIVE GHG EMISSIONS

Project	Annual Amortized GHG Emissions (metric tons CO_2e)	GHG Offsets (metric tons CO_2e)
CD-IV Project[a]	505	88,000
MP-I Replacement[b]	NA[c]	75,000
Snow Creek Phase III[d]	8,851	0

NOTES:
[a] GHG emissions calculations and assumptions are provided in Appendix C.2.
[b] Mono County, 2012.
[c] Annual amortized GHG emissions for the MP-I Replacement Project are not available.
[d] Town of Mammoth Lakes, 2007.

including the MP-I Replacement Project, which includes the replacement of an existing geothermal power plant, and the Snow Creek Phase III Project, which is proposes the development of 850 residential dwelling units, 400 hotel rooms/suites, and up to 75,000 square feet for non-residential uses on a total of approximately 237 acres. Overall, the CD-IV Project and MP-I Replacement Project offset GHG emissions through the generation of electricity from a renewable source while Snow Creek Phase III Project would generate modest GHG emissions, largely from vehicle traffic.

4.5.9 Mitigation Measures

Mitigation Measure GHG-1: ORNI 50, LLC shall put forth a good-faith effort to obtain hermetically sealed circuit breakers and gas insulated switches for all SF_6-containing equipment that would be associated with the CD-IV Project.

4.5.10 Residual Impacts after Mitigation Incorporated

There would be no residual substantial impacts related to GHG emissions or climate change after mitigation has been incorporated.

4.6 Cultural and Paleontological Resources

4.6.1 Methodology for Analysis for Cultural Resources

This section describes effects on cultural resources that have the potential to be caused by implementation of the CD-IV Project and Alternatives. The following discussion addresses potential environmental impacts associated with implementation of the Proposed Action and recommends measures to reduce or avoid adverse impacts anticipated from construction, operation, and decommissioning of the proposed CD-IV Project and Alternatives. A discussion of cumulative impacts related to cultural resources is also included in this section.

The purpose of this section is to provide evidence of the ongoing public process by which the BLM, USFS, and GBUAPCD are jointly complying with Federal, State, and local regulations to which each agency is variously subject. GBUAPCD is the lead agency for the purpose of complying with CEQA. The BLM is the lead agency for the purpose of complying with NEPA and has further obligations to comply with Section 106 of the National Historic Preservation Act of 1966, as amended [16 USC 470(f)] (NHPA), and other federal historic preservation programs.

The structure of the cultural resources analysis for the Proposed Action accommodates both the primary need of GBUAPCD to demonstrate, under CEQA, a consideration of the potential for the project to affect cultural resources and the primary needs of the BLM to conduct similar analyses under NEPA and Section 106. The present analysis is intended to fulfill the largely parallel goals of the regulatory programs through the execution of five basic analytic phases. Details of these phases follow below and provide the parameters of the present analysis.

1. The initial phase determined the appropriate geographic extent or Area of Potential Effects (APE) of the analysis for the Proposed Action and for each alternative action under consideration. The APE include an area sufficient to accommodate all of the proposed project facilities under consideration.

2. The second phase produced inventories of the cultural resources within the APE. MACTEC (2012) reported on a Class III cultural resource inventory of the APE in *A Class III Cultural Resources Inventory for the Basalt Canyon Project, Mono County, California.* The Bureau of Land Management, Bishop Field Office (Haverstock, 2012) performed additional survey, reported in *An Expanded Cultural Resources Inventory Report for the Proposed Casa Diablo IV Geothermal Project.* Figure 3.6-1 shows the extent of these surveys, which covered areas designated under Alternatives 1-3, except for the well location 26-30 (under Alternative 3 only). No surface disturbing activity will occur in this area (well 26-30 and its associated pipeline until a cultural survey has been completed.

3. The third phase determined whether particular cultural resources in an inventory are historically significant, and which resources can be avoided by construction.

4. The fourth phase assessed the character and the severity of the impacts of the Proposed Action and alternatives on the historically significant cultural resources that cannot be avoided in each respective inventory.

5. The final phase proposes measures that would resolve significant impacts.

4.6.1.1 Cultural Resources Analysis under CEQA and the NHPA

A key part of a cultural resources analysis under CEQA, NEPA, and Section 106 is to determine which of those cultural resources that a proposed or alternative action may affect are important or historically significant. Note that each of these three regulatory programs uses slightly different terminology to refer to historically significant cultural resources. Clarifications on the use of the terms “historical resource,” “important historic and cultural aspects of our national heritage,” and “historic property” may be found in the Chapter 9, Glossary.

Inventory of Cultural Resources in Project Area of Analysis

A cultural resources inventory specific to each proposed or alternative action under consideration is a necessary step in the effort to determine whether each such action may; 1) under CEQA, cause a substantial adverse change in the significance of historical or unique archaeological resources; 2) under NEPA, affect important historic and cultural aspects of our national heritage; or 3), under Section 106, adversely affect any cultural resources that are listed in or are eligible for listing in the National Register of Historic Places (National Register).

The development of a cultural resources inventory entails working through a sequence of investigatory phases to establish the kinds and numbers of cultural resources within an APE. Background research identified cultural resources previously recorded and assessed the results of any geotechnical studies or environmental assessments completed for a project site. Fieldwork collected primary data on newly discovered cultural resources within the APE. Post fieldwork analyses support the development of determinations of significance for the cultural resources that are found. The BLM, as the lead federal agency for all tribal consultation and coordination, consulted with the following Federally recognized tribes: Bishop Paiute Tribe; Utu Utu Gwaitu Paiute Tribe (Benton); Big Pine Paiute Tribe; and the non-Federally recognized tribe Mono Lake Kutzadika'a Paiute Indian Community. The purpose of the consultation was to identify any site to which the Tribes attach religious or cultural significance (within the APE, none were identified). The cultural resources studies conducted for the CD-IV Project are detailed in Chapter 3.6 of this EIS/EIR. Tables below summarize findings for reference.

National Register eligibility recommendations have been made for archaeological resources (see Table 4.6-1; Pacific Legacy, 2009; MACTEC, 2012; Haverstock, 2012). Formal concurrence has not yet been made by the USFS or the SHPO. For the purposes of this analysis, all resources without existing formal National Register eligibility determinations are assumed to be National Register eligible. Prehistoric resources will typically be evaluated for their contribution to the as-yet-defined Casa Diablo Obsidian National Register District.

Avoidance of cultural resources is always the preferred alternative. Table 4.6-1 also notes when Proposed Action and Alternatives were able to avoid sites (Proposed Action and Alternatives further discussed below).

TABLE 4.6-1
SUMMARY OF NATIONAL REGISTER ELIGIBILITY AND TREATMENT RECOMMENDATIONS FOR ARCHAEOLOGICAL SITES

Site Designation	NRHP Recommendation	Closest Project Component	Actions to Avoid and Recommendation
FS 05045200307 Prehistoric site	District contributor	existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
FS 05045100314 Prehistoric site	District contributor	well pad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
FS 05045200389 Prehistoric site			BLM determined that FS 05045200389 is not an archaeological site. No treatment.
FS 05045200297a Prehistoric site	not eligible	pipeline	Recorded by MACTEC but does not meet BLM site definition. No treatment.
FS 05045200297b Prehistoric site	P-District contributor	well pad & pipeline	BLM finds site boundaries smaller than MACTEC and site outside pipeline and well pad. Move pipeline within existing dirt road off site. Fence during construction and monitor.
FS 0504520024 Locus 391 Prehistoric and historic components	P-District contributor H-unevaluated	wellpad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
FS 05045200026 Prehistoric and historic components	P-District contributor H-not eligible	well pad, pipeline, roads	No treatment. Portion of site within Direct APE tested and determined not a contributor to NRHP eligibility of site.
ACH-02 Prehistoric site			Site redefined by BLM as CD4-02 and CD4-03 (see below).
ACH-03 Prehistoric site	District contributor	pipeline	Move pipeline or conduct phased data recovery.
ACH-04 Historic site	not eligible	wellpad	No treatment.
ACH-05 Prehistoric site	District contributor	pipeline & wellpad	Move well pad & pipeline or conduct phased data recovery.
ACH-06 Prehistoric site	District contributor	wellpad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
ACH-07 Historic site	not eligible	pipeline	No treatment.
ACH-09 Prehistoric site	District contributor	existing road	Move well pad or conduct phased data recovery.
ACH-11 Prehistoric and historic components	P-District contributor H-not eligible	pipeline	Alternative 3 is designed to avoid prehistoric component. When this is possible, no further treatment is necessary. Fence during construction. No further treatment needed for historic component.
ACH-12 Historic site	not eligible	pipeline	No treatment.
ACH-13 Prehistoric site	District contributor	wellpad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.

TABLE 4.6-1 (Continued)
SUMMARY OF NATIONAL REGISTER ELIGIBILITY AND TREATMENT RECOMMENDATIONS FOR ARCHAEOLOGICAL SITES

Site Designation	NRHP Recommendation	Closest Project Component	Actions to Avoid and Recommendation
ACH-14 Historic site	unevaluated	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
ACH-15 Prehistoric and historic components	P-District contributor H-not eligible	wellpad	Move well pad to avoid site. Fence during construction. No further consideration for historic component.
ACH-16 Prehistoric site	District contributor	existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
ACH-17 FS 05045202199 Historic site	unevaluated	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
CD4-S1 FS 05045202183 ACH-01	District contributor	existing road	No deposit in road based on previous testing. Fence road edges during construction.
CD4-S1H	not eligible	existing road	No treatment.
CD4-S2 FS 05045202184	District contributor	new road	Monitored capping of the archaeological deposit within the roadway with geo-textile cloth and sterile soil.
CD4-S2H Historic site	not eligible	existing road	No treatment.
CD4-S3 FS 05045202184	District contributor	pipeline	Limit construction of pipeline to existing pipeline corridor through site or conduct phased data recovery.
CD4-S3H Historic site	not eligible	wellpad	No treatment.
CD4-S4 FS 0504520024 Locus 297	P-District contributor	well pad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
CD4-S4H Historic site	eligible	existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S5 Prehistoric site	District contributor	pipeline	Move pipeline outside of site boundaries. Impose permit conditions or conduct phased data recovery
CD4-S5H Historic site	not eligible	existing road	No treatment.
CD4-S6 Prehistoric site	District contributor	well pad	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S6H Historic site	not eligible	pipeline	No treatment.
CD4-S7 Prehistoric site	District contributor	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S7H FS 0504200024/ Locus ACH-8 Historic site	not eligible	existing road	No treatment.

TABLE 4.6-1 (Continued)
SUMMARY OF NATIONAL REGISTER ELIGIBILITY AND TREATMENT RECOMMENDATIONS FOR ARCHAEOLOGICAL SITES

Site Designation	NRHP Recommendation	Closest Project Component	Actions to Avoid and Recommendation
CD4-S8 Prehistoric site	District contributor	existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S8H Historic site	eligible	existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S9 FS 05045200923 Prehistoric site	District contributor	existing road	No treatment. Continued use of existing paved road through site will not cause project effects.
CD4-S10 Prehistoric site	District contributor	existing roads	Monitored capping of the archaeological deposit within the roadway with geo-textile cloth and sterile soil.
CD4-S11 Prehistoric site	District contributor	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S12 Prehistoric site	District contributor	one new road one existing road	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction. BLM will impose standard permit conditions.
FS 0504200024 Locus 297c (CD4-S13)/CD4-S13/14 Prehistoric site	District contributor	pipeline	Multiple recommendations: Monitored spanning of pipeline over site area; site area has exhausted data potential.
CD4-S15 FS 05045200297x Prehistoric and historic components	P-District contributor H-unevaluated	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S16 Prehistoric site	District contributor	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary.
CD4-S17/H FS 05045202199 Prehistoric and historic components	P-District contributor H-unevaluated	pipeline	Alternative 3 is designed to avoid cultural resources. When this is possible, no further treatment is necessary. Fence during construction.
CD4-S18H Prehistoric and historic components	P-District contributor H-not eligible	pipeline	Move pipeline outside of site boundaries. Impose permit conditions or conduct phased data recovery.

Evaluation of Cultural Resources in Project Area of Analysis

Evaluation of Historical Significance under CEQA

CEQA requires GBUAPCD, as a lead agency, to evaluate the historical significance of cultural resources by determining whether or not they meet several sets of specified criteria. Under CEQA, the definition of a historically significant cultural resource is that it is eligible for listing in the California Register, and such a cultural resource is referred to as a “historical resource,” which is a “resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register,” or “a resource listed in a local register of

historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code," or "any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record" [CCR 14 § 15064.5(a)]. The term "historical resource" indicates a cultural resource that is historically significant and/or eligible for listing in the California Register of Historical Resources. A resource may also be considered a unique archaeological resource under CEQA.

Under CEQA, the CD-IV Project would have a significant impact on cultural resources if it would:

1. Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5;

2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 15064.5;

3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;

4. Disturb any human remains, including those interred outside of formal cemeteries.

Under all of these criteria, adverse changes and impacts include the following:

1. Physical, visual, or audible disturbance resulting from construction, operation, and development that would affect the integrity of a resource or the qualities that make it eligible for the California Register or National Register;

2. Exposure of cultural resources to vandalism or unauthorized collecting;

3. A substantial increase in the potential for erosion or other natural processes that could affect cultural resources;

4. Neglect of a cultural resource that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to a Native American tribe; or

5. Transfer, lease, or sale of a cultural resource out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the resource's historic significance.

Evaluation of Historical Significance under Section 106

Section 106 of NHPA (16 USC 470f) requires federal agencies to consider, in consultation with SHPO, Indian tribes, local governments, and other interested parties, the impacts of their undertakings on historic properties, which includes any historic district, site, building, structure, object, or properties of traditional religious and cultural importance to Native Americans that are included in or eligible for inclusion in the National Register. The NHPA established the Advisory

Council for Historic Preservation and State Offices of Historic Preservation to assist federal and State officials regarding matters related to historic preservation. Under Section 106, federal agencies are required to assess the effects of an undertaking on cultural resources to determine if they are adverse, and if so, to propose mitigation measures to resolve such impacts. Historic properties are those resources that are listed in or are eligible for listing in the National Register per the criteria listed at 36 CFR 60.4 (Advisory Council on Historic Preservation, 2000) and are presented in the next subsection below.

National Register of Historic Places Evaluation

36 CFR Part 800.3 discusses the consultation process. Section 800.4 sets out the steps a Federal agency must follow to identify historic properties. 36 CFR Part 800.4(c)(1) outlines the process for National Register eligibility determinations.

The Historic Sites, Buildings and Antiquities Act of 1935 required the survey, documentation, and maintenance of historic and archaeological sites in an effort to determine which resources commemorate and illustrate the history and prehistory of the United States. The NHPA expanded on this legislation and assigned the responsibility for carrying out this policy to the United States Department of the Interior, National Park Service (NPS). Per NPS regulations, 36 CFR Part 60.4, and guidance published by the NPS, National Register Bulletin, Number 15, How to Apply the National Register Criteria for Evaluation, different types of values embodied in districts, sites, buildings, structures, and objects are recognized. These values fall into the following categories:

1. ***Associate Value (Criteria A and B)*****:** Properties significant for their association with or linkage to events (Criterion A) or persons (Criterion B) important in the past.

2. ***Design or Construction Value (Criterion C)*****:** Properties significant as representatives of the man-made expression of culture or technology.

3. ***Information Value (Criterion D)*****:** Properties significant for their ability to yield important information about prehistory or history.

The quality of significance in American history, architecture, archaeology, engineering and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling and association. Cultural resources that are determined eligible for listing in the National Register, along with SHPO concurrence, are termed “historic properties” under Section 106, and are afforded the same protection as sites listed in the National Register. Sites that have not been evaluated for eligibility to the National Register are assumed eligible for project purposes, until a formal evaluation can be completed.

Assessing Action Impacts

The core of a cultural resources analysis under CEQA, NEPA, or Section 106 is to assess the character of the impacts that a proposed or alternative action may have on cultural resources. The analysis takes into account three primary types of potential impacts which each of the above regulatory programs defines and handles in slightly different ways. The three types of potential impacts include direct, indirect, and cumulative impacts. Once the character of each potential

effect of a proposed or alternative action has been assessed, CEQA requires of further assessment of whether such impact is significant (see CEQA Significance Criteria, above).

Direct and Indirect Impacts

Direct and indirect impacts are those that are more clearly and immediately attributable to the implementation of Proposed Action or Alternatives. Direct and indirect impacts are conceptually similar under CEQA and NHPA, although uses of the concepts vary somewhat, as detailed below.

Direct and Indirect Impacts under CEQA. For CEQA, the definitions of effects are provided in section 15358 of the *CEQA Guidelines.* Impacts to cultural resources are those associated with project development, construction, and co-existence. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic built-environment resources when those structures must be removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, and when the new structures produce a harmful effect to the materials or structural integrity of the historic structures, such as emissions or vibrations. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates potentially damaging noise and vibration, improved accessibility and vandalism, or greater weather exposure.

Ground disturbance accompanying construction at a proposed plant site, along proposed linear facilities, and at a proposed lay-down area has the potential to directly impact subsurface archaeological resources that are unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction.

Direct and Indirect Impacts under Section 106. Both direct and indirect impacts may be considered adverse effects under Section 106. The regulatory definition of “adverse effect,” pursuant to 36 CFR section 800.3(1)(a), is “when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association…Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.”

Cumulative Impacts

Cumulative Impacts are also slightly different concepts under CEQA and Section 106.

Cumulative Impacts under CEQA. A cumulative impact under CEQA refers to a proposed project's incremental impacts considered over time and taken together with those of other, nearby, past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (PRC § 21083; CCR 14 § 15064(h), 15065(a)(3), 15130, and 15355). Cumulative impacts to cultural resources in the project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed project, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to the future construction of a proposed project and other proposed projects in the vicinity could have a cumulatively considerable effect on archaeological deposits, both prehistoric and historic. The alteration of the natural or cultural setting which could be caused by the construction and operation of a proposed project and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Cumulative Impacts under Section 106. The Section 106 regulation makes explicit reference to cumulative impacts only in the context of a discussion of the criteria of adverse effect [36 CFR §800.5(a)(1)]. Cumulative impacts are largely undifferentiated as an aspect of the potential impacts of an undertaking. Such impacts are enumerated and resolved in conjunction with the consideration of direct and indirect impacts.

Assessing the Level of Severity of Action Impacts

Once the character of the impacts that Proposed Action or Alternatives may have on historically significant cultural resources has been determined, the severity of those impacts needs to be assessed. CEQA and Section 106 each have different definitions and tests that factor into decisions about how severe or how significant the impacts of particular actions may be. Assessing effects to National Register-eligible resources and cultural resources is typically accomplished through the consultation process.

Significant Impacts under CEQA

Under CEQA, "a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). Thus, staff analyze whether a proposed project would cause a substantial adverse change in the significance of the subset of the historical resources in the cultural resources inventory for a project area that the proposed project demonstrably has the potential to effect. The degree of significance of an impact depends on:

1. The cultural resource impacted;
2. The nature of the resource's historical significance;
3. How the resource's historical significance is manifested physically and perceptually;

4. Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and how much the impact will change those integrity appraisals.

Adverse Effects under Section 106

In accordance with 36 CFR Part 800.5 of the ACHP's implementing regulations, which describes criteria for adverse effects, impacts on cultural resources are considered significant if one or more of the following conditions would result from implementation of the proposed action:

An undertaking has an effect on a historic property when the undertaking may alter characteristics of the property that may qualify the property for inclusion in the National Register. For the purpose of determining the type of effect, alteration to features of a property's location, setting, or use may be relevant, depending on the property's significant characteristics, and should be considered.

An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Adverse effects on historic properties include, but are not limited to:

1. Physical destruction, damage, or alteration of all or part of the property
2. Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's qualification for the National Register
3. Introduction of visual, audible, or atmospheric elements that are out of character with the property or that alter its setting
4. Neglect of the property, resulting in its deterioration or destruction
5. Transfer, lease, or sale of the property

Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the National Register. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

Resolving Significant/Adverse Impacts

The final phase of a cultural resources analysis is the resolution of those impacts of a proposed or alternative action that have been found to be significant or adverse. The terminology used to describe the process of impacts resolution differs among the three regulatory programs. The resolution of significant impacts under CEQA involves the development and implementation of "mitigation measures," which would minimize any such impacts (14 CCR § 15126.4). The Section 106 process directs the "resolution of adverse effects" through the development of proposals to avoid, minimize, or otherwise mitigate such effects [36 CFR § 800.6(a)].

4.6.2 Project Design Measures

The analysis assumes that the following Project Design Measures (PDMs) related to cultural resources are fully implemented:

1. *CUL-PDM-1*: All grading and site construction activities will avoid, to the extent possible, all cultural resource sites identified in the cultural resource survey report prepared for the project areas. If identified cultural resource sites cannot be avoided, ORNI 50, LLC will comply with all requirements of the USFS and the SHPO prior to any grading or site construction activities that will affect the cultural resources.

2. *CUL-PDM-2*: If buried cultural deposits are discovered during site construction activities which were not identified in earlier cultural resource clearances for the project, grading and site construction activities in the vicinity of the cultural deposit will be evaluated by the Inyo National Forest archaeologist, or by a cultural resource specialist pursuant to the requirements of SHPO.

3. *CUL-PDM-3*: ORNI 50, LLC employees, contractors, and suppliers will be informed about the sensitivity of the cultural resources in the Project area and reminded that all cultural resources are protected and, if uncovered, shall be left in place and reported to the ORNI 50, LLC representative and/or their supervisor.

4.6.3 Proposed Action

Proposed Action will occur in three project phases: construction, operation and maintenance, and decommissioning. Construction requires clearing and grading of the temporary and permanent disturbance areas. Operations and maintenance includes day to day activities, and periodic maintenance and upgrade to existing equipment. Decommissioning of Proposed Action would include dismantling the power plant and well-field and restoring the site to pre-Project conditions.

4.6.3.1 Direct and Indirect Impacts

This analysis of direct and indirect impacts for the Proposed Action and various alternatives is organized according to project phases noted above: construction; operation and maintenance; and decommissioning. Table 4.6-2 summarizes actions appropriate to each alternative, and also provides an analysis of the potential impacts to cultural resources for the Proposed Action and Alternatives. Alternatives 1-4 would have differing impacts to these resources, as Table 4.6-2 notes.

Modifications to the design of Alternative 1 have been made with the intent of avoiding direct physical impacts to most cultural resources within the footprint of the CD-IV Project. Impacts would still potentially occur to some archaeological sites (see Table 4.6-1) as well as to the resources contributing to the Casa Diablo Obsidian Quarry Archaeological District. Impacts from Alternative 2 are the same as Alternative 1. Alternative 3 would impact the fewest sites.

Construction

Construction could result in the direct impact to previously recorded and unanticipated cultural resources including damage and/or displacement of resources, resulting in the loss of information about history and prehistory.

TABLE 4.6-2
SUMMARY OF PROPOSED ACTION, ALTERNATIVES, AND IMPACTS

Action Type	Action	Impact to Resources
Alternative 1. Proposed Action		
Construction	Construction of Alternative 1 would require clearing and grading of the temporary and permanent disturbance areas.	Modifications to the design of Alternative 1 have been made with the intent of avoiding direct physical impacts to most cultural resources within the footprint of the CD-IV Project. Impacts would still potentially occur to sites within the APE as well as to the potential National Register Historic District. Due to various surface conditions or changes over time, not all cultural resources are expressed on the surface. Any project with ground disturbing components has the potential to directly impact unanticipated cultural resources. The concentration of archaeological sites in the vicinity suggests that this potential exists in the APE. Construction of Alternative 1 may result in inadvertent discoveries of cultural resources. Implementation of the PDMs and Mitigation Measure CUL-8 would ensure that the worker training program reduce the risk of direct impacts to cultural resources within the project APE and that work stop in the vicinity of an unanticipated discovery.
Operation and Maintenance	Day to day operations; periodic maintenance to existing equipment	The primary potential for direct impacts to cultural resources is from unanticipated damage or inadvertent discoveries. Because operation and maintenance activities would be limited to the approved construction footprint of Alternative 1, with the exception of roads maintained/plowed during project operations that do not require upgrades or revisions during project construction, no additional direct impacts to cultural resources are expected during operation and maintenance. During operation and maintenance, the PDMs and the MOA would reduce the risk of adverse impacts to cultural resources within the project APE. Avoidance and protection of potentially significant resources during the operation and maintenance phase of the project through implementation the HPMP and HPTP would protect cultural resources originally avoided by construction impacts.
Decommissioning	Decommissioning of Proposed Action would include dismantling the power plant and well-field and restoring the site to pre-Project conditions.	Because decommissioning activities are similar in nature to construction activities, the PDMs and mitigation measures developed for construction activities would be applied during the decommissioning phase, including protocols related to the protection of cultural resources from adverse impacts. With implementation of the MOA and HPMP, decommissioning effects on any known or unknown historic and archaeological resources would be mitigated by ensuring identification, evaluation, avoidance, and protection of resources.
Alternative 2. Alternative Plant Location		
Construction	Construction of Alternative 2 would require clearing and grading of the temporary and permanent disturbance areas.	Both direct and indirect construction impacts for Alternative 2 are similar to Alternative 1.
Operation and Maintenance	Similar to Alternative 1.	Both direct and indirect operation and maintenance impacts for Alternative 2 are similar to Alternative 1.
Decommissioning	Similar to Alternative 1.	Both direct and indirect decommissioning impacts for Alternative 2 are similar to Alternative 1.
Alternative 3. Modified Pipeline Alternative		
Construction	Both direct and indirect construction impacts for Alternative 3 are similar to Alternative 1, the proposed project. There is a reduction in the potential for unanticipated discoveries of cultural resources on Alternative 3 relative to the reduction in the operation and maintenance footprint compared to the Proposed Action.	Other than Alternative 4 (No Action), Alternative 3 would impact the fewest sites. There remain several locations at which project facilities cross or overlap with historic properties. Engineering plans for CD-IV Project Alternative 3 have not been finalized, and minor adjustments to the Alternative 3 design can be made. There is considerably flexibility of location and design for most project facilities (well pads, pipelines, new access roads, transmission line). Impacts would still potentially occur to sites within the APE as well as to the potential National Register Historic District.

TABLE 4.6-2 (Continued)
SUMMARY OF PROPOSED ACTION, ALTERNATIVES, AND IMPACTS

Action Type	Action	Impact to Resources
Alternative 3. Modified Pipeline Alternative (cont.)		
Operation and Maintenance	Similar to Alternative 1.	Both direct and indirect operation and maintenance impacts for Alternative 3 are similar to Alternative 1.
Decommissioning	Similar to Alternative 1.	Both direct and indirect decommissioning impacts for Alternative 3 are similar to Alternative 1.
Alternative 4. No Action		
Construction	No action	No Impact
Maintenance and Operation	No action	No Impact
Decommissioning	No Action	No Impact

Section 4.6.2 discusses project design measures implemented prior to construction, with the intent of avoiding cultural resources. Implementation of PDMs will avoid the majority of archaeological sites, but some impacts remain. **Mitigation Measures CUL-1 through CUL-8** (detailed below in Section 4.6.5) have been formulated to ensure that project construction effects on cultural resources would be mitigated by ensuring identification, evaluation, avoidance, and protection of resources. Construction of all alternatives would also occur in full compliance with the PDMs (see Section 4.6.2, Project Design Measures).

Based on the Section 106 Consultation process the BLM has determined that the sites and potential Historic District may be adversely affected by the implementation of the Proposed Project, and is consulting with SHPO, ACHP, USFS, and the Tribes on means of reducing adverse effects. **Mitigation Measure CUL-8** would ensure continued consultation with Tribes and reduction of adverse effects to the potentially significant sites and/or a significant district.

A Memorandum of Agreement (MOA) will be negotiated through additional Section 106 consultation (**Mitigation Measure CUL-1**). A Historic Property Treatment Plan (HPTP) will be developed, as an appendix to the MOA. The MOA will also identify potential additional mitigation to resolve adverse effects and provide cultural resource protection, including development of a Historic Properties Management Plan (HPMP), and public outreach.

Due to various surface conditions or changes over time, not all cultural resources are expressed on the surface. Any project with ground disturbing components has the potential to directly impact unanticipated cultural resources. The concentration of archaeological sites in the vicinity suggests that this potential exists in the APE. Construction of all alternatives may result in inadvertent discoveries of cultural resources. Implementation of the PDMs and **Mitigation Measure CUL-6** would ensure that the worker training program reduce the risk of direct impacts to cultural resources within the project APE and that work stop in the vicinity of an unanticipated discovery.

Operation and Maintenance

The primary potential for direct impacts to cultural resources during the operation and maintenance phase is from unanticipated damage or inadvertent discoveries. Because operation and maintenance activities would be limited to the approved construction footprint of Alternative 1, with the exception of roads maintained/plowed during project operations that do not require upgrades or revisions during project construction, no additional direct impacts to cultural resources are expected during operation and maintenance. During operation and maintenance, the PDMs, Mitigation Measures CUL-1 through CUL-8, and the MOA would reduce the risk of adverse impacts to cultural resources within the project APE. Avoidance and protection of potentially significant resources during the operation and maintenance phase of the project through implementation of the HPMP and HPTP would protect cultural resources originally avoided by construction impacts.

Decommissioning

Decommissioning of Proposed Action would include dismantling the power plant and well-field and restoring the site to pre-Project conditions. Because decommissioning activities are similar in

nature to construction activities, the PDMs and mitigation measures developed for construction activities would be applied during the decommissioning phase, including protocols related to the protection of cultural resources from adverse impacts. With implementation of **Mitigation Measures CUL-1 through CUL-8**, decommissioning effects on any known or unknown historic and archaeological resources would be mitigated by ensuring identification, evaluation, avoidance, and protection of resources.

The primary potential for direct impacts to cultural resources during the decommissioning phase is from either unanticipated damage or inadvertent discoveries. The PDMs, Mitigation Measures CUL-1 through CUL-8, and the MOA would reduce the risk of direct impacts to cultural resources within the APE. Avoidance and protection of potentially significant resources during the decommissioning phase of the project would protect cultural resources originally avoided by construction impacts. Because decommissioning activities would be limited to approved construction footprints, no additional direct impacts to cultural resources are expected.

4.6.3.2 CEQA Significance Determination

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following project phases: construction; operation and maintenance; and decommissioning. Table 4.6-3 summarizes this information.

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented in the table based on the CEQA Significance Criteria presented in Section 4.2.2.

4.6.4 Cumulative Impacts

Cumulative impacts on cultural resources take into account the proposed action's impacts as well as those likely to occur as a result of other existing, proposed and reasonably foreseeable projects. When analyzing cumulative impacts on cultural resources, an assessment is made of the impacts on individual resources as well as the inventory of cultural resources within the cumulative impact analysis area.

4.6.4.1 Geographic Extent/Context

The regulations implementing Section 106 of the NHPA expressly integrate consideration of cumulative concerns within the analysis of a proposed action's potential direct and indirect effects by defining "adverse effect" to include "reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative" [36 CFR §800.5(a)(1)].

The geographic scope of the cumulative effects analysis for cultural resources is the APE and a five mile radius around the APE, which provides a reasonable context wherein cumulative actions could affect cultural resources. This is a large enough area to encompass any indirect effects of the CD-IV Project on cultural resources that may combine with similar effects caused by other projects.

TABLE 4.6-3
CEQA SIGNIFICANCE DETERMINATION

Criteria	Action Type	Action	Impact to Resources
a) Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5	Construction	Construction would require clearing and grading of the temporary and permanent disturbance areas.	As described above, the Proposed Action could impact historical resources (as defined in CCR 14 15064.5) during the construction phase. These impacts would be significant. However implementation of the MOA and HPMP, as well as implementation of the PDMs would reduce impacts to historical resources to a less-than-significant level.
	Operation and Maintenance	Day to day operations; periodic maintenance to existing equipment	As described above, the Proposed Action could impact historical resources (as defined in CCR 14 15064.5) during the operation and maintenance of the CD-IV Project. These impacts would be significant. However implementation of mitigation measures to be defined in the HPMP and HPTP, as well as implementation of the PDMs would reduce impacts to historical resources to a less-than-significant level.
	Decommissioning	Decommissioning of Proposed Action would include dismantling the power plant and well-field and restoring the site to pre-Project conditions.	As described above, the Proposed Action could impact historical resources (as defined in CCR 14 15064.5) during decommissioning of the CD-IV Project. These impacts would be significant. However implementation of mitigation measures to be defined in the HPMP and HPTP, as well as implementation of the PDMs would reduce impacts to historical resources to a less-than-significant level.
b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to § 15064.5	Construction	Similar to criterion a above.	As described above, the Proposed Action could impact unique archaeological resources [as defined in section 21083.2(g)] during the construction phase. These impacts would be significant. However implementation of mitigation measures to be defined in the HPMP and HPTP, as well as implementation of the PDMs would reduce impacts to unique archaeological resources to a less-than-significant level.
	Operation and Maintenance	Similar to criterion a above.	As described above, the Proposed Action could impact unique archaeological resources [as defined in section 21083.2(g)] during the operation and maintenance of the CD-IV Project. These impacts would be significant. However implementation of mitigation measures, to be defined in the HPMP and HPTP, as well as implementation of the PDMs would reduce impacts to unique archaeological resources to a less-than-significant level.
	Decommissioning	Similar to criterion a above.	As described above, the Proposed Action could impact unique archaeological resources [as defined in section 21083.2(g)] during the decommissioning of the CD-IV Project. These impacts would be significant. However implementation of mitigation measures, to be defined in the HPMP and HPTP, as well as implementation of the PDMs would reduce impacts to unique archaeological resources to a less-than-significant level.
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature	This section is discussed elsewhere.		
d) Disturb any human remains, including those interred outside of formal cemeteries	Construction	Similar to criterion a above.	No known human remains are located within the CD-IV Project APE however this possibility cannot be entirely discounted. Impacts to human remains would be significant. However implementation of mitigation measures, to be defined in the HPMP and HPTP, during construction of the Proposed Action, as well as implementation of the PDMs would reduce impacts to human remains to a less-than-significant level.

TABLE 4.6-4 (Continued)
CEQA SIGNIFICANCE DETERMINATION

Criteria	Action Type	Action	Impact to Resources
d) Disturb any human remains, including those interred outside of formal cemeteries (cont.)	Maintenance and Operation	Similar to criterion a above.	No known human remains are located within the CD-IV Project APE however this possibility cannot be entirely discounted. Impacts to human remains would be significant. However implementation of mitigation measures, to be defined in the HPMP and HPTP, during operation and maintenance of the Proposed Action, as well as implementation of the PDMs would reduce impacts to human remains to a less-than-significant level.
	Decommissioning	Similar to criterion a above.	No known human remains are located within the CD-IV Project APE however this possibility cannot be entirely discounted. Impacts to human remains would be significant. However implementation of mitigation measures, to be defined in the HPMP and HPTP, during decommissioning of the Proposed Action, as well as implementation of the PDMs would reduce impacts to human remains to a less-than-significant level.

Determining the temporal scope requires estimating the length of time the effects of the proposed action will last, either individually or in combination with other anticipated effects. The temporal scope of impacts to cultural resources during development of cumulative projects along with the Proposed Action would be through the end of project decommissioning, because any direct or indirect effects of the project would only occur during the life of the project.

4.6.4.2 Existing Cumulative Conditions

Cumulative conditions to cultural resources involve the disturbance of culturally significant resources, and alteration of the historic and cultural landscape of the area over time. Recreation, land management, and other land uses have had some cumulative effects on cultural resources. Examples are existing roadways that overlay archaeological sites, or existing roadways adjacent to archaeological sites, making them more accessible.

4.6.4.3 Reasonably Foreseeable Projects

Table 4.1-1 in Section 4.1 provides a listing of all the current and reasonably foreseeable projects, including other proposed or approved geothermal development projects, proposed or approved projects within Mono County's jurisdiction, and other actions/activities that the Lead Agencies consider reasonably foreseeable. Many of these projects have either undergone independent environmental review pursuant to CEQA or will do so prior to approval. Even if environmental review has not been completed for the projects described in Table 4.1-1, their effects were considered in the cumulative impacts analyses in this EIS/EIR for the geographic area described below in Section 4.6.7.1.

4.6.4.4 Construction

The CD-IV Project has been designed to avoid direct physical effects to most known archaeological resources; however, the Proposed Action would potentially adversely affect some previously identified significant historic properties and the proposed Casa Diablo Obsidian Quarry Archaeological District. As noted above, Alternative 3 would result in the least amount of direct physical effects. In addition, there is the potential for unanticipated damage or inadvertent discoveries of unknown resources during the construction phase of the CD-IV Project. If any unanticipated resources are encountered during construction, measures to reduce impacts to these resources would be implemented (as described in **Mitigation Measures CUL-1 to CUL-2**, below). Construction of other projects located in the geographic area for the cumulative analysis (described in Section 4.6.7.1, below) could also result in damage to known or previously unknown resources encountered during construction.

The CD-IV Project may contribute to adverse cumulative impacts on cultural resources. For instance, while direct impacts to historic properties can often be avoided, projects and activities in the vicinity of a historic property can alter the context of the resource by changing its surroundings, potentially degrading the value of the resource. Similarly, individual projects can contribute to the degradation of certain ethnographic values of an area simply by altering the landscape, particularly as related to Native American cultures, even if no cultural resources are

directly affected. This could include alteration of important views, modification of traditional landscapes, or limitations on traditional uses of an area.

4.6.4.5 Operation and Maintenance

With implementation of the PDMs and project-specific mitigation measures listed in Section 4.6.2 and 4.6.5 respectively, adverse effects on any known or unknown historic properties that could potentially be encountered during operation and maintenance activities would be mitigated by ensuring identification, evaluation, avoidance, and protection of those resources. Given these factors, the operation of the Proposed Action would not directly contribute to cumulative impacts on cultural resources within the geographic extent.

4.6.4.6 Decommissioning

Decommissioning of the CD-IV Project, consistent with an approved decommissioning plan, would greatly reduce any project-related contributions to cumulative effects. In addition, it is unlikely that any unanticipated resources would be discovered during decommissioning activities, as such all cultural resources at the site would probably have been previously identified during either construction or operation. Therefore, CD-IV decommissioning would not contribute to any adverse cumulative impacts on cultural resources. In addition, with decommissioning and restoration, the CD-IV Project site would be restored to a condition similar to pre-construction conditions, and any effect that the project may have on culturally important landscapes, views, or traditional uses of the area would be eliminated or substantially reduced.

4.6.4.7 CEQA Significance Determinations

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 2 would remain less than significant with mitigation.

4.6.5 Mitigation Measures

All alternatives (except Alternative 4: No Action) analyzed for this document have the potential to cause an adverse effect on significant cultural resources. In addition to the PDMs listed above, project-specific mitigation measures have been developed to reduce and/or avoid potential cultural resources impacts associated with construction, operation, and decommissioning of the proposed CD-IV Project or an alternative. These project-specific mitigation measures presented below shall be applied to mitigate impacts under CEQA and shall be coordinated through the Section 106 process.

> **Mitigation Measure CUL-1:** A MOA shall be prepared and shall detail: 1) procedures to resolve adverse effects under Section 106; 2) coordination between the CEQA process and Section 106 compliance; 3) procedures for treatment of inadvertent discoveries; 4) procedures for determining treatment and disposition of human remains; 5) compliance monitoring; 6) dispute resolution; 7) development of an Historic Properties Treatment Plan; and 8) Tribal consultation and participation. Resolution of effects to cultural resources eligible for or listed in the National Register may include research and documentation,

development of an Historic Properties Management Plan, data recovery excavations, curation, public interpretation, use or creation of historic contexts, and report distribution.

Mitigation Measure CUL-2: On the basis of preliminary National Register eligibility assessments made under the MOA, particularly concerning contributing resources to the Casa Diablo Obsidian National Register District, the USFS and BLM may require the relocation of project components to avoid or reduce damage to cultural resource values. Where operationally feasible, potentially National Register-eligible resources shall be protected from direct project impacts by project redesign within previously surveyed and analyzed areas.

Mitigation Measure CUL-3: The CD-IV Project Alternative 3 design of September 19, 2012, was in part developed to avoid historic properties. Where the USFS and BLM decide that National Register-eligible or -listed cultural resources cannot be protected from direct impacts by project redesign, ORNI 50, LLC shall comply with appropriate mitigative treatment(s) that will be detailed in the MOA.

Mitigation Measure CUL-4: A HPTP shall be developed and included in the MOA that defines and maps all known cultural resources within 150 feet of the project APE. The HPTP shall also detail how resources will be marked and protected as Environmentally Sensitive Areas during construction. The HPTP shall define any additional areas that are considered to be of high-sensitivity for discovery of buried significant cultural resources, including burials, cremations, or sacred features. This sensitivity evaluation shall be conducted by an archaeologist who meets the Secretary of the Interior's Standards and who takes into account geomorphic setting and surrounding distributions of archaeological deposits. The HPTP shall detail provisions for monitoring construction in these high-sensitivity areas. It shall also detail procedures for halting construction, making appropriate notifications to agencies, officials, and Native Americans, and assessing register-eligibility in the event that unknown cultural resources are discovered during construction. For all unanticipated cultural resource discoveries, the HPTP shall detail the methods, consultation procedures, and timelines for assessing register-eligibility, formulating a mitigation plan, and implementing treatment. Mitigation and treatment plans for unanticipated discoveries shall be approved by the USFS, BLM, and the SHPO prior to implementation.

Mitigation Measure CUL-5: Archaeological monitoring shall be conducted by a qualified archaeologist familiar with the types of historic and prehistoric resources that could be encountered within the APE, and under direct supervision of a principal archaeologist. All cultural resources personnel will be approved by the BLM and USFS. A Native American monitor may be required at culturally sensitive locations specified by the USFS following government-to-government consultation with Indian tribes. The HPTP shall indicate the locations where Native American monitors will be required and shall specify the tribal affiliation of the required Native American monitor for each location. ORNI 50, LLC shall retain and schedule any required Native American monitors.

Mitigation Measure CUL-6: Prior to construction, the BLM will ensure that the boundaries of historic properties for which project facilities appear to overlap is clearly marked on the ground with wood lathe and flagging set no more than 10 meters apart. Historic properties planned for avoidance and protection shall be designated as Environmentally Sensitive Areas (ESAs). Historic properties that are within 20 meters (65 feet) of the Direct APE will be identified and labeled as ESAs on engineering plans.

ORNI 50, LLC will retain a qualified archaeologist to conduct mandatory cultural sensitivity training for all project staff and contractors prior to construction activities associated with this undertaking.

Mitigation Measure CUL-7: In the event of inadvertent discoveries during construction, operation and maintenance, or decommissioning, procedures outlined in the MOA and the HPTP shall be adhered to. At a minimum this shall include: 1) stop work orders in the vicinity of the find' 2) recordation and evaluation of the find by a qualified archaeologist' 3) notification of the find to BLM and USFS; 4) and implementation of appropriate treatment measures, such as avoidance or data recovery.

Mitigation Measure CUL-8: Following language developed in the MOA, the BLM shall continue to consult with Indian tribes to identify sacred sites, properties of traditional religious and cultural importance, and traditional use areas that might be affected by the CD-IV Project. If such places are identified, the BLM will consult further with tribes to resolve access impediments or other identified impacts.

4.6.6 Residual Impacts after Mitigation Incorporated

Under the Proposed Action (Alternative 1), individual archaeological sites and contributing resources to the Casa Diablo Obsidian Quarry Archaeological District may be adversely affected by the Proposed Action, in cases where avoidance is not practical. There remains potential for adverse effects to unknown resources that may be discovered at during construction, operation and maintenance, and decommissioning. Implementation of the mitigation measures presented above will reduce impacts to cultural resources to a less-than-significant level for the purposes of CEQA and minimize adverse effects to known and previously unknown historic properties under NHPA. Alternative 3 of the CD-IV Project has been designed to avoid the majority of direct adverse effects to significant known resources.

4.6.7 Proposed Action and Impacts, Paleontological Resources

4.6.7.1 Construction

Staging areas, work areas, and excavations associated with construction of the CD-IV Project could result in inadvertent damage to or destruction of fossils that would possibly be unique and/or scientifically important. The potential for disturbance of significant paleontological resources is generally limited to grading and excavation activities within previously undisturbed (i.e., in situ) sedimentary geologic units. As largely buried resources, the exact location or presence of fossils within undisturbed geologic units cannot always be determined, but the relative likelihood of encountering fossils can be estimated based on the paleontological potential of the rock unit, as determined in the affected environment (Section 3.6.3). As discussed in that section, the only area of the project site that might be prone to impacts to paleontological resources would be the Pleistocene-age geologic units underlying proposed well sites 55-32 and 65-32 and the portion of the proposed well pipeline leading to those well sites, located south of the existing MP-II plant. Pleistocene-age alluvium has a PYFC Class 3, which identifies

fossiliferous geologic units whose fossil content varies in significance, abundance, and predictable occurrence. Such units will have inconsistent occurrences of vertebrate fossils and significant nonvertebrate fossils the predictability is known to be low. In all other areas, including the proposed plant site, the potential presence of fossils is negligible or non-existent (PYFC Class 1) because the rocks are volcanic or glacial in origin.

Shallow excavations at well sites 55-32 and 65-32, or for footings associated with installation of the aboveground pipeline, both have the potential to yield yet unknown/undiscovered fossils of significance. The sensitive geologic unit (Pleistocene alluvium) is likely to occur only as a relatively thin veneer over older volcanic rocks deeper below ground. The sensitive area is thus limited in depth and extent as described above. Excavations required to construct the holding basin for drilling muds at well sites 55-32 and 65-32 could inadvertently encounter a paleontological resource. In addition, any excavation associated with the well-drilling itself, or installation of well drilling equipment, particularly closer to the surface, could also encounter a paleontological resource. As few fossils have been discovered within Pleistocene alluvium in the region and because the extent of excavation within the sensitive unit would be minor, the probability of encountering a fossil is very low.

Potential impacts to paleontological resources would be localized, minor and short-term.

4.6.7.2 Operation and Maintenance

During operation and maintenance activities, it is not anticipated that additional areas would be disturbed because proposed facilities would be already built and any access for maintenance or repairs would occur within previously disturbed soils.

4.6.7.3 Decommissioning

Decommissioning activities would disturb the same areas already disturbed during construction. Hence, there would be no additional impacts related to paleontological resources during decommissioning. The impact would be minor.

4.7 Geothermal and Groundwater Resources

4.7.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives for geothermal and groundwater resources focuses on potential effects related to geothermal resources that would result from implementation of the Proposed Action, such as changes in outflow to surface waters and geothermal manifestations, as well as potential for changes in cold/potable groundwater availability and water quality that could occur as a result of additional geothermal development. This analysis relies upon expert peer review of the Applicant's proprietary simulation model of the geothermal reservoir and a comprehensive evaluation of the voluminous technical studies and monitoring data available for the Long Valley area since the beginning of existing geothermal operations. The technical study summarizing these findings, *Geologic Overview of the Long Valley Caldera Potential Environmental Impacts* (EGS, 2012), included as Appendix D, contains technical details and references.

4.7.1.1 Outflow to Surface Waters and Geothermal Manifestations

In order to assess the potential for increased geothermal development to substantially affect outflow of geothermal water to surface waters and geothermal manifestations in the Project vicinity, this analysis evaluates the hydrologic connection between these waters, historical response to existing geothermal production, the Applicant's reservoir simulation model's prediction of reservoir response to the proposed production increase, and the potential consequences of the reservoir response to geothermal fluid outflow. Effects on surface water quality and groundwater use related to above-ground construction and operational activities are discussed separately in Section 4.19, Surface Water Hydrology.

4.7.1.2 Groundwater Resources

This analysis evaluates the potential for the Proposed Action to substantially affect the availability and quality of shallow cold groundwater resources based upon review of technical studies related to the geologic structure of Project area, historical monitoring of pressures in existing monitoring wells, and more recent chemical and isotopic analyses of water samples from the geothermal reservoir and shallow groundwater.

4.7.2 Applicant Proposed Project Design Measures

The analysis assumes that the following Project Design Measures (PDMs) related to hydrologic resources would be fully implemented:

Geothermal Resources

1. *GEO-5*: ORNI 50 LLC commits to continuing to operate the existing geothermal projects in conformance with the Plans of Operation for Development, Injection and Utilization, approved by the BLM and USFS, as well as in conformance with monitoring through the Long Valley Hydrologic Advisory Committee, and remedial

action programs, which are designed to prevent, or mitigate, potential hydrothermal impacts to the Owens tui chub critical habitat, Hot Creek Hatchery and Hot Creek Gorge springs from geothermal operations conducted on federal geothermal leases in the Mono-Long Valley KGRA. ORNI 50 LLC also commits to operating the proposed geothermal project in conformance with these requirements.

4.7.3 CEQA Significance Criteria

CEQA Guidelines Appendix G does not explicitly specify potential significance criteria for geothermal resources. However, select hydrologic resources significance criteria would be applicable for groundwater resources and have been modified to include geothermal resources Therefore, based on CEQA Guidelines Appendix G, a project would cause adverse impacts to hydrologic resources, as relevant to geothermal resources, if it would:

a) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted) or substantially degrade groundwater quality

b) Substantially deplete or alter geothermal outflow to surface water and geothermal manifestations

4.7.4 Alternative 1: Proposed Action

4.7.4.1 Direct and Indirect Impacts

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following project phases: construction; operation and maintenance; and decommissioning.

Outflow to Surface Waters and Geothermal Manifestations

As discussed in Section 3.7, roughly 70 percent of the current outflow from the geothermal reservoir occurs at Hot Creek on the southeastern edge of the Resurgent Dome (Figure 3.7-3). Geochemical, hydrological and thermal data from wells and springs in the southeastern caldera corroborate the continuity of geothermal fluid flow from Casa Diablo through Hot Creek and eastward to Lake Crowley and the comingling of shallow geothermal outflow and groundwater systems in the southern and southeastern caldera. Most of the prominent higher flow rate springs within the caldera occur within the southern caldera moat localized along faults within or around the southern edge or within the Resurgent Dome primarily at Casa Diablo, Hot Creek Gorge and Little Hot Creek (Figure 3.7-3). Thermal contributions to Hatchery Springs are estimated to provide approximately 5 percent of waters to the local Hot Creek Fish Hatchery. Hydrothermal manifestations are notably absent in the western caldera moat, with the exception of steam-heated features in the vicinity of Mammoth Mountain. Key geothermal features of concern within the caldera described in Section 3.7 include: Hot Creek Springs, Hot Bubbling Pool, Hot Creek Fish Hatchery, and thermal ground that occurs in several locations in the southern caldera moat.

Construction

Construction of the Proposed Action would not result in the ongoing withdrawal of geothermal fluid, nor other activities that could potentially deplete geothermal resources. Relatively small quantities of geothermal fluid with respect to the reservoir volume may be removed during flow testing of the wells, however, the potential effects on outflows to surface water and geothermal manifestations as a result of loss of geothermal fluid would be imperceptible.

Operation

Operation of the Proposed Action would increase the existing extraction of geothermal fluid from the Long Valley geothermal reservoir by approximately 50 percent. All of the produced geothermal fluid would be returned to the reservoir via reinjection, as it is now. The current average flow rate to the existing Casa Diablo plants is 12,000 gallons per minute (gpm), from both the Casa Diablo production wells and the two production wells (Wells 57-25 and 66-25) in Basalt Canyon. The CD-IV Project would expand production from Basalt Canyon by about 6,000 gpm to produce a total of 18,000 gpm from the reservoir. Because the geothermal reservoir has been shown to be connected to the surface waters and sensitive hot springs or other geothermal features in the south-southeastern caldera, these features may be affected by the additional development of the geothermal reservoir. However, historical monitoring data, modeling forecasts, and temperature of thermal features suggest that little change to the quantity, quality or temperature of these geothermal features would occur under the Proposed Action. Each of these lines of evidence is discussed below.

Findings from Historical Monitoring. The USGS and the LVHAC have investigated the shallow hydrologic system since the early 1980s. The data gathered from geothermal monitoring wells, shallow groundwater wells, and surface hydrologic features such as cold and hot springs and streams have been used to evaluate the potential effect of geothermal development on sensitive hot springs and other thermal features, surface water and groundwater quality. Historical data suggests that natural factors such as variations in precipitation, snow melt, groundwater recharge and magmatic activity have influenced the temperature and flow rate of surficial geothermal features to a greater extent than pressure reductions in the geothermal reservoir. The concentrations of non-reactive elements (such as chloride, boron, and fluoride) that have been used to track the origin, evolution, and circulation of geothermal fluids have remained stable in the reservoir, subsequent to an initial decline of 10 to 20 percent in chloride concentrations due to cold water influx during the early phases of geothermal production. Temperatures of produced geothermal fluids in Casa Diablo wells which also declined during that period have stabilized as well. Concentrations of non-reactive elements in hot springs which have been sampled over time (such as Hot Creek Springs) did not change significantly. The estimated rate of thermal water discharge at Hot Creek Gorge and water levels in nearby monitoring wells have varied little since 1988, despite several changes in geothermal production and injection, as well as local seismic and magmatic activity. Correlations between temperature and location of thermal water discharge and earthquakes in Long Valley were observed after the increase in seismic activity in 1980. Changes in the location and temperatures of thermal discharge that led to the closing of the Hot Creek swimming area in 2006 correlated with above- normal precipitation the preceding winter, and are not likely related to changes in geothermal production from Casa Diablo. Pressure variations in

thermal and non-thermal monitoring wells (within a few miles east of Casa Diablo correlate with those in the production reservoir with only minor delays (days to weeks) in the arrival time of the pressure changes induced by changes in the production at Casa Diablo. While pressures in the Casa Diablo production zone decreased approximately 22 percent from the initial conditions through 2005, pressures increased by 7 percent after Basalt Canyon production began and Casa Diablo production was reduced in 2006 (for an overall net reduction of 15 psi). A deep monitoring well close (0.5 mile east) to Casa Diablo mimicked these changes by showing declines of approximately 8 percent between 1995 and 2005, and a rapid increase when some production was transferred to Basalt Canyon in 2006 to levels 3 percent above the 1995 levels. A shallow monitoring well about 3 miles east of Casa Diablo, CW3, showed a very slight decline in pressure of about 2.5 percent in response to Casa Diablo production. This pressure decline was recovered during the years of heavy precipitation between 1995 and 2000 and again when some production was transferred to Basalt Canyon, suggesting that at the pressure response of the shallow aquifer at this location is affected by both groundwater and Casa Diablo production. These distinct pressure variations are noted close to Casa Diablo but the effect attenuates with distance; pressure variations are not detectable as far east as Hot Creek. Water level measurements in well CH10B, located near Hot Creek Gorge, are not indicative of reservoir pressure changes related to geothermal development.

In the Basalt Canyon area, reservoir pressure appears to have declined approximately 10 psi, or about 2 percent, since the increase in production from that area began in 2006. Two monitoring wells were completed in the same zone that is being produced in the Basalt Canyon area (deep Bishop Tuff). Pressure declines of 2 percent were observed in one well in 2006, but this monitoring well had to be abandoned in 2007. In the second monitoring well, located north of Basalt Canyon, pressure declined 2.2 percent from 2006 to 2010 (EGS, 2012). It is worth noting that these observations occurred during a period in which there has been no injection of spent geothermal fluids in the Basalt Canyon area. The proposed CD-IV Project includes both production and injection in Basalt Canyon, therefore the long-term reservoir pressure response in the Basalt Canyon area cannot be quantified from the available monitoring data.

Numerical Model Forecasts. The Applicant has developed a proprietary numerical model of the geothermal reservoir that has been used to simulate geothermal production and predict reservoir response for the existing Casa Diablo geothermal developments. The Applicant's numerical simulation of the geothermal reservoir has been updated and used to forecast the geothermal reservoir response to the CD-IV Project. As part of this EIS/EIR analysis, the Applicant's model was subject to independent technical review by SAIC, Inc. to evaluate its validity for analyzing environmental impacts of the CD-IV Project. More specifically, the SAIC review considered the following aspects:

1) the soundness of the resource conceptual model
2) the appropriateness of model grid with respect to the geothermal field
3) the validity of boundary conditions
4) the quality of the initial state temperature and pressure match

5) the quality of the production history match
6) the reasonableness of model behavior during forecasts
7) overall quality of the model for simulating the response of the geothermal resource to expanded production

Because of the proprietary nature of the model described in the SAIC report, the SAICreport is confidential. However, SAIC concluded that there is good agreement between the model predictions and measurements and the model may be used to investigate the impact of future production scenarios on the reservoir pressures and temperatures. Model predictions of reservoir pressures and temperatures are discussed further below and in the technical study presented in Appendix D.

One function of the model is to forecast pressure and temperature declines at various locations in the reservoir. Results indicated that, over the life of the CD-IV Project with continued production from the existing Casa Diablo facilities, declines in reservoir pressure would range from 1.45 to 10.2 pounds per square inch (psi) (equivalent to 0.1 to 0.7 bar[1]). At the maximum level, this forecast pressure decline would be approximately 20 to 25 percent of the initial reservoir decline (after 1991 when production increased and injection changed to return spent fluid to the deeper Bishop Tuff reservoir). This forecast pressure decline would reduce the pressure in the Casa Diablo reservoir to levels observed between 1991 and 2006 (when some production was transferred to Basalt Canyon enabling a pressure increase in Casa Diablo). In comparison, the total reservoir pressure decline in the production zone from existing Casa Diablo geothermal production has been about 45 psi, of which 35 psi occurred in 1991 when production increased and injection changed and 15 psi was recovered when production was partially transferred. In contrast, the pressure in the Bishop Tuff in the Casa Diablo area increased 15 percent from initial conditions after injection began and is forecast to increase about half that much as a result of the CD-IV Project.

The produced temperature for existing geothermal wells is forecast to decline about 18° F (10°C) over the 30 year life of the proposed project from the current temperatures ranging from about 340 to 356° F (170 to 180°C). The temperature of produced fluids at the Casa Diablo geothermal projects originally declined from initial conditions by approximately 21.6ºF (12ºC) by 1993 then stabilized along with the pressure. When production was partially transferred to Basalt Canyon, the combined temperature of produced fluids increased to close to initial conditions, partly because the Basalt Canyon fluids are hotter. The forecast temperature decline for Casa Diablo will be approximately the same or slightly higher as the initial decline (until 1993), producing temperatures at 2005 levels by 2045.

With the exception of Hatchery Springs (discussed further below), model simulation results did not predict a decline in thermal output to the hot springs from either existing geothermal production or expanded production under the CD-IV Project. Further, despite observed changes within the geothermal reservoir, the historical impacts of geothermal development at Casa Diablo

[1] One bar is an International System of Units (metric) unit of pressure that is about equal to the atmospheric pressure on Earth at sea level.

on the Long Valley hydrologic system, including the surface manifestations and groundwater resources discussed above, have not been significant. Therefore, because the effect of increased production under the CD-IV Project is anticipated to result in a smaller (pressure) or equivalent (temperature) change in geothermal reservoir conditions than has been observed to date, the CD-IV Project is unlikely to have a substantial adverse effect on the hydrologic system. In addition, the CD-IV Project wells would produce from a deeper, hotter portion of the reservoir than the existing shallow Casa Diablo production reservoir and located further from the comingled thermal and non-thermal hydrology around the Resurgent Dome, which would be expected to reduce potential effects on geothermal features sourced by shallow outflow related to declining reservoir pressures.

Temperature of Thermal Features. The chemistry of the thermal features collected as part of the LVHAC hydrologic monitoring suggests that the thermal features such as Hot Creek Spring and Hot Bubbling Pool are predominantly thermal water, with mixtures of groundwater. Mass balance calculations using chloride and temperature data[2] indicate that the shallow Casa Diablo aquifer is approximately 80 percent thermal water. Casa Diablo thermal water most likely mixes and boils (the Casa Diablo reservoir temperature is above boiling and would boil at the surface; both Hot Creek and the Hot Bubbling Pool are below boiling temperature at the surface) before discharging at the surface. Hot Creek and Hot Bubbling Pool waters, appear to be approximately 80 percent and 90 percent Casa Diablo thermal aquifer and 20 percent to 10 percent cold groundwater[3]. Despite cooling by mixing of cold and thermal water, as long as the mixed fluid which feeds the spring remains above the surface boiling temperature (as is the case at Hot Creek and Hot Bubbling Pool and nearby features), the actual discharge surface temperature remains at the boiling temperature (approximately 200ºF or 93ºC at 7000 feet, the elevation of Hot Creek) regardless of changes in the relative proportions of thermal water component or groundwater component. Therefore, the major surface manifestations are unlikely to be affected by changes in reservoir temperature as much as the geothermal waters are affected. However, at lower forecast temperatures of thermal inflow from the Casa Diablo reservoir (predicted to be up to 18ºF or 10ºC lower than current), there would be slightly lower inflow temperatures and slightly less (approximately 2 percent) steam at the surface.

Summary of Effects on Sensitive Geothermal Features. Based on response to reservoir pressure changes observed from historical monitoring and numerical model forecasts, the impact of the Proposed Action is not anticipated to have a substantial effect on outflow to surface waters and geothermal manifestations. Effects on specific sensitive geothermal resources are described below:

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2 Mass balance calculations assume that thermal reservoir at Casa Diablo is represented by Monitoring Well MBP-3, a geothermal monitoring well sampled by the USGS (230 mg/L chloride, 316.4 ºF or 158 ºC) and the geothermal upflow is represented by Monitoring Well 44-16 (283 mg/L chloride, 392 ºF or 200 ºC),

3 This estimate comes from a mass balance which is based on chloride which is undetectable in cold water and the assumption that any chloride is the result of geothermal fluid and a reduction in chloride is the result of cold water. Therefore the difference between 283 mg/L at 44-16 and 230 mg/L in geothermal fluids at MPB-3 is (1-(230/283)), or about 20 percent. If (1-230/283) is water at 15 ºC and (230/283) is 200 ºC, then the temperature of the mixture is (15x(1-(230/283))+(200x(230/283)=157.5 which is approximately 158 ºC, the measured temperature of the Casa Diablo mixture. This same calculation can be done at Hot Creek after the correction for the concentration of the fluids discharging at Hot Creek and Hot Bubbling Pool for boiling.

***Hot Creek Springs*:** Observed variations have primarily correlated with seismic activity and variations in rainfall, and were not explicitly attributable to historic changes in production associated with prior operations at Casa Diablo facilities. Therefore, as discussed above, the proposed project is unlikely to significantly affect the temperature of Hot Creek Springs. Assuming that the thermal discharge from Casa Diablo cools up to 11 to 18ºF (6 to 10°C) as forecast by the model, the discharge at Hot Creek could produce slightly less steam.

***Hot Bubbling Pool*:** A hot bubbling pool, which is located approximately 5 km east of the existing Casa Diablo facilities, experienced a 3.9 foot (1.2 m) water level decline concurrent with the onset of expanded geothermal fluid production and deeper injection in 1991. Subsequent to the change in geothermal production westward to Basalt Canyon in 2006, the water level has nearly recovered. Since the CD-IV Project is projected to have only 20 percent of the historical reservoir pressure changes in Casa Diablo and related changes in production and injection would occur primarily in the deeper zone in Basalt Canyon (and to a lesser extend injection in the deeper zone in Casa Diablo), substantial changes in water levels are not anticipated.

***Hot Creek Fish Hatchery*:** Recent studies of spring flow, temperature and water chemistry at the Fish Hatchery have shown that minimal temperature changes have occurred in the mixed thermal and non-thermal warm springs in response to geothermal development at Casa Diablo. Changes in discharge occurred during 1984 and 1995 when alterations in the geothermal production scheme occurred at the same time that the region also experienced a long-term drought, which affected all parts of the hydrologic system. Monitoring of hot spring inlet temperatures show variations seasonally as well as with longer periods of drought and heavy precipitation. Total net changes in temperature at the two main Hot Creek Fish Hatchery springs during the most significant period of geothermal development at Casa Diablo (1988-2003) were less than 2ºF (1.1^{o}C). Although greater temporary temperature declines have occurred during this time period approximately 4°F (2.2^{o}C) in 1995), these changes were apparently related to high winter precipitation, greater snow melt runoff, and higher than normal cold groundwater flow rates during the spring and summer. Furthermore, changes in hot spring inlet temperatures have not been accompanied by changes in chemistry which would indicate a change in thermal inflow, suggesting that heat in the rocks is buffering temperature of inflow to the hot springs (by conductive heating rather than the conductive cooling observed along the inflow to Little Hot Creek springs). Thus it is difficult to identify the smaller effects of geothermal development on the Hatchery springs relative to natural climatic effects and subsurface heat transfer because climatic variations and geothermal reservoir changes have both occurred simultaneously. Hatchery spring temperatures are apparently buffered by conductive heat from hot rocks in the subsurface to water along the water's flow path, thus buffering potential impacts on temperature from changes in thermal water discharge.

Although the CD-IV Project is forecast to reduce the thermal outflow to Hatchery Springs by about 17 percent, the thermal water fraction is a very small part (less than 5 percent) of the total flow, so the impact to the combined cold and thermal discharge at the springs is forecast to be reduced by 0.85 percent and is not likely to be measureable relative to climatic effects. In addition, conductive buffering of the temperature would minimize potential temperature changes making such changes difficult to detect.

***Little Hot Creek*:** The Little Hot Creek Springs discharge below boiling temperatures at a maximum of approximately 176ºF (80ºC) and there is no evidence of boiling. Using chloride concentrations[4] as for Hot Creek above, the mass balance indicates that these springs discharge a mixture of about 70 to 75 percent thermal water and 25 to 30 percent cold water. The temperature of Little Hot Creek Springs, however, is not 70 to 75 percent of the temperature of thermal water. This suggests that there has been significant conductive cooling as well as mixing between Casa Diablo and Little Hot Creek, which dampens the effect of Casa Diablo reservoir changes. No significant changes in flow or temperature at Little Hot Creek were reported by the USGS Long Valley monitoring program during the period when significant changes in reservoir temperature and pressure occurred in Casa Diablo from initial conditions after the increase in production and deepening of injection in 1991. This suggests that the smaller increases forecast for the CD4 project will not generate significant changes at Little Hot Creek.

***Thermal ground*:** Thermal ground occurs in several locations in the southern caldera moat related to active or reactivated fumarolic areas or older broad altered zones of nutrient-poor, clay-rich soils. Several relict mudpots and fumaroles at Casa Diablo became active after earthquake swarms of the 1980's and as production increased and reservoir pressure declined in 1991. Some of the reactivated springs or fumaroles occur at considerable distances and higher elevations along major controlling fault zones around Casa Diablo and farther west in the caldera moat. Although the increased steam output is partly related to shallow geothermal reservoir pressure declines, two-phase conditions and steam migration from the shallow heated groundwater system, volcanic, and related seismic activity can also produce increases in steam-affected ground. Several liquid hot springs at Casa Diablo converted to steam vents accompanied by increases in ground temperature within the field during 1991-1993.

Changes in fumaroles, high carbon dioxide gas flow and tree deaths were not related to geothermal production from Casa Diablo but were an apparent response to potential magmatic input around Mammoth Mountain after 1990. The rapid onset of dying trees was apparently related to carbon dioxide interfering with nutrient uptake through the tree roots. Although carbon dioxide outflow and stressed vegetation is a natural consequence of shallow outflow, the lack of vegetation does not signify currently active thermal ground or elevated carbon dioxide emissions. Hydrothermally altered soils are clay-rich, depleted in nutrients and relatively high in trace element concentrations that inhibit vegetation growth. The prominent altered areas like the major fault zones that define the caldera margin and the relict fumarolic mounds around Shady Rest are bare because of alteration, not specifically because of increased thermal ground.

Fewer shallow geothermal effects are anticipated with increased production from Basalt Canyon under the proposed CD-IV Project. The geothermal fluid production (extraction) wells under the proposed Action would be drilled approximately 2-3 times deeper than the existing Casa Diablo wells. Thus, the CD-IV Project will increase production of geothermal fluid from the deeper Basalt Canyon reservoir, which is physically separated from the surface, effectively buffering changes in heat flow to the surface and limiting or preventing gas loss to shallower levels. Two phase steam/water conditions are not anticipated in the deeper production reservoir, and it is

[4] Chloride concentrations of 200 mg/L at Little Hot Creek USGS Monitoring station.

unlikely that any steam would reach the ground surface through the low permeability landslide block that underlies that Basalt Canyon area. Shifting production away from the shallow Casa Diablo reservoir is not expected to result in any additional thermal ground, and may reduce some of the steam increases at Casa Diablo related to earlier pressure declines. Therefore, increasing geothermal fluid production and injection in the lower geothermal reservoir is not anticipated to cause adverse impacts to springs, surface waters, and other geothermally related hydrologic surface features. Existing hydrologic monitoring programs under the oversight of the LVHAC would be evaluated by the USGS and all LVHAC members and expanded, as needed, to ensure monitoring adequately addresses the Proposed Action, in accordance with the Mono County General Plan, and in accordance with PDM GEO-5. Additional monitoring may include, but is not limited to, the following: drilling of additional monitoring wells; installation of new or updated monitoring equipment; monitoring of additional thermal and non-thermal springs, fumaroles, shallow groundwater wells, or geothermal wells; additional geochemical analyses. Continued compliance with the LVHAC monitoring, including monitoring determined necessary by the LVHAC for assessment of the CD-IV Project, would be required by the USFS and BLM as Conditions of Approval of the project.

Decommissioning

Decommissioning of the proposed Action would result in the removal of existing facilities and the proper abandonment of existing geothermal wells. All geothermal power production and geothermal fluid extraction activities that would occur under the Proposed Action conditions would cease. No additional geothermal fluid would be extracted, and no new facilities would be constructed. The geothermal reservoir may recover some of the pressure and temperature declines forecast by the numerical model for the Proposed Action. As discussed above, the changes in temperature and outflow at the springs and other related geothermal surface manifestations except those close (less than 3.1 miles or 5 km) are largely attributed to climactic, seismic and magmatic changes and not to changes in reservoir pressures and temperature. However, at the time of the increase in production and deepening of injection at Casa Diablo in 1991, there were changes in reservoir pressure and temperature and corresponding changes in the surface manifestations closest to Casa Diablo (Hot Bubbling Pool). However, with the transfer of some production to Basalt Canyon in 2006, the changes were reversed. Because the predicted geothermal reservoir pressure and temperature declines under the CD-IV Project are expected to be less that those after 1991, any changes from the CD-IV Project are expected to be less. Furthermore, because both the reservoir changes and changes to Hot Bubbling Pool appear to be reversible after the recovery or partial recovery of reservoir pressure and temperature, any changes in surface manifestations close to Casa Diablo are anticipated to be reversed.

Groundwater Resources

Construction

Drilling of geothermal production and injection wells to depths of up to 2,500 feet in the geothermal reservoir would require drilling through the shallow groundwater aquifer. As discussed in the project description, all wells will be cased to a depth below the lowest groundwater aquifer to prevent commingling of fluids in the wells. The use of casing would seal the upper groundwater

aquifer and prevent communication between the overlying shallow aquifer and the deep geothermal reservoir. Casing installation would be performed according to industry standards and well permit specifications. The potential effect on groundwater resources from drilling and installation of geothermal production and injection wells is considered to be low.

Construction period shallow groundwater use is discussed in Section 4.19, Water Resources. No further discussion is warranted.

Operation

Operation of the Proposed Action is anticipated to have little to no effect on the availability and quality of groundwater resources used for drinking water supply. This conclusion is supported by the following: geologic features that physically separate the geothermal aquifer from groundwater resources; the lack of response in shallow groundwater wells to pressure changes in the geothermal reservoir; temperature; the chemical signature of the groundwater and geothermal water composition; and isotope data that indicates different recharge sources for the groundwater and geothermal aquifer. These factors are discussed below.

Geologic Setting. As discussed in Section 3.7, the MCWD produces water from nine water production wells located in the western part of the caldera that are spatially and vertically separated from the geothermal wells located further east (see Section 3.19, Surface Water Hydrology). Shallow non-thermal groundwater in the Mammoth Groundwater Basin is generally colder (approximately 12.5-16ºF or 7-9ºC), shallower (82 –869 feet or 25-265m) and constrained to shallow glacial till, alluvium/colluviums and interbedded basalts/andesites relative to the geothermal system north and east. These rocks which host the cold groundwater aquifers, unconformably overlie the rocks of the geothermal system.[2] Cold groundwater aquifers used by MCWD are separated from the deeper, hotter geothermal system by intense alteration of upper Early Rhyolite units below the unconformity[2] in the western caldera to mostly impermeable clays. The geologic cross-section of the Mammoth Groundwater Basin presented in the MCWD groundwater model (Wildermuth, 2009) shows the location of the unconformity[5] observed during well drilling which separates the cold groundwater aquifers and the underlying geothermal system (Figure 3.7-6). Deep drilling results have shown that the Early Rhyolite units are more extensive than assumed from surface mapping (EGS, 2012). The intensely altered mix of ash and flows constitute a generally impermeable barrier between the groundwater aquifer and the underlying geothermal reservoir.

Pressure Histories. Monitoring as part of the LVHAC includes 3 shallow non-thermal groundwater wells in the Mammoth Groundwater Basin. Historical pressure readings at these monitored wells show little response to noticeable pressure changes within the geothermal reservoir. Pressure histories of the individual shallow groundwater wells tend to reflect proximity to recharge sources, seasonal variations, and the hydrologic characteristics of varying geologic units. The observed monitoring does not indicate a connection of the shallow groundwater with the underlying deep geothermal reservoir.

[5] An unconformity is a substantial break or gap in the geologic record where a rock unit is overlain by another that is not next in the stratigraphic sequence. The landslide block is an example of an unconformity.

Currently groundwater generally flows with the topography from Mammoth Mountain to the east. Closest to Mammoth Mountain, where the cold groundwater aquifer rocks are the thickest, the water levels are at the highest elevations. The geothermal monitoring wells furthest west (e.g. RDO-8) also have higher water levels, but not as high as in the cold groundwater wells suggesting that there is a pressure separation between the systems which decreases to the east (Sorey, 2003).

Several shallow geothermal exploration holes encountered warm (40 to 70°C) water in on the north side of the Mammoth Groundwater Basin north of Mammoth Creek within the same aquifer rocks as the cold groundwater aquifers. Some of the MCWD monitoring wells have temperatures between 9 to18ºF (5 to10ºC) warmer than the typical wells albeit without the chemistry of the deep geothermal system. If the pressure within the cold groundwater aquifer declines due to extensive pumping, it is possible that warm water from these wells could flow towards the MCWD cold groundwater wells, but it is likely to affect only the temperatures as the chemistry of these shallow warm waters is similar to the other MCWD wells and not like the geothermal system.

Geochemistry. Monitoring records document no changes in the chemistry of groundwater wells in the Mammoth Groundwater Basin from 1996 to 2009 during continual production of the geothermal system at Casa Diablo. Sorey (2011b) has examined the available fluid chemistry data. Geothermal waters from various wells display nearly constant ratios of chloride to boron and chloride to bromide, which indicates a common water source beneath the Rhyolite Plateau. Although a few shallow groundwater wells have chloride/boron ratios typical of geothermal wells (greater than 20), the absolute boron concentration in groundwaters is small (less than 2 percent of that in high enthalpy geothermal waters) and very near the reporting level for laboratory analysis of these elements, therefore the chloride/boron ratios of groundwater are not indicative of the origin of the low chloride levels in the cold groundwaters. In addition, chloride concentrations of 250 mg/L typical of high temperature deep geothermal water have not been detected in the shallow groundwater wells of the Mammoth Groundwater Basin. Very low concentrations of chloride (2 to 5 mg/L) detected in samples from one isolated well (Well P-17) provide inconclusive evidence of a contribution of geothermal water in this one well; however, if the source of the chloride is thermal water, the maximum thermal contribution to the groundwater would be very small (1-2 percent).

Temperatures. As discussed above, the temperature of water in the shallow cold aquifer and the underlying geothermal reservoir vary widely, from about 46.4 ºF (8°C) in the shallow waters to over 374ºF (190 ^{o}C) in the geothermal reservoir. Five MCWD wells along the northwestern side of the basin display elevated water temperatures relative to the rest of the basin. These slightly warm MCWD wells border the Rhyolite Plateau and the central part of the deeper geothermal source reservoir in the western caldera. Three temperature gradient boreholes drilled to 1,509 – 2,182 feet (460-665 meters) in the western caldera encountered maximum temperatures of 167 to 185ºF (75 to 85°C). No chemical analyses were available for the temperature gradient wells, but analysis of the groundwater wells indicates that in only one well (Well P-17 discussed above) there is a possible indication that there may be a very small thermal component. Based on geochemistry of most of these wells, the slightly warmer temperatures in groundwater wells in the northwestern portion of the Mammoth Groundwater Basin do not appear to be the result of

upward flow of hot geothermal fluid into the groundwater basin, but instead are likely the result of a conductive transfer of heat to the groundwater as it flows through the area of high heat at the periphery of the geothermal system in the western caldera moat.

Isotopic Data. Analyses and comparisons of light stable isotopes deuterium (D) and oxygen-18 from Long Valley show that cold groundwater recharge for the Mammoth Groundwater Basin aquifers originates from several sources: snowmelt infiltration at the southern and eastern bases of Mammoth Mountain; seepage from the upper reaches of Mammoth Creek; and snowmelt that flows through coarse-grained glacial deposits south of the caldera floor (e.g. along Sherwin Creek). These aquifers are located in alluvium/colluvium, shallow glacial tills, and moat basalt. In contrast, oxygen-18 and deuterium values for hot water flowing in the geothermal reservoir beneath the western part of the caldera indicate that such water originates from snowmelt along the northern base of Mammoth Mountain and the upper reaches of Dry Creek. Changes in isotopic values trace geothermal flow from the west moat to the south and east to Casa Diablo and beyond. Because the isotopic signature of the cold shallow groundwater and the geothermal waters is distinct and unique, these data indicate that there is no influx of geothermal water into shallow groundwater in the western part of the caldera. Stable isotopic compositions of cold groundwaters in the Mammoth Basin plot almost exactly on the meteoric water line, with no suggestion of measureable influence from geothermal fluids (Figure 3.7-7). In summary, chemical data do not show consistent evidence for mixing between thermal and non-thermal waters beneath the western part of Long Valley caldera (Sorey, 2011b).

Summary. Available evidence indicates that the shallow Mammoth Groundwater Basin is physically isolated from the deeper geothermal system. Because these two systems are separate, the CD-IV Project would be unlikely to affect the availability or quality of shallow groundwater resources in the Project vicinity. No effects on the shallow cold water basin have been observed during monitoring of the 27 years of operation of the existing Casa Diablo facilities. Further, even if there are connections, the forecast pressure declines are unlikely to cause adverse impacts to the overlying groundwater system. In addition, producing from the deeper Basalt Canyon geothermal reservoir proposed under the CD-IV Project would have less potential to adversely affect shallow groundwater resources.

Despite the location of the shallow Mammoth Groundwater Basin in a geologically active area with variable annual precipitation (recharge) and regardless of the source of the low levels of chloride and temperature, current groundwater quality and quantity are within acceptable drinking water standards. The model forecasts of the geothermal reservoir response to CD-IV expansion of geothermal development are a very slight pressure decline and temperature decline. Therefore, it is unlikely that the proposed project will affect the current groundwater quality. As discussed above, the existing hydrologic monitoring programs under the oversight of the LVHAC would be evaluated by the USGS and expanded as needed to ensure monitoring adequately addresses the proposed Action, including its potential to affect groundwater resources. Additional monitoring may include, but is not limited to, the following: drilling of additional monitoring wells; installation of new or updated monitoring equipment; monitoring of additional thermal and non-thermal springs, fumaroles, shallow groundwater wells, or geothermal wells; additional

geochemical analyses. Continued compliance with the LVHAC monitoring, including additional monitoring determined necessary by the LVHAC for assessment of the CD-IV Project, would be required by the USFS and BLM as Conditions of Approval of the project.

Decommissioning

Decommissioning of the Proposed Action would result in the discontinuation of all geothermal fluid extraction and injection activities associated with the Proposed Action. For the reasons outlined above, these actions would not be anticipated to affect shallow groundwater resources. Closure and abandonment of geothermal production and injection wells would be performed in accordance with well closure permits and standard industry procedures that would minimize the potential for effects on the overlying shallow aquifer. Potential effects on shallow groundwater would be minimal.

4.7.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented previously.

a) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted) or substantially degrade water quality.

Construction

Construction period groundwater use is discussed in Section 4.19, Water Resources. No further discussion is warranted. As discussed above under Groundwater Resources, drilling of production and injection wells would involve the installation of casing to prevent commingling of fluids between the groundwater supplies and the geothermal aquifer, therefore, construction of the CD-IV Project would not affect shallow groundwater availability and quality. The impact would be less than significant.

Operation and Maintenance

As discussed above under Groundwater Resources, available evidence indicates that the groundwater aquifer used for drinking water supplies is physically separate from the underlying hot geothermal reservoir. Production and injection of geothermal fluid at depths of 1,600 to 2,500 feet (487.7 to 762 m) would not substantially affect the availability or quality of the groundwater supplies, therefore, this impact would be less than significant.

Decommissioning

No change in groundwater supplies is anticipated as a result of decommissioning, therefore, this impact would be less than significant.

Mitigation: None Required.

b) Substantially deplete or alter geothermal outflow to surface water and geothermal manifestations.

Construction

As discussed previously under Geothermal Resources, construction of the Proposed Action would not result in the ongoing withdrawal of geothermal fluid, nor other activities that could potentially deplete geothermal resources. Relatively small quantities of geothermal fluid with respect to the reservoir volume may be removed during flow testing of the wells, however, the potential effects on outflow to surface water and geothermal manifestations as a result of loss of geothermal fluid would be imperceptible and less than significant.

Operation and Maintenance

As discussed above under Geothermal Resources, increasing geothermal fluid production in the geothermal reservoir is not anticipated to cause noticeable impacts to springs, surface waters, and other hydrologic surface features. Existing monitoring programs under the oversight of the Long Valley Hydrologic Advisory Committee would be expanded to include monitoring for the proposed Action, in accordance with the Mono County General Plan, and in accordance with PDM GEO-5. Potential impacts would be less than significant.

Decommissioning

As discussed previously under Geothermal Resources, decommissioning of the Proposed Action would have a less-than-significant impact on Geothermal Resources.

Mitigation: None Required.

4.7.5 Alternative 2: Plant Site Alternative

4.7.5.1 Direct and Indirect Impacts

Potential impacts of Alternative 2 related to geothermal and groundwater resources would be the same as those discussed for the Proposed Action (Section 4.7.1.1).

4.7.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Impacts would be less than significant, as discussed for the Proposed Action.

4.7.6 Alternative 3: Reduced Pipeline Alternative

4.7.6.1 Direct and Indirect Impacts

Potential impacts of Alternative 3 related to geothermal and groundwater resources discussed in this section would be the same as those discussed for the Proposed Action.

4.7.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Impacts would be less than significant, as discussed for the Proposed Action.

4.7.7 Alternative 4: No Action

4.7.7.1 Direct and Indirect Impacts

Under implementation of the No Action Alternative, the CD-IV power plant, wells and pipelines would not be constructed and no impacts on geothermal resources would occur. However, installation of some additional geothermal exploration wells could still occur, in accordance with already approved permits, however, these wells would not be used for geothermal production. Well construction and decommissioning-related impacts would be the same as the Proposed Action, but reduced in intensity. However, operational impacts associated with the use of exploration wells for assessment and monitoring of geothermal resources under the No Action Alternative would have no effect on geothermal and groundwater resources.

4.7.7.2 CEQA Significance Determination

The No Project Alternative would not result in any CD-IV project related impacts on geothermal and groundwater resources. However, previously-approved exploratory drilling that is not part of the CD-IV project would occur and would have similar less-than-significant impacts on geothermal and groundwater resources as compared to the Proposed Action for construction and decommissioning.

4.7.8 Cumulative Impacts

4.7.8.1 Geographic Extent/Context

The geographic scope for cumulative impacts related to geothermal and groundwater resources encompasses the Long Valley KGRA and the Mammoth Groundwater Basin. Existing and proposed geothermal development projects could contribute to the cumulative impact of the Proposed Action and alternatives with respect to the Long Valley geothermal reservoir. Projects involving new water wells or public water supply wells in the Mammoth Groundwater Basin, although none have been identified, could contribute to cumulative impacts on groundwater resources. With the exception of individual water wells subject to ministerial well permits, these types of projects would undergo independent environmental review pursuant to NEPA and/or CEQA prior to approval. Regardless, the effects of these types of projects were considered in this analysis of cumulative impacts related to geothermal and groundwater resources.

4.7.8.2 Existing Cumulative Conditions

The existing MP-1, MP-2 and PLES-1 geothermal developments at Casa Diablo area produce power from hot geothermal fluid in the Long Valley geothermal reservoir. As discussed in the sections above, geothermal developments have been operating for approximately 27 years with a

total reservoir pressure decline measured at 55 psi, although the reservoir has partially recovered 10-15 psi since production was shifted to Basalt Canyon. In contrast, the pressure in the deeper Bishop Tuff increased 15 percent from initial conditions after injection in this zone began in 1991.

In the Basalt Canyon area, reservoir pressure appears to have declined about 2 percent since the increase in production from that area began in 2006, during a period in which there has been no injection of spent geothermal fluids in the Basalt Canyon area.

4.7.8.3 Reasonably Foreseeable Projects

A project to replace/update the existing MP-1 power plant, the MP-1 Replacement Project, is currently under CEQA review. This project would replace the aging MP-1 power plant with a new, more efficient binary power plant. No net change in the rate of geothermal fluid produced would result (Mono County, 2012). No public water supply projects were identified.

4.7.8.4 Construction

Cumulative impacts associated with construction of the Proposed Action or an alternative would be limited to projects under construction at the same time and within the same geothermal reservoir and groundwater basin. Construction of the MP-1 Replacement Project or demolition of the existing MP-1 plant and the CD-IV Project could overlap in time and vicinity, however, the MP-1 Replacement Project does not include the construction of any new geothermal wells. Therefore, construction related impacts of the Proposed Action on geothermal and groundwater resources would not result in a combined impact that would cause an adverse cumulative effect.

4.7.8.5 Operation and Maintenance

Operation and maintenance of the Proposed Action, Alternative 2 or Alternative 3 would occur over approximately the next 30 years. The existing and proposed Casa Diablo geothermal projects (MP-2, PLES-1, and MP-1 Replacement) are also estimated to operate over the same period and within the same geothermal reservoir. The analysis of the Proposed Action, presented above in Section 4.7.4.1, assumes the continued operation of these geothermal facilities. The numerical simulation model of the reservoir evaluates the proposed geothermal production of the CD-IV Project in combination with the continued production from the Casa Diablo facilities, thus, the analysis presented is a cumulative analysis. As concluded above, the combined impact of operation and maintenance of the CD-IV Project and the Casa Diablo geothermal developments is unlikely to cause an adverse cumulative effect with respect to geothermal and groundwater resources.

Operation and maintenance of the No Action Alternative would not involve extraction and/or reinjection from the geothermal reservoir and would not contribute to an adverse cumulative effect.

4.7.8.6 Decommissioning

The cumulative effect of decommissioning of the Proposed Action, Alternative 2 or Alternative 3, in combination with decommissioning of the other existing Casa Diablo geothermal

developments, could result in a recovery of some of the pressure and temperature declines in the geothermal reservoir over time. Because little change to outflow to surface waters and geothermal manifestations is anticipated with the predicted pressure and temperature declines in the geothermal reservoir under the cumulative operation of the CD-IV Project and Casa Diablo projects, likewise, it is unlikely that a recovery or partial recovery of pressure and temperature in the geothermal reservoir over time would have a substantial effect. Decommissioning of the No Action Alternative would not contribute to a cumulative effect on geothermal resources as the wells that could be constructed under approved permits would not be used for geothermal production.

Impacts of decommissioning of the Proposed Action and Alternatives on groundwater resources (including the No Action Alternative, assuming that any approved geothermal wells constructed would need to be properly abandoned) would be primarily related to potential water quality impacts during well abandonment. These impacts would be similar to those that could occur during decommissioning of the Casa Diablo geothermal wells. Well permits and regulations would contain measures to adequately protect groundwater quality so that decommissioning of these projects would not contribute to an adverse cumulative effect.

4.7.8.7 CEQA Significance Determination

As discussed above in Section 4.7.8.5, analysis of the operation and maintenance impacts of the CD-IV Project on geothermal and groundwater resources encompasses the cumulative operation and maintenance of the CD-IV Project along with the other existing and foreseeable geothermal development projects in the Long Valley area. The cumulative impact would be less than significant. Construction and decommissioning of the CD-IV Project would have similar less-than-significant impacts on geothermal and groundwater resources. The Project's incremental contribution in this regard would not be cumulatively considerable and the cumulative impact would be less than significant.

4.7.8.8 Mitigation Measures

No mitigation measures are required.

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4.8 Geologic, Soil and Mineral Resources

4.8.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the potential impacts from geologic, seismic and volcanic hazards to proposed project facilities, facility workers and the public; as well as impacts from project construction and operation on soil and mineral resources. Impacts are identified and evaluated based on relevant BLM and Forest Service standards, policies, and guidelines; and are also evaluated in the context of local regulations, building codes and standards.

Several issues have been identified that require analysis, and in some cases, mitigation. These issues and the approach to analysis in this EIS/EIR are as follows:

1. ***Impacts to Geologic and Soil Resources*:** This issue is generally focused on natural geologic resources including soils, minerals and other features of geologic interest such as hot springs and fumaroles.

2. ***Soil and Ground Instabilities*:** This issue addresses the potential for the project to be subject to ground movements, either as a result of site-specific condition (i.e., expansive soils, slope instabilities, or excessive soil settlement), or regional processes such as subsidence and uplift (due to deep volcanic processes). This analysis also discusses the potential for proposed thermal fluid extraction and injection operations to result in local subsidence or settlement of the ground surface. This topic is generally focused on non-seismic geologic or soil issues that could affect the project over the long run.

3. ***Surface Faulting and Seismic Hazards*:** This issue addresses potential effects on proposed facilities and site workers from surface fault rupture, strong seismic shaking, and/or other secondary earthquake hazards such as liquefaction or landslides. While earthquakes and related hazards would have regional consequences, this analysis is focused on increased risks to the public and/or site workers that are a direct consequence of the proposed project. This would include safety risks to plant worker in the event of fault rupture, as well as a discussion of potential for well construction and thermal fluid injection to induce earthquakes.

4. ***Impacts from Regional Volcanic Hazards*:** Volcanic and seismic hazards in the region are highly related and may occur simultaneously; however, these issues are treated separated because a strong earthquake may occur without a volcanic eruption and vice versa. This issue discusses the potential for future volcanic unrest, the existing warning systems and response plans that are in effect, and possible impacts to the project.

The overall impact conclusions for the above referenced topics are made based on the location, context, intensity and duration of impacts to natural resources (for the first issue) and public health and safety (for the last three issues). The intensity and significance of impacts with respect to natural geologic hazards consider both the probability of a particular hazard of occurring in conjunction with the level of consequences to public and/or worker health and safety that can be reasonably anticipated. For impacts to natural resources, impact intensities are determined based on the value and/or uniqueness of the resource (i.e., sensitive soils and/or prime farmland), the

geographic extent of impacts (i.e., localized or widespread), and the timing of the impact (i.e., temporary or permanent).

4.8.2 Project Design Measures

The analysis assumes that the following PDMs related to geology, soils and mineral resources are fully implemented:

Soils and Geologic Resources

1. *GEO-1*: Topsoil will be salvaged, as feasible, and stockpiled (no more than two feet high) for use during subsequent reclamation of the disturbed areas.

2. *GEO-2*: Soils will be de-compacted as part of reclamation prior to the replacement of topsoil.

3. *GEO-3*: ORNI 50, LLC will construct the CD-IV Project in conformance with recommendations by the geotechnical engineer.

Geothermal Resources

4. *GEO-4*: ORNI 50, LLC commits to continuing to operate the existing geothermal projects in conformance with the Plans of Operation for Development, Injection and Utilization, approved by the BLM and USFS, as well as in conformance with monitoring through the Long Valley Hydrologic Advisory Committee, and remedial action programs, which are designed to prevent, or mitigate, potential hydrothermal impacts to the Owens tui chub critical habitat, Hot Creek Hatchery and Hot Creek Gorge springs from geothermal operations conducted on federal geothermal leases in the Mono-Long Valley KGRA. ORNI 50, LLC also commits to operating the proposed geothermal project in conformance with these requirements.

Natural Hazards

5. *GEO-5*: The CD-IV plant will be constructed to handle the maximum credible earthquake in the project area. The power plant and all project construction will comply with Seismic Zone D standards, the most stringent under the IBC.

6. *GEO-6*: The CD-IV power plant and pipelines will be designed and constructed to reasonably minimize the potential for failure or rupture in the event of fault offset in these zones.

7. *GEO-7*: The emergency contingency plans will include actions to be taken in the event responsible agencies declare a volcanic hazard warning or alert, or in the event of a volcanic eruption.

Protection of Erosion and Surface Waters

1. *HYD-1*: Appropriate erosion control measures will be used to control any offsite discharges, and the Project will adopt any relevant LRWQCB and USFS best management practices to prevent soil erosion, including the preparation of a SWPPP.

2. *HYD-3*: Existing roads will be evaluated and properly graded and repaired in areas that show evidence of enhanced erosion.

3. *HYD-4*: Exposed, disturbed soils in construction areas will be watered to minimize wind erosion and dust. Topsoil piles will be covered to minimize erosion during wind storms. See also AQ-1.

4. *HYD-5*: A site drainage and runoff management plan will be prepared. All new access roads will comply with the plan to minimize erosion and off-site sedimentation. Off-site stormwater will be intercepted in ditches and channeled around the well sites to energy dissipaters as necessary to minimize erosion.

5. *HYD-6*: The pipeline route will not be cleared or graded to minimize soil disturbance.

6. *HYD-7*: The Project will obtain coverage under, and comply with, the California Construction General Storm Water Permit.

4.8.3 CEQA Significance Criteria

As stated in Appendix G of the CEQA Guidelines, implementation of the Project would have a significant impact on geology and soils if it were to:

a) Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault;

   ii. Strong seismic ground-shaking;

   iii. Seismic-related ground failure, including liquefaction; and/or

   iv. Landslides;

b) Result in substantial soil erosion or the loss of topsoil;

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse;

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property; or

e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

In addition, as stated in Appendix G of the CEQA Guidelines, implementation of the Project would have a significant impact on mineral resources if it were to:

a) Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the state; or

b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

4.8.4 Alternative 1: Proposed Action

4.8.4.1 Direct and Indirect Impacts

Impacts to Geologic and Soil Resources

As discussed in the affected environment, Section 3.8, there are no unique or prime farmland soils within the footprint of the project, nor are there mineral resources other than the existing geothermal leases that would be directly affected by the project. No indirect impacts would occur to mineral resources or unique or prime farmland soils located outside the footprint of the project. Geologic features in the vicinity of the project include hot springs, fumaroles and volcanic domes. Project facilities are purposefully located away from fumaroles to avoid thermal ground conditions, and facility placement would not otherwise directly affect a unique geologic feature. The possibility for indirect effects on hot springs in the project vicinity related to pumping of the geothermal reservoir is discussed in Section 4.7, *Geothermal Resource*. For the above reasons, this impact discussion focuses on impacts to soil resources within the project site.

Construction

Construction activities associated with installation of proposed facilities would have a greater extent of impacts on soil resources compared to the operation and maintenance phase or the decommissioning phase of the project. Aside from soil disturbances required for the installation of proposed facilities (i.e., drilling, excavation, grading and grubbing), additional soil disturbances would occur from vegetation clearing and soil compaction associated with equipment and material staging areas, pipeline construction corridors, and the construction of new roads and improvement or closure of existing roads. Soil compaction may increase soil erosion through decreased infiltration rates and dislodging soil particles, and can result in the loss of soil pore spaces and oxygen necessary to support native plant growth. The level of surface soil disturbances that would be required for the construction phase is summarized below (refer to Table 3.8-1 and Figure 3.8-3 for the location and name of individual soil map units to be disturbed):

1. Construction of the geothermal plant is expected to disturb approximately 283,500 sq ft (6.5 acres) of soil, primarily Vitrandic Haploxerolls-Vitrandic Xeropsamments[1].

2. Construction of the substation would require soil disturbances over approximately 0.25 acre (100 feet by 80 feet) adjacent to the power plant. A transmission line connection from the power plant substation to the existing SCE Casa Diablo Substation would be approximately 500 feet long and the alignment would be cleared of trees for an area wide enough to permit passage of trenching equipment.

3. Permanent disturbance for well facilities would be relatively small—about 0.4 acres each for up to 16 wells.

4. Construction of well facilities would each require soil disturbances over approximately 2.5 acres (needed for equipment storage and vehicles, mud pits, and containment basins).

[1] This soil map unit is described in Table 3.8-1.

5. New roads, where required (see Figure 2-8), would be 15 feet wide, with a turning radius of no less than 50 feet, and would require some degree of soil compaction and surfacing to accommodate construction-related vehicles.

6. Approximately 25,000 feet of pipeline would be required from the power plant to the production/injection interconnection points. Although the pipeline would be aboveground, and a large portion of the proposed route has been previously disturbed, some soil compaction in new areas would be required to access the proposed 20-foot construction corridor along the pipeline route. The use of the catwalk construction method for pipeline installations would not require establishment of temporary roads, but would still result in a moderate degree of soil trampling and compaction. In addition, permanent soil disturbances would occur in the pipeline corridor due to installation of pipeline piers and footings but would be limited to the footprint of the pilings and footings.

Generally, construction activities would result in direct soil disturbance (i.e., through grading or excavation) at up to 20 discrete sites ranging in size from 2.5 acres (for well sites) to 6.5 acres (for the power plant), scattered over an approximately 3 mile wide area. Construction activities would also result in soil compaction within linear corridors associated with the proposed pipeline route and new roads. Due to uncertainties regarding the exact number of wells to be drilled and the timing of facility construction, the precise total acreage to undergo both temporary and long-term soil disturbance is unknown. However, based on proposed facilities and assuming all 16 wells would be drilled, the total disturbance area over the life of the project could be over 50 acres. However, construction of the facilities would be phased such that a much smaller area would be disturbed at any one time (for example, no more than two drill rigs would be operating at any one time). The soil types to be disturbed during construction are relatively common in the region and are not considered prime farmland soils, soils of statewide importance, nor are they otherwise considered sensitive or unique (such as hydric or serpentine soils). In addition, the project area is currently characterized by prior soil disturbances associated with previous geothermal exploration activities, existing pipeline and well sites, as well as the presence of a fairly dense network of NFS roads and trails used primarily for public recreation. Consequently, the intensity of potential impacts is moderated by the common value of the soils and the prior disturbances associated with existing roads, trails and facilities.

Nevertheless, the topsoils present within the project site have inherent value in that they are necessary to support the growth of vegetation native to the area. As discussed in the affected environment (Section 3.8), the USFS seeks to maintain and preserve the natural function of soils dedicated to growing vegetation, including support for plant growth function, soil hydrologic function, and a filtering - buffering function. In addition, the 1988 Inyo National Forest LRMP contains numerous standards and guidelines with respect to management of soil resources. Without measures to avoid or minimize damage to soil function (e.g., due to soil compaction and rilling) during construction and operation of the project, and without plans to properly decommission disturbed areas (i.e., restoration and revegetation), soils within the project area could experience long term adverse impacts in specific areas through degradation of soil function and increased susceptibility to erosion. While soils in the project area generally have low susceptibility to erosion, as discussed in Section 3.8, soil erosion (e.g., rilling) has been observed on slopes as gentle as 5 percent in areas where soil is bare and compacted (such as along roads).

The creation of access roads to new well pads, the well pads themselves, and staging areas as stated above could continue to result in similar types of impacts.

ORNI 50, LLC has proposed several measures to address the potential impacts on soils, including PDMs GEO-1, GEO-2, HYD-1, HYD-3, HYD-4, HYD-5, HYD-6, and HYD-7 (described in Section 3.8.1). The GEO measures are generally focused on preserving topsoils by stockpiling them until such time as they are needed for revegetation, and decompacting soils prior to topsoil replacement; and the HYD measures are focused on preventing and/or detecting and repairing erosion of soil caused by wind or water. These types of PDMs are appropriate to avoid or substantially reduce the project's adverse impacts on soil resources. As discussed in Section 4.19, the requirements imposed by the Construction General Permit (e.g., SWPPP) and the mitigation measures identified in that discussion would also prevent or substantially reduce soil erosion by wind or water during both construction and operations. To ensure that PDMs are reviewed and approved by USFS personnel and that proper USFS standards and guidance is used when developing erosion control and drainage plans, ORNI 50, LLC shall implement **Mitigation Measure GEO-1** (See Section 4.8.9 below).

Implementation of the PDMs, water quality mitigation measures in Section 4.19, and **Mitigation Measure GEO-1**[2] would ensure that adverse impacts to soil resources are avoided or substantially reduced.

Operation and Maintenance

It is likely that, over the life of the project, up to six injection wells and up to eight production wells would be drilled, two wells have already been drilled for exploratory purposes. These areas were included in the project footprint described in the setting, and the description and analysis of impacts to soils is the same as discussed for construction impacts above. Following facility and well installation, operation and maintenance activities would have minimal additional soil impacts. Access roads would require periodic maintenance, regrading, or plowing (during the winter); and some of the wells may need to be redrilled or worked over, requiring many of the same activities required to drill a new well. Additionally, production wells that do not demonstrate sufficient productivity could be converted to an injection well. All of these activities would take place within previously disturbed areas and would not require additional disturbances outside of the construction footprint analyzed for the construction phase (above). As such, the impact conclusion for the operation and maintenance phase of the project is similar as above: without mitigation, operation and maintenance of the project would have localized adverse impacts on soil resources in the long run.

However, implementation of the PDMs, water quality mitigation measures in Section 4.19, and **Mitigation Measure GEO-1** would ensure that adverse impacts to soil resources are avoided or substantially reduced.

Decommissioning

As part of the decommission phase, a site Abandonment-Reclamation Plan would be prepared in conformance with BLM and USFS requirements. As part of the plan, the surface of the site would be restored to conform to approximate pre-Project land uses. Decommissioning of the project would

have short term localized adverse impacts on soil resources while facilities are decommissioned, prior to site restoration. These impacts would be similar though less intense than construction-related impacts discussed above. During this time, similar short term measures described above would be implemented to reduce or avoid adverse impacts on soils. In the long run, areas newly disturbed by the project would be returned to pre-construction conditions through topsoil replacement and revegetation. The PDMs ensure that reclamation activities include the appropriate restoration of soil type and quality. Areas where soils are compacted, disturbed or degraded under existing conditions would be restored and thus in these specific areas, the decommissioning phase would have a locally positive impact on soil resources in the long run.

Summary of all Phases

With implementation of identified PDMs, mitigation measures in Section 4.19, and **Mitigation Measure GEO-1**, the long-term impact of the project as a whole (including decommissioning and the site Abandonment-Reclamation Plan) would not have any substantially adverse impacts on soil resources. There would be no impact to mineral resources (other than the geothermal reservoir) or geologic features (other than thermal springs). The possible impacts to the geothermal reservoir and thermal springs are discussed in Section 4.7, *Geothermal Resources*.

Soil and Ground Instabilities

Construction

Typical geotechnical concerns for any type of project include the potential for long-term soil and ground instabilities associated with subsidence, settlement (esp. differential settlement), expansive soils and/or landslides. These issues are normally examined and addressed in the process of obtaining permits required to construct a project, including grading and building permits. Prior to receiving building permits, ORNI 50, LLC will be required to submit to the USFS all grading plans, geologic and soils reports, and engineering designs necessary to demonstrate compliance with applicable building codes and permit provisions. Such reports must always be prepared and certified by individuals licensed in the State of California to perform their respective practice (i.e., engineering, geology, etc…).

Because a geotechnical investigation of the proposed power plant site, well pad installations, or pipeline route has not yet been conducted by ORNI 50, LLC, the potential for the proposed facilities to be adversely affected by soil and ground instabilities can only be generalized based on regional-scale topographic, geologic, and soils information presented in the affected environment section (see Section 3.8). Site-specific geologic and soil reports will be required to adequately characterize soil properties and provide appropriate recommendations for construction site preparation, fill compaction, foundation designs, and other engineering features. This information will be developed as part of grading and/or building permit application submittals, in accordance with PDM GEO-3 and GEO-5, and in compliance with Mono County building regulations (Ord. 08-02 § 1) enforced by the Mono County Building Division and standards developed by the International Code Council (ICC)[2].

[2] The latest edition (2012) of the IBC incorporates seismic design standards and criteria that were developed based on California's seismic standards and are thus also adopted by California in the CBC.

Based on initial examination of available geologic and soil information, the project site is unlikely to be underlain by expansive soils, soils prone to settlement, or located within a landslide area. Soils in the project area are relatively coarse-grained and lack significant clay fraction or thick accumulations of organic material. As such, soils are unlikely to be expansive or prone to settlement. In any case, adverse soil conditions, if present, would be a threat to project facilities only, and not to the public at large. There are no developed properties (other than existing MPLP and SCE facilities) immediately adjacent to the proposed facilities and there is no indication that unstable soils underlying proposed facilities would affect anything other than MPLP's facilities themselves. Finally, facility damage from expansive soils or soil settlement tends to occur slowly and progressively, such that problem areas can be detected and addressed as they occur. Nevertheless, without mitigation, unstable or expansive soils could have adverse impacts on proposed facilities and worker safety.

Generally, the topics discussed above are typical geotechnical issues that are routinely addressed through application of modern building codes, compliance with permit provisions, and industry standard building practices such as removal or treatment of unsuitable soils, proper placement and compaction of imported fills, and appropriate foundation and/or retaining wall designs. However, PDM GEO-5 has an outdated reference to the IBC and seismic hazard "Zone D" and PDM GEO-6 is too vague to provide confidence that geotechnical issues will be appropriately detected, investigated and considered in project grading plans and engineering designs. For these reasons, and to ensure proper design of the power plant, geothermal wells and ancillary facilities, **Mitigation Measure GEO-2** shall be implemented. **Mitigation Measure GEO-2** directs ORNI 50, LLC to conduct a geotechnical investigation for the proposed facilities prior to issuance of a grading permit or use permit and to retain a geotechnical engineer to be onsite during site preparation and grading to ensure geotechnical recommendations are being properly implemented. Compliance with applicable building codes, implementation of PDMs GEO-5, GEO-6 and **Mitigation Measure GEO-2** would ensure that soil and ground instabilities would not have adverse impacts on facilities and its workers.

Operation and Maintenance, and Decommissioning

A prevalent public concern regarding the deep pumping of geothermal wells is their potential to cause widespread subsidence of the ground surface. In most areas where subsidence has been attributed to geothermal operations, the region of earth deformation has been confined to the wellfield area itself, and has not disturbed anything off-site (Geothermal Energy Association, 2007). The following discussion is excerpted from a publication by the Geothermal Energy Association (2007):

> Although it can occur naturally, subsidence can also occur as a result of the extraction of subsurface fluids, including groundwater, hydrocarbons, and geothermal fluids. In these cases, a reduction in reservoir pore pressure reduces the support for the reservoir rock itself and for the rock overlying the reservoir, potentially leading to a slow, downward deformation of the land surface. While subsidence can be induced by thermal contraction of the reservoir due to extraction and natural recharge, properly placed injection wells reduces the potential for subsidence by maintaining reservoir pressures. At fields produced from sedimentary rocks where the porosity and permeability is primarily between rock grains,

injection can successfully mitigate for subsidence. At the Heber geothermal field in southern California, for example, injection successfully resolved subsidence. At The Geysers, where subsidence may be caused more by temperature decline (thermoelastic contraction) than pressure decline (poroelastic contraction), injection is not necessarily an effective mitigation tool for subsidence. However, long-term monitoring at The Geysers demonstrates a very slow rate of subsidence that has no direct environmental impact.

Naturally-occurring subsidence most frequently takes place in areas that are tectonically active such as volcanic regions and fault zones. Subsidence can also typically occur in areas where sedimentary basins are filled with unconsolidated sands, silts, clays and gravels. Most known geothermal resources are located in areas that are tectonically active, and may experience natural subsidence. For example, subsidence occurs naturally in the Medicine Lake geothermal area of California due to volcanic activity, even though no geothermal development has yet taken place in the region. Because geothermal operations occur at tectonically active sites, it is sometimes difficult to distinguish between induced and naturally occurring subsidence. Subsidence related to geothermal development is more likely in areas where the geothermal reservoir occurs in weak, porous sedimentary or pyroclastic formations.

In cases where subsidence may be linked to geothermal reservoir pressure decline, injection is an effective mitigating technique. By injecting spent geothermal brines back into the reservoir from which they came, reservoir pressure is stabilized. This approach has helped to maintain the pressure of geothermal reservoirs and can prevent or mitigate for subsidence at geothermal development sites.

The CD-IV Project would utilize a closed loop system of reinjecting the geothermal fluid it extracts. As discussed in the setting, natural volcanic processes have caused the region immediately northeast of the site to experience variable degrees of resurgence/uplift (an average of 80 centimeters since 1980). Neither this natural rate of uplift, the numerous small to moderate earthquakes that have occurred since construction of the existing plant, nor ongoing operation of the existing wells at the project site have caused structural damage of the existing facility due to ground subsidence.

Nevertheless, as discussed in the affected environment, studies have established a link between geothermal fluid extraction and minor changes in land surface elevation. Documented subsidence on the order of mm/year were found, which is typical of modern developed geothermal systems and considerably less than subsidence rates in regions of extensive groundwater extraction. Notably, as with repeated inflation/deflation events of much greater magnitude in other well-studied active caldera complexes such as Yellowstone and Campi Flegri in Italy, calderas do experience complex inflation and subsidence during periods of unrest (Hill, 2006 as cited in EGS, 2012). Neither Yellowstone nor Campi Flegri or any one of many other volcanic centers experiencing complex deformation events are linked to geothermal production. The well documented unrest in Long Valley caldera has been episodic and not necessarily uniform. Recent deformation within the resurgent dome in the west central part of Long Valley caldera has been punctuated by periods of abrupt rapid uplift, relative quiescence and even minor subsidence (Hill, 2006 as cited in EGS, 2012). The leveling data are not necessarily a uniform record and early USGS baseline leveling studies around Casa Diablo document the amount of subsidence (in a “noisy” record) was less than 25 percent of the total uplift noted across the resurgent dome.

The potential for subsidence is mitigated by the differing reservoir conditions across the caldera and modern geothermal field management practices of developing the reservoirs in stages and complete return of all the produced fluid to the subsurface to avoid large-scale and irreversible effects on surface features and resource sustainability. Caldera deformation, particularly subsidence at Casa Diablo, has been discontinuous since 1988 and the record of deformation across the entire caldera including Casa Diablo has not necessarily been constant or uniform (Langbein, 2003 as cited in EGS, 2012). The USGS observed that the apparent amount of subsidence was limited and spatially related to the producing area around Casa Diablo. Interpretations related the minor amount of subsidence to a combination of thermal contraction in the deeper 700m deep injection zone and slow pressure declines in the shallow 200-meter deep production zone (Farrar and others, 1995 as cited in EGS, 2012; Langbein, 2003 as cited in EGS, 2012). Later USGS publications on the Casa Diablo field also suggest alternative mechanisms for the subsidence such as comparatively shallow effects like changes in shallow unconfined aquifers and the slow dewatering of relatively compressible, porous sediments and hydrothermally altered volcanic tuffs or tuffaceous sediments that underlie the topographic low of the structural graben that contains most of the Casa Diablo development (Howle and others, 2003 as cited in EGS, 2012). The shallow effects are part of the changes limited to the early production history of the field and are not necessarily continuous or continuing.

The planned development into Basalt Canyon will produce from a much deeper reservoir in indurated Early Rhyolite and Bishop Tuff, which should mitigate the effect of changes in shallow aquifer conditions and relatively compressible poorly consolidated altered alluvium/colluvium noted at Casa Diablo. Nevertheless, insufficient information is available to make conclusive statements about the degree to which pumping from the deeper reservoir would lessen potential subsidence rates. There is a chance that increased pumping from the deeper reservoir could continue or increase the rate of subsidence occurring naturally and occurring as a result of existing pumping operations. In order to address the uncertainty regarding expected local subsidence rates, and to protect infrastructure and resources from potentially adverse effects, **Mitigation Measure GEO-3** is proposed. This measure would expand the existing monitoring network based on the location of proposed wells, and shall establish subsidence tolerance limits to protect existing infrastructure and resources. The impact of local subsidence on infrastructure, with mitigation Measure GEO-3, would be substantially reduced or avoided altogether.

Surface Faulting and Seismic Hazards

Construction, Operation and Maintenance, and Decommissioning

Ground Shaking. As discussed above under soil and ground instability, compliance with applicable building codes, implementation of PDMs GEO-3, GEO-6 and **Mitigation Measure GEO-2** would ensure that soil and ground instabilities would not have substantial adverse impacts on facilities and its workers. This includes the effects of seismic ground shaking because building codes include requirements to design structures according to their seismic design category (CDC), which provides specific building standards based on the level and intensity of expected ground motions, and the occupancy category of the structure. Because building codes and geotechnical seismic design parameters are primarily intended to avoid building collapse or

substantial structural damage, a strong earthquake could still cause short term damage to or toppling of unsecured equipment and worker injuries could still occur. However, facility impacts could be later inspected, repaired or corrected. For these reasons, with implementation of the PDMs and **Mitigation Measure GEO-2** identified above, the effects of seismic ground shaking on facilities and its workers would be minor.

Fault Rupture. The principal damage risk of surface fault rupture (exclusive of induced slip or settling) is deformation or offset along the actual location of a fault break. To avoid those potential risks, California's Alquist-Priolo act was passed in 1972 and both State and Federal geologic surveys have worked to identify faults that represent the greatest risk of near-term movement and surface rupture. The Alquist-Priolo act is intended to avoid placement of structures for human occupancy on the active traces of earthquake faults. While the project does not propose structures for human occupancy and is thus not subject to the provisions of the Act, the information on fault traces and fault zones developed in support of the act is useful in identifying locations that may be underlain by an active fault trace. As discussed in the affected environment, Section 3.8.1.7, the following project components are crossed by a mapped trace of the active Hilton Creek Fault, or are within its earthquake fault zone as mapped in accordance with the Alquist-Priolo act:

1. the southwestern corner of the proposed geothermal power plant, including the proposed substation and electrical transmission line connection;

2. the proposed well site 55-31;

3. three locations along the proposed pipeline route near the existing MP-I plant, near the proposed Plant, and north of well 55-31.

Further, because proposed wells would be drilled deep into the ground, and the Hilton Creek Fault is steeply east-dipping, proposed well 55-32 may intersect the fault plane at depth. Not all of the project components listed above, including the proposed location of the power plant and substation are actually directly located on a mapped fault trace. However, because precisely locating fault without direct observed evidence of ground rupture (which can be made following an earthquake, or by subsequent trench investigations across suspected fault traces) can be uncertain, the Alquist-Priolo act calls for the establishment of fault "zones" to account for this uncertainty and in recognition that active faults can sometimes be closely paralleled by additional faults similarly capable of rupture.

In the event of a large earthquake on the Hilton Creek Fault, offset along its trace would likely be relatively minor, as it was in 1980 when it produced several earthquakes ranging from magnitude 6 to 6.2. Nevertheless, without adequate design, fault offset (particularly if it occurred at the proposed power plant site) could have adverse consequences to overlying structures and could temporarily inhibit the plant's ability to continue normal operations. While the CD-IV Project would not construct new structures for human occupancy, it proposes facilities that are industrial in nature, containing heated water, fuels and other potential contaminants. Fault rupture beneath the proposed power plant would introduce the possibility of worker safety hazards and/or contaminant releases to the environment. Without adequate design, fault rupture beneath the proposed project could cause

major adverse effects to worker safety and the surrounding environment. Early development of the existing power plant included a site specific fault investigation and found that the site was not underlain by an active fault (Black Eagle Consulting Inc., 2011).

Consequently, prior to approval of final engineering designs for the proposed plant, the presence and precise location of active fault traces must be determined, and if present, design features adequate to either avoid or accommodate fault rupture must be incorporated into final designs for the plant. In accordance with PDM GEO-6, geotechnical consultants commissioned by ORNI 50, LLC are currently investigating the precise location of the Hilton Creek Fault at the project site using a combination of detailed surveys, fault trenches, test pits and boreholes; however, results have not been released to date. As currently proposed, certain design features of the facility are likely to be adequate to accommodate ground rupture in the event of a large earthquake on the fault. For example, "expansion loops" would be constructed about every 250 to 500 feet along the production pipeline route, and further apart along the injection pipeline, so that the pipeline could "flex" as it lengthens and shortens due to heating and cooling. These design features also allow the pipeline to accommodate, without rupture, substantial offset where it crosses a fault trace. Further, automatic emergency shutdown would occur in the event pipeline pressure sensors detect either a pressure lower than the low pressure set point, indicating a possible rupture of a line, or a pressure higher than the high pressure set point. In the event an earthquake causes damage or rupture to wells at depth, or to the aboveground pipeline, the automatic shutdown procedure would minimize effects on the surrounding environment and would allow plant operators to inspect, detect and repair the problems without being subject to safety hazards. Additional description of emergency contingency plans, engineering and administrative controls concerning the use of hazardous materials, and health and safety mitigation measures, are further discussed in Section 4.13, *Public Safety, Hazardous Materials, and Fire*.

The probability of a large earthquake along the Hilton Creek Fault is difficult to ascertain and the potential for fault rupture to occur in the exact location of the proposed project is slight. However, installation of proposed design features (expansion loops and automatic shutdown), implementation of PDM GEO-7 and **Mitigation Measure GEO-4** would reduce the implications to the worker safety, the environment, and the facility in the event a large earthquake produces fault rupture. With implementation of the mitigation measure, the impact of fault rupture on the proposed project is expected to be minor.

Induced Seismicity. A prevalent public concern regarding the installation and use of deeply penetrating geothermal wells is their potential to induce seismicity. Although earthquakes typically occur naturally, seismicity has at times been induced by human activity, including the development of geothermal fields, through both production and injection operations (Geothermal Energy Association, 2007). In these cases, the resulting seismicity has been low-magnitude events known as microearthquakes. Earthquakes with Richter magnitudes below 2 or 3, which are generally not felt by humans, are called microearthquakes. These microearthquakes sometimes occur when geothermal fluids are injected back into the system, and are centered on the injection site. The microearthquakes, sometimes associated with geothermal development, are not considered to be a hazard to the geothermal power plants or the surrounding communities, and

will usually go unnoticed unless sensitive seismometers are located nearby. For this reason the project would have no adverse impacts on buildings and other structures in surrounding communities due to induced seismicity, if it occurs.

Impacts from Regional Volcanic Hazards

Construction, Operation and Maintenance, and Decommissioning

In cooperation with the California OEM Services (OEM) and civil authorities in eastern California, the USGS has established procedures to promptly alert the public to a possible eruption. In 1982, the USGS under the Volcano Hazards Program began an intensive effort to monitor and study geologic unrest in the Long Valley Caldera. The goal of this effort is to provide residents and civil authorities in the area reliable information on the nature of the potential hazards posed by this unrest and timely warning of an impending volcanic eruption, should one develop. Most, perhaps all, volcanic eruptions are preceded and accompanied by geophysical and geochemical changes in the volcanic system. Common precursory indicators of volcanic activity include increased seismicity, ground deformation, and variations in the nature and rate of gas emissions (Battaglia et al., 2003).

Based on a geologic history of 20 eruptions over the last 5000 years and the eruption at Paoha Island approximately 250 years ago, the young silicic domes of the Mono–Inyo volcanic chain still have the potential to produce significant eruptive events. The probability of such an eruption occurring in any given year is less than 1 percent. This is comparable to the annual chance of a magnitude 8 earthquake (like the Great 1906 San Francisco Earthquake) along the San Andreas Fault in coastal California or of an eruption from one of the more active Cascade Range volcanoes in the Pacific Northwest, such as Mount Rainier.

The project area is more than 1.8 miles (3 km) from the potential future eruption sites like the phreatic explosion craters on Mammoth Mountain and more than 3.1 miles (5 km) from potential eruptive areas around the Inyo Craters. In accordance with PDMs GEO-3, GEO-6 and **Mitigation Measure GEO-2**, project buildings and facilities will conform to accepted construction requirements to withstand heavy snow loads which would also be able to accommodate light ash fall. Larger scale events and larger volumes of erupted materials are not projected for probable future eruptions. Should the USGS issue a volcanic watch (condition yellow) or warning (condition red) based on indicators of unrest in the region (see Section 3.8.1.8) public authorities would be notified, and the MPLP would implement emergency response procedures in accordance with PDM GEO-7. Such actions could range from generally elevated alertness and establishment of reporting and coordination protocols (under a watch), to facility shutdown and evacuation in the event of an actual eruption.

Given ORNI 50, LLC would incorporate volcanic hazards in its emergency response plan, the active monitoring by the USGS, and that the project facilities could withstand ashfall from a volcanic eruption, the impact of volcanic activity on the proposed project would be minor. The project would have no impact on neither the likelihood of a volcanic eruption nor exposure of surrounding communities to volcanic hazards.

4.8.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.8.3.

a) Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving: i) rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault; ii) strong seismic ground-shaking; iii) seismic-related ground failure, including liquefaction; and/or iv) landslides.

The impacts of faulting and seismicity have been comprehensively addressed in the discussion of direct and indirect impacts in Section 4.8.4.1. Compliance with applicable building standards and implementation of PDMs GEO-3, GEO-5, GEO-6 and **Mitigation Measure GEO-2 and GEO-4** would ensure that the proposed project is built to avoid or reduce potential risks to facilities, worker safety and the surrounding environment involving faulting and seismic hazards. The impact is *less than significant with mitigation.*

b) Result in substantial soil erosion or the loss of topsoil.

Impacts relating to erosion and loss of topsoil have been comprehensively addressed in the discussion of direct and indirect impacts in Section 4.8.4.1. Compliance with applicable regulations and permits (e.g., SWPPP), and implementation of PDMs GEO-1 andGEO-2 would ensure that construction, operation and maintenance and decommissioning of the proposed project is performed in a manner that reduces or avoids significant impacts to topsoil and erosion. The impact is *less than significant with mitigation.*

c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

The impacts of soil and ground instabilities (non-seismic) have been comprehensively addressed in the discussion of direct and indirect impacts in Section 4.8.4.1. Compliance with applicable building standards, and implementation of PDMs GEO-3 and GEO-5, and implementation of **Mitigation Measure GEO-2** would ensure that the proposed project is built to avoid or reduce potential risks to facilities involving on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse. The impact is *less than significant with mitigation*.

d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property.

As discussed in the affected environment and in Section 4.8.4.1, the potential for the site to contain expansive soils is low. Nevertheless, implementation of PDMs GEO-3 and GEO-5 and **Mitigation Measure GEO-2** would avoid substantial risks to life or property involving expansive soils. The impact is *less than significant with mitigation.*

e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

There would be *no impact* with respect to this topic because there are no septic tanks proposed as part of the project.

4.8.5 Alternative 2: Plant Site Alternative

4.8.5.1 Direct and Indirect Impacts

Impacts to Geologic and Soil Resources

Alternative 2 would affect a slightly different area and extent of soil, because the proposed location of the power plant and the eastern end of the pipeline alignment would change. However, the soil units affected would likewise not be prime farmland soils or otherwise sensitive or unique soils. Alternative 2 would not require the proposed pipelines to branch at Old Highway 395 because the alternative plant site would be reached along the same path to the eastern-most well pads, thereby reducing the total length of the pipeline required. However, because a longer electrical transmission line would be required relative to the proposed action (because of the increased distance between the alternative plant site and the existing substation), the reduction in the length of the pipeline is approximately cancelled out by the increase in the length of transmission line required. Because the total area of disturbance would not substantially change, the impacts of Alternative 2 on geologic and soil resources would be the same or similar to those discussed for the Proposed Action (Section 4.8.4.1). Therefore the impact conclusion is the same. Implementation of identified PDMs and mitigation measures would avoid or substantially reduce the potential adverse impacts on soil resources at the project site.

Soil and Ground Instabilities

Alternative 2 would affect a slightly different area and extent of soil, because the proposed location of the power plant and the eastern end of the pipeline alignment would change. However, the soil units affected would remain the same. Therefore the impacts of Alternative 2 on soil and ground instabilities would be the same as those discussed for the Proposed Action (Section 4.8.4.1). Compliance with applicable building codes, implementation of PDMs GEO-3, GEO-6 and **Mitigation Measure GEO-2** would ensure that soil and ground instabilities would not adversely affect proposed facilities and its workers.

Surface Faulting and Seismic Hazards

Ground Shaking. While the layout of proposed facilities would change slightly under Alternative 2, the project would remain located in the same general location and would be underlain by the same geologic units and soil types. As such, the maximum level of ground shaking that can be reasonably anticipated are the same as discussed for the Proposed Action (Section 4.8.4.1). Like the Proposed Action, compliance with applicable building codes, implementation of PDMs GEO-3, GEO-5, and GEO-6 and **Mitigation Measure GEO-2** would ensure that the effects of seismic ground shaking would remain minor.

Fault Rupture. While the layout of proposed facilities would change slightly under Alternative 2, the project would remain located in the same general location and would likewise be underlain active fault traces of the Hilton Creek Fault. The alternative plant site would be located near another trace of the Hilton Creek Fault, located further to the east. Similar to the proposed action, the alternative plant site would be located in the mapped fault zone, but not the mapped trace of the fault. For these reasons, impacts from fault rupture and proposed mitigation would be the same as discussed for the Proposed Action (Section 4.8.4.1). With installation of proposed design features (expansion loops and automatic shutdown), implementation of PDMs GEO-6 and GEO-7, and **Mitigation Measure GEO-4**, the project would ensure that fault rupture would not adversely affect proposed facilities and its workers.

Induced Seismicity. Alternative 2 would not change the wellfield or levels of anticipated geothermal pumping; and thus impacts from induced seismicity would be the same as the Proposed Action. Alternative 2 would have no adverse impacts on buildings and other structures in surrounding communities due to induced seismicity, if it occurs.

Impacts from Regional Volcanic Hazards

While the layout of proposed facilities would change slightly under Alternative 2, the project would remain located in the same general location and would likewise be subject to the same volcanic hazards. Given ORNI 50, LLC would incorporate volcanic hazards in it emergency response plan (PDM GEO-8), the active monitoring by the USGS, and that the project facilities could withstand ashfall from a volcanic eruption, the impact of volcanic activity on the proposed project would remain minor.

4.8.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Project. Potential impacts of Alternative 2 would remain less than significant.

4.8.6 Alternative 3: Modified Pipeline Alternative

4.8.6.1 Direct and Indirect Impacts

Impacts to Geologic and Soil Resources

Under Alternative 3, the location of the power plant and the number and location of proposed wells would not change from that of the Proposed Action. Only the proposed routes for the production and injection pipelines, as well as the number and location of new access roads would change. The ultimate length (and area of disturbance) associated with construction and operation of the pipelines would not be substantially reduced or lengthened; however, from a soil disturbance perspective, Alternative 3 presents a slightly preferable option due to the collocation of proposed facilities with proposed access roads, as well as the increased length of double pipelines, which mean impacts are less dispersed and more concentrated. As such, the type and level of impacts on soil resources under alternative 3 would be the similar but slightly reduced compared to impacts of the Proposed Action (Section 4.8.4.1).

Soil and Ground Instabilities

Under Alternative 3, the location of the power plant and the number and location of proposed wells would not change. Only the proposed routes for the production and injection pipelines would change. However the route change in relation to soil and ground instabilities is inconsequential. Therefore, the impacts of Alternative 3 on soil and ground instabilities would be the same as those discussed for the Proposed Action (Section 4.8.4.1).

Surface Faulting and Seismic Hazards

Under Alternative 3, the location of the power plant and the number and location of proposed wells would not change. Only the proposed routes for the production and injection pipelines would change. However the route change does not result in a greater or lesser number of active fault crossings, nor does it change the level of seismic hazard expected at the site. Therefore, the impacts of Alternative 3 on surface faulting and seismic hazards would be the same as those discussed for the Proposed Action (Section 4.8.4.1).

Impacts from Regional Volcanic Hazards

While the layout of proposed facilities would change slightly under Alternative 3, the project would remain located in the same general location and would likewise be subject to volcanic hazards. Given ORNI 50, LLC would incorporate volcanic hazards in its emergency response plan (PDM GEO-7), the active monitoring by the USGS, and that the project facilities could withstand ashfall from a volcanic eruption, the impact of volcanic activity on the proposed project would remain minor.

4.8.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Project. Potential impacts of Alternative 3 would remain less than significant.

4.8.7 Alternative 4: No Action

4.8.7.1 Direct and Indirect Impacts

Under the No Action Alternative, the CD-IV power plant, wells and pipelines would not be constructed and no related impacts on geologic, soils, and mineral resources would occur. The project area would continue to experience the same existing levels of geologic, seismic and volcanic hazards. Soil resources within undisturbed areas associated with project pipelines and power plant would not be adversely affected and areas that are currently devoid of vegetation or compacted for access roads would continue to exist in that condition. However, installation of some additional geothermal exploration wells could still occur, in accordance with already approved permits. Impacts resulting from previously-approved well construction and decommissioning would be similar to those described Proposed Action, but to a lesser degree. Operational impacts associated with the use of exploration wells for assessment and monitoring

of geothermal resources under the No Action Alternative would have no effects on geologic, soils, and mineral resources.

4.8.7.2 CEQA Significance Determination

Under CEQA, the No Action Alternative would result in no impacts from power plant or pipeline construction because the change from existing conditions would be minimal to none. Impacts resulting from well construction would be similar to those described under the Proposed Action but to a lesser degree, as five fewer wells could be constructed.

4.8.8 Cumulative Impacts

4.8.8.1 Geographic Extent/Context

The geographic extent considered for potential cumulative impacts to people and structures related to geologic and seismic hazards is more localized or site-specific. The temporal scope includes construction, operation and maintenance of the Project. For soil resources, the geographic extent for cumulative impacts is the general area surrounding the site with similar soil types. As analyzed above, the Project alone would not result in substantial adverse impacts on soil and geologic resources, soil and ground instabilities, faulting and seismic hazards, or volcanic hazards, given required compliance with building codes, the PDMs, and implementation of **Mitigation Measures GEO-2 and GEO-4**.

4.8.8.2 Existing Cumulative Conditions

Existing cumulative conditions with respect to geology, soils and seismicity are as described in the description of the affected environment, Section 3.8.

4.8.8.3 Reasonably Foreseeable Projects

Soil and ground instabilities, faulting and seismic hazards, or volcanic hazards all relate to local, site-specific soil conditions, ground response to earthquakes, and are impacts that are limited to the footprint of the proposed project. The presence or construction of other projects does not increase the probability or severity of seismic hazards to which the project site might be exposed. As such, the impacts with respect to these issues are not cumulative in nature. Even other projects that are overlapping with the proposed project would be held to the same seismic and building standards as the proposed project. Other cumulative projects that are overlapping with the pipeline route or geothermal wells are recreational type projects or road/highway improvements (e.g., Digital 395 Middle Mile Project, Sawmill Cutoff Road Reconstruction Project, Inyo National Forest Shady Rest Motorized Staging Project, Trails System Master Plan, Parks and Recreation Master Plan Update) that would not subject MPLP facilities or its workers to increased risk of geologic hazards.

However, other large development projects could result in extensive soil disturbances. Such projects include:

1. Mammoth View Project
2. Old Mammoth Place
3. Search and Rescue Facility
4. Mammoth Creek crossing
5. Hidden Creek Crossing
6. Snowcreek Master Plan
7. Sierra Star Master Plan Project

To the extent that these project would disturb natural soils (as opposed to previously developed/impacted areas), they would result in similar types of impacts as described for the proposed project to soil resources.

4.8.8.4 Cumulative Impact Analysis

As discussed in the impact analysis (Section 4.8.3.1), the soils in the project area are not considered prime farmland soils, soils of statewide importance, nor are they otherwise considered sensitive or unique (such as hydric or serpentine soils). In addition, the project area is currently characterized by prior soil disturbances associated with geothermal development, a fairly dense network of forest roads and trails used for public recreation, and the developed area of Mammoth Lakes. The large development projects that are reasonably foreseeable would similarly be subject to the Construction General Permit (e.g., SWPPP), as described above and in Section 4.19, *Surface Water Hydrology*, reducing adverse impacts of soil loss during construction and on water quality within downstream receiving waters. Specific provisions, discharge limitations, and BMPs required of development projects under the construction general permit are developed with the aim of addressing basin-wide erosion and water quality problems; therefore, the water quality standards that must be met under the permit are defined to address cumulative water quality conditions within the watershed (and are strict as a result). The adverse effects of construction activities on soil loss and erosion, even if development projects were overlapping in the construction phase with the proposed project, would be minor in the cumulative context.

However, if all the projects were permitted and proceeded to construction, large areas of soil could be permanently excavated, compacted, or otherwise disturbed to accommodate utility lines, roads, and building foundations. The contribution of the proposed project to the total soil resources to be disturbed under the cumulative scenario would be minimal, especially given decommissioning of the project would restore the land to its preconstruction condition. However, as a whole, the cumulative impact with respect to permanent soil disturbance due to development would be moderate. While the area of impact could be rather large and permanent (if all projects proceeded to construction), the affected soils are already somewhat impacted under existing cumulative conditions, and they would not consist of prime farmland soils, soils of statewide importance, nor would they be otherwise sensitive or unique.

4.8.8.5 CEQA Significance Determinations

With respect to soil and ground instabilities, faulting and seismic hazards, and volcanic hazards, no significant cumulative impact would result from the cumulative scenario to which the Project’s incremental impact could contribute, for the reasons described above.

4.8.9 Mitigation Measures

Mitigation Measure GEO-1: *Soil Erosion Control Plan Review and Approval.* Project design measures HYD-1, HYD-3, and HYD-5 should be reviewed and approved by a USFS watershed specialist before implementation. Erosion control and drainage plans for new and existing roads to be utilized for the project shall be aimed at maintaining to the greatest extent feasible the soil quality objectives contained in the USFS Pacific Southwest Region (Region 5) Watershed and Air Management Manual (Supplement R5-2500-50-2012-1). In developing the plan, ORNI 50, LLC and/or its contractor shall consult with the USFS to determine the appropriate soil quality objective(s) to be met following construction (for temporary construction disturbances), and following decommissioning (for total site restoration). As part of the erosion control and drainage plans, ORNI 50, LLC and/or its contractor shall implement an appropriate combination of BMPs, selected from the USFS Water Quality Management Handbook (R5 FSH 2509.22, Chapter 10, Amendment 2509.22-2011-1), that are necessary to meet or exceed the applicable soil quality objective(s) (i.e., maintain or enhance soil quality and function).

Mitigation Measure GEO-2: *Soils and Geotechnical Investigation*. Prior to issuance of a grading permit or use permit, a qualified California-licensed geotechnical engineer shall prepare and submit to the USFS a final geotechnical investigation that provides recommendations to address seismic safety, including determination of the appropriate IBC Seismic Performance Category for the site, and design requirements for foundations, retaining walls/shoring and excavation. The scope of the geotechnical report shall include the proposed plant site as well as the pipeline route and well sites. The geotechnical investigation shall identify and evaluate the presence of expansive, compressible or liquefiable soils and, if present, shall make recommendations for site preparation or design necessary to avoid or reduce adverse structural impacts. Structural foundations shall not be founded on engineered fill, nor on native soil, unless it is demonstrated that the soils would be adequate to support the foundation. A California-licensed geotechnical engineer shall be retained by ORNI 50, LLC to be present on the project site during excavation, grading, and general site preparation activities to monitor the implementation of the recommendations specified in the geotechnical investigation. When/if needed, the geotechnical engineer shall provide structure-specific geologic and geotechnical recommendations that shall be documented in a report approved by the permitting agency.

Mitigation Measure GEO-3: *Subsidence Monitoring and Mitigation*. The existing hydrologic monitoring program conducted by the USGS will be reviewed by the USGS and all LVHAC members to ensure adequate monitoring is conducted for the CD-IV project. Based on recommendations by the USGS and LVHAC members, the monitoring program will be expanded to include additional monitoring in the CD-IV Project area and any areas outside the project area that may be impacted by the expanded geothermal development. The monitoring plan will include subsidence and uplift tolerances for potential impacts to infrastructure and resources, and shall include an action plan (e.g., require discontinued or reduced pumping rates) in the event tolerances are exceeded. Additional monitoring may include but is not limited to: drilling additional monitoring wells, installation of new or updated monitoring equipment, monitoring additional thermal and non-thermal springs, monitoring of shallow groundwater wells, monitoring

of additional geothermal wells, geochemical analyses, fumarole monitoring, and use of current methods that can detect small-scale changes (for example utilizing InSAR data or high precision leveling methods).

Mitigation Measure GEO-4: *Surface Fault Rupture Hazard Investigation*. ORNI 50, LLC shall include in PDM GEO-7 a requirement to provide the USFS the results and findings of the surface fault rupture hazard investigation and demonstrate that such findings have been incorporated where necessary into the final layout and design of the proposed project. The Surface Fault Rupture Hazard Investigation shall conform to California Geological Survey *Note 49, Guidelines for Evaluating the Hazard of Surface Fault Rupture* (CGS, 2002) and shall be prepared and certified by a California-licensed geotechnical engineer**.**

4.8.10 Residual Impacts after Mitigation Incorporated

Following implementation of mitigation measures provided in Section 4.8.9, all adverse impacts on geology, soils and seismicity resulting from construction, operations and maintenance, and decommissioning of the CD-IV Project and Alternatives would be avoid or substantially reduced.

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4.9 Grazing, Wild Horses and Burros

4.9.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to permitted livestock grazing, wild horses and burros. Primary sources of information for this analysis included:

1. USFS issued livestock grazing permits for the area.
2. 2010 Geocommunicator (BLM)
3. 2006 BLM map for HAs and HMAs

4.9.1.1 Wild Horses and Burros

According to the 2010 Geocommunicator on the BLM website and the 2006 BLM map for HAs and HMA, California (south), there are no HAs, or HMAs located within or adjacent to the proposed Project or alternatives. The Proposed Action or Alternatives would have no impact on wild horses, or burros and therefore are not analyzed further.

4.9.1.2 Livestock Grazing

In order to assess the potential for the Proposed Action or Alternatives to affect permitted livestock grazing in the project area, this analysis evaluates whether livestock forage would be reduced and whether project components would impede or prevent livestock from accessing different foraging areas.

4.9.2 Project Design Measures

No PDMs pertaining to livestock grazing have been identified.

4.9.3 CEQA Significance Criteria

The following significance criteria potentially pertaining to livestock grazing activities were identified (criteria c and d would not apply) from the CEQA Guidelines Appendix G. A project would cause adverse impacts on agriculture if it would:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?

b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?

e) Involve other changes in the existing environment which due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?

4.9.4 Alternative 1: Proposed Action

The analysis of direct and indirect impact for the Proposed Action is organized according to the following project phases: construction; operation and maintenance; and decommissioning.

4.9.4.1 Direct and Indirect Impacts

Within the Hot Creek Allotment, the Proposed Action would result in direct impacts on grazing leases by permanently decreasing the amount of available grazing habitat by 6.5 acres from construction of the power plant, an additional 0.25 acre from construction of the substation, and 0.75 acre from construction of the transmission line. In the Sherwin/Deadman Allotment, the CD-IV Project would result in the loss of 1.4 acre of grazing lands through construction of new access roads.

The CD-IV Project would also result in direct impacts on livestock during construction and decommissioning activities by temporarily reducing the amount or quality of available forage, as 27.5 acres of habitat would be temporarily affected and unavailable during construction of the 9.2-miles of pipeline. If the construction period coincides with the grazing period, livestock could wander into construction areas; construction noise and traffic could make them more difficult to manage, resulting in “spooked” or lost livestock; and livestock could be injured or killed. Construction is anticipated to occur over a 3-month period as construction activities move in succession along the pipeline route. The annual permitted grazing season is from July 5 to September 30, although the Sherwin/Deadman permittee spends only a portion of that time in the project area as sheep are rotated throughout the allotment. It is likely that the time of construction and the time of grazing could be coordinated to avoid conflict. Grubbing or vegetation clearing activities would be limited to drilling areas, road under-crossings, and cable trenching but large-scale ground disturbance is not proposed during construction of the above-ground pipeline. This analysis assumes a 40-foot-wide corridor along the length of the pipeline would be temporarily affected by construction activities, with natural reclamation beginning immediately after construction and forage restored within a growing season. Based on that assumption, approximately 27.5 acres of lower-quality Jeffrey/Sagebrush/Bitterbrush forage would be temporarily affected within the Hot Creek and Sherwin/Deadman Allotments. It should be noted that the section of the Hot Creek Allotment that is within the Project area is rarely used by cattle. This temporary reduction in forage is a negligible percentage of the total suitable acreage within the allotments, which are reported to be 8,731 acres and 12,418 acres, respectively (BLM, 2005). The completed above-ground pipeline is not anticipated to reduce or eliminate grazing habitat because vegetation can re-establish beneath it and shadowing would not be substantial enough to prevent regrowth. Impacts from decommissioning would be similar to construction impacts except that no temporary loss of vegetation is anticipated during decommissioning.

Development of the well field with up to 16 total wells would result in the temporary removal of 2.5 acres of vegetation at each well site (up to 40 acres total) during construction. Following construction, vegetation would be restored on 2.1 acres at each site. Approximately 0.4 acres at each well would be fenced and remain devoid of vegetation for the life of the well. In summary, there would be 6.4 acres of vegetation removed long-term and 33.6 acres of short term disturbance.

Operation and maintenance activities include the potential to re-drill, work-over, or stimulate additional wells over the life of the CD-IV Project. These activities would be consistent with approved exploration activities and stipulations, which anticipate a total of 15 potential well sites. Ground disturbance associated with these well sites is negligible. The Proposed Action also has the potential to create or expand areas of thermal ground, which could adversely impact the quality or quantity of forage available. However, this is unlikely and is not anticipated to be an outcome of the CD-IV Project.

The above-ground pipeline would allow for approximately 12 to 18 inches of ground clearance beneath, but could present a barrier to livestock movement and/or management. Parallel pipelines, if spaced far enough apart could result in livestock becoming trapped between pipes. Road under-crossings would occur approximately every quarter-mile to provide sufficient crossing and escape opportunities (see Figure 4.4-2), however there would be some pipeline segments that do not offer quarter-mile undercrossings. Compliance with the mitigation measures described below in Section 4.9.9 Mitigation Measures would compensate for the permanent reduction in grazing area resulting from construction of new access roads, well fields, and the Casa Diablo power plant, and would avoid and minimize permanent impacts on grazing livestock resulting from Project operation and maintenance.

4.9.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.9.2.

The Project area does not contain Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, and is not zoned for agricultural use. The Farmland Mapping and Monitoring Program (FMMP) designates the project site as “Not Mapped”. The project area is also not under Williamson Act Contract, and therefore would not result in impacts based on the CEQA criteria.

4.9.5 Alternative 2: Plant Site Alternative

4.9.5.1 Direct and Indirect Impacts

Impacts would be similar under Alternative 2. Although the plant would be constructed at an alternative location, it is still located within the Hot Creek Allotment. Alternative 2 would result in a permanent loss of 7.3 acres of grazing land from construction of the plant, 0.25 acres from construction of the substation, and 5.61 acres from the construction of the transmission line. Alternative 2 would also result in the permanent loss of 1.4 acre of grazing land from construction of new access roads, the permanent loss of up to 6.4 acres of grazing land from construction of the well field, and the temporary loss of up to 33.6 acres of grazing land from construction of the well field. Total pipeline mileage would be 9.3 miles (26.9 acres of temporary disturbance) versus 9.2 miles under the Proposed Action (27.5 acres of temporary disturbance).

4.9.5.2 CEQA Significance Determination

CEQA significance determination would be the same as described above for the Proposed Action. As described above under 4.9.4.2 CEQA Significance Determination, Alternative 2 would not result in impacts based on the CEQA criteria.

4.9.6 Alternative 3: Modified Pipeline Alternative

4.9.6.1 Direct and Indirect Impacts

Total impacts would be similar under Alternative 3, although the pipeline would be modified east of U.S. Highway 395. The total pipeline length would be 9.1 miles (26.3 acres of temporary disturbance) versus 9.2 miles under the Proposed Action (27.5 acres of temporary disturbance). Like the Proposed Action, Alternative 3 would result in permanent losses of 6.5 acres of grazing land from construction of the plant, 0.25 acres from construction of the substation, and 0.75 acres from the construction of the transmission line. Alternative 2 would also result in the permanent loss of 1.4 acres of grazing land from construction of new access roads, up to 6.4 acres of grazing land from construction of the well field, and the temporary loss of up to 33.6 acres of grazing land from construction of the well field.

4.9.6.2 CEQA Significance Determination

CEQA significance determination would be the same as described above for the Proposed Action. As described above under 4.9.4.2 CEQA Significance Determination, Alternative 3 would not result in impacts based on the CEQA criteria.

4.9.7 Alternative 4: No Action

4.9.7.1 Direct and Indirect Impacts

Under Alternative 4, no plant, above-ground pipeline, or new access roads would be constructed. No impacts to grazing allotments would occur from the construction of a power plant and pipelines, and grazing allotments would not be subject to a temporary loss of 61.1 acres of grazing land or a permanent loss of 15.3 acres of grazing land.

However, not part of the CD-IV project, up to 11 exploration wells could be constructed, which were approved previously and analyzed in previous NEPA and CEQA documents. For comparison purposes, construction footprint and methods would be similar to under the Proposed Action resulting in the clearing of approximately 2.5 acres of vegetation during construction of each well. The long-term disturbance area would be less than the 0.4 acres similar to that described under the Proposed Action, but an exact acreage would depend on whether the well would be used for monitoring, testing, or other uses.

4.9.7.2 CEQA Significance Determination

CEQA significance determination would be the same as described above for the Proposed Action.

Alternative 4 would not result in impacts because no construction would occur.

4.9.8 Cumulative Impacts

4.9.8.1 Geographic Extent/Context

The Sherwin/Deadman Grazing Allotment occurs west of U.S. Highway 395, encompasses the Project area, and contains 12,418 acres of suitable grazing habitat. The Hot Creek Grazing Allotment occurs east of U.S. Highway 395, encompasses the Project area, and contains 8,731 acres of suitable grazing habitat.

4.9.8.2 Existing Cumulative Conditions

The Project vicinity can be characterized as a remote, rugged area with little development. The proposed Project would not make a considerable contribution to cumulative effects on grazing allotments in the vicinity. As a whole, the CD-IV Project would temporarily impact 61.1 acres and permanently impact 15.3 acres. Within the Sherwin/Deadman Grazing Allotment, temporary and permanent impacts would occur to suitable grazing land, affecting less than 0.001 percent of the total in each case. Within the Hot Creek Grazing Allotment, temporary and permanent impacts would occur to suitable grazing land, also affecting less than 0.001 percent of the total in each case.

4.9.8.3 Reasonably Foreseeable Projects

Several projects overlap the Project area, including a power plant replacement on 7.5 acres and construction of a new 583-mile fiber network adjacent to U.S. Highway 395. In the Project vicinity, a new airport terminal and parking spaces will be constructed at Mammoth Airport Terminal. Other projects are small-scale endeavors in developed areas, including street improvements, city park improvements, bicycle and pedestrian trails, rest-area improvements, and similar projects. None of these projects are likely to impact grazing leases in a significant way, because they are either small in scale, located within developed areas, or replacing existing structures.

4.9.9 Mitigation Measures

Mitigation Measure GRZ-1: To facilitate livestock management, upon submission of the Facility Utilization Permit, the USFS Authorized Officer would review the affected grazing allotments and recommend appropriate locations for additional under-crossings, if any, in any continuous segment of above-ground pipeline extending one-half mile or longer.

Mitigation Measure GRZ-2: The USFS may seek reimbursement from the geothermal lessee for the permanent loss of 15.3 acres of grazing habitat and for the costs of implementing the livestock escape management plan if it is demonstrated that the lessee's Project operations directly result in stray livestock. The USFS Authorized Officer would coordinate with the Term Grazing Permittee to mitigate the loss.

4.9.10 Residual Impacts after Mitigation Incorporated

No significant impacts to grazing leases would occur if the permittee complies with Mitigation Measures GRZ Measures 1 and 2. Residual impacts before mitigation is incorporated include the permanent loss of 6.5 acres of grazing habitat resulting from plant construction and 1.4 acre of grazing habitat resulting from construction of new access roads. However, if the USFS seeks reimbursement from the geothermal lessee for loss of grazing habitat, it is assumed that the reimbursement will adequately compensate for permanent losses and no residual impact would occur. Residual impacts before mitigation is incorporated also include the potential for above-ground pipelines to restrict livestock movement and/or frustrate their management. If the USFS Authorized Officer does not make recommendations for additional under-crossings, or if the recommendations are inadequate, or if the geothermal lessee is not able to incorporate the recommendations into Project design, there could be residual impacts related to livestock movement and management.

4.10 Land Use

4.10.1 Methodology for Analysis

The analysis of land use impacts for the CD-IV Project and Alternatives addresses issues of consistency with adopted land use or habitat conservation plans and policies and the potential creation of new physical barriers within the existing Mammoth Lakes and Mono County communities. The analysis related to a physical disruption of an existing community is based on an assessment of the existing land uses, characteristics in the surrounding area, and the extent to which the Project would introduce new land uses or alter existing land uses. Impacts to recreation-related land uses are addressed in Section 4.14, *Recreation.*

4.10.1.1 Consistency with Land Use Plans, Policies and Regulations

Evaluation of potential land use impacts of the CD-IV Project and Alternatives is based on review of the plans, policies and guidelines that would apply to the Project identified in Section 3.10, including BLM and USFS standards, policies, and guidelines, as well as local plans for Mono County and the Town of Mammoth Lakes.

Impact assessment is based on known impacts relative to construction, operation and maintenance, and decommissioning of the proposed pipeline and power plant. Potential land use conflicts are identified and evaluated based on existing land uses, land uses proposed as part of the CD-IV Project and Alternatives, BLM land use-related standards and policies, federal land use designations established in the LRMP (USFS, 1988), a consistency analysis of the CD-IV Project with existing land use and zoning as defined by the Mono County General Plan and Zoning Ordinance (Mono County, 2010a and 2010b), respectively, and a consistency analysis with the Town of Mammoth Lakes General Plan and Zoning Map (Mammoth Lakes, 2007 and 2010). Land use compatibility is based on the intensity and patterns of land use to determine whether the CD-IV Project would result in incompatible uses or nuisances.

4.10.2 Project Design Measures

The analysis assumes that the following PDMs related to land use are fully implemented:

1. *LU-1*: All geothermal pipelines potentially visible in scenic highway corridors or important visual areas will be obscured from view to the extent reasonably feasible by fences, natural terrain, vegetation, or constructed berms (consistent with Mono County Conservation/Open Space Element, Goal I, Objective D, Action 1.18).

2. *LU-2*: Geothermal exploration and development projects will be carried out with the fewest visual intrusions reasonably possible (consistent with Mono County Conservation/Open Space Element, Goal I, Objective F).

3. *LU-3*: Prior to operation of the Project, Ormat will prepare a Site Abandonment-Reclamation Plan in conformance with BLM and USFS requirements. When Project operations are complete, Ormat will restore the site to approximate pre-Project land uses according to the plan requirements.

4.10.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to land use and planning if it would:

a) Physically divide an established community;

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or

c) Conflict with any applicable habitat conservation plan or natural community conservation plan.

Regarding criterion c), the CD-IV Project would not be located within the boundaries of an existing habitat conservation plan (HCP) or natural community conservation plan (NCCP); therefore, this criterion is not discussed in this section.

4.10.4 Alternative 1: Proposed Action

4.10.4.1 Direct and Indirect Impacts

Consistency with Land Use Plans, Policies, and Regulations

The following provides consistency determinations for land use plans, policies, and regulations that would be applicable to the CD-IV Project during construction, operation and maintenance, and decommissioning.

Geothermal Steam Act

Under the terms of the Geothermal Steam Act of 1970, the BLM is the federal agency delegated for management of geothermal operations on federal lands leased for geothermal resource development. Discussion of this act as it pertains to the Proposed Action is included in Section 1.6.1, Federal Policy Consistency and Land Use Plan Conformance.

BLM Bishop Field Office Resource Management Plan

The Proposed Action is consistent with the BLM Bishop Field Office RMP which directs management to provide for geothermal exploration and development.

USFS, Inyo National Forest LRMP

The Proposed Action would be consistent with the LRMP as it would not conflict with the management directions regarding applicable resource areas, such as geology, recreation, riparian areas, visual resources, and wildlife. As discussed in Section 4.18, *Visual Resources*, there are mapped VQOs in the CD-IV Project area. In addition, portions of leases CACA-14407 and CACA-14408 are designated as “No Surface Occupancy” areas to protect critical visual zones along U.S. Highway 395, SR 203, and Sawmill Cutoff Road (NFSR 03S08). Implementation of

PDMs VIS-1 through VIS-4, LU-1, and LU-2, would generally reduce the visibility of pipelines in scenic areas. Implementation of **Mitigation Measures VIS-1: Landscape Plan**, **VIS-2: Underground Pipeline Crossovers**, and **VIS-4: Power Plant Landscape Plan** (see Section 4.18.9 below) would further reduce the visual effects of the CD-IV Project. However, even with implementation of these measures the CD-IV Project would remain inconsistent in some areas with VQOs designated as "retention."

Mono County General Plan

The CD-IV Project would be located primarily on National Forest System land designated by the Mono County General Plan as *Resource Management-Inyo National Forest Land & Resource Management Plan* (*RM-INF*). This designation is intended to "recognize and maintain a wide variety of values in the lands outside existing communities…including geothermal or mineral resources." The *RM-INF* designation recognizes the planning authority of the USFS over the publically owned land, and that the land is subject to the LRMP. USFS concurrence with BLM's approval of the CD-IV Project and any Conditions of Approval required by the USFS, as described above, would ensure consistency with the LRMP.

The only portion of the CD-IV Project and Alternatives that would be on private land would be proposed pipelines going across land leased by ORNI 50, LLC or owned by LADWP. Private land in the Project area is designated as *Resource Management* (*RM)* [ORNI 50, LLC]. Activities proposed on the private lands are subject to the approval of a use permit by Mono County through the Mono County Energy Management Department and the Mono County Planning Commission. Neither the power plant site nor any wells are proposed on private lands. Approvals by the County for the CD-IV Project would include the following (MPLP, 2010):

1. Use Permit (from Energy Management)
2. Building permits (from the Building Division)
3. Grading Permit (from Public Works)

Mono County General Plan policies which would be applicable to portions of the CD-IV Project located on private lands are listed in Section 3.10. Relevant policies from the Land Use Element describe enhancing and maintaining the environmental and economic integrity of the County; avoidance of incompatible land uses; minimization of visual and cultural resources impacts; and maintaining recreational areas. The CD-IV Project would contribute to economic growth in the County and reduce environmental impacts through implementation of mitigation measures and PDMs included in Section 4.6, *Cultural and Paleontological Resources*; Section 4.14, *Recreation*; and Section 4.18, *Visual Resources*.

The Conservation/Open Space Element includes specific policies regarding geothermal development. Relevant policies describe the need to protect hydrologic resources and water quality; minimization or prevention of adverse effects on deer population and migration; adherence to air quality standards and regulations; and minimization of noise associated with geothermal development. Implementation of mitigation measures and PDMs listed in Section 4.2, *Air Resources*; Section 4.3, *Biological Resources-Wildlife*; Section 4.7, *Geothermal Resources*; and Section 4.11, *Noise and Vibration* would ensure consistency of the Project with the Mono County General Plan.

In addition, as stated in Section 3.10, the Mono County General Plan planning and land use maps supersede county zoning maps.

Town of Mammoth Lakes General Plan

A portion of the well pipeline constructed under the CD-IV Project and Alternatives would be located within the Mammoth Lakes Municipal Boundary, on land designated as *National Forest (NF)*. National Forest Land is not subject to the land use jurisdiction of the Town of Mammoth Lakes. As such, the CD-IV Project would be consistent with the Town of Mammoth Lakes General Plan.

4.10.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (construction, operation and maintenance, decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.10.3.

a) Physically divide an established community.

Construction

The CD-IV Project is located in a relatively rural and forested area in unincorporated Mono County on National Forest System land administered by the USFS as part of the Inyo National Forest. The nearest established community to the proposed power plant site is the Town of Mammoth Lakes. The Municipal Boundary of Mammoth Lakes is approximately 2 miles west of the proposed power plant. The project could change access to the project area through the construction of the project (power plant, pipelines, and above-ground transmission line) and would result in temporary and permanent road closures and the construction of new roads for various project components.

The power plant would be constructed on land that is currently vacant forest land within Inyo National Forest. Construction of the power plant would require the permanent closure of a portion of one road, NFSR 03S129E. The road would dead end at the CD-IV power plant fence and reopen on the other side. This portion beyond the plant would continue to be accessible by Antelope Springs Road (03S05) or Substation Road. If entrance to the power plant is provided through the substation, the portion NFSR 03S129E between the power plant and substation would also be permanently closed.

Construction of the pipelines would also result in temporary closures and restrictions on other NFSRs (see Table 2-3 and Figure 2-8). The proposed main well pipeline and injection pipeline would be located mostly parallel to or along the same corridor as the existing pipeline in Basalt Canyon. The pipeline would be constructed near ground level (averaging 12 to 18 inches above the ground surface); however, to allow continued public access on roads that the pipeline must cross, the pipeline would be constructed to cross under existing roads. The proposed pipeline would also be constructed underground at the same location as the existing pipeline where it crosses U.S. Highway 395.

Pipeline crossings of NFSRs would be constructed by the cut-and-fill method whereby a trench up to ten feet deep would be cut through the road. This construction technique would minimize the time period during which public access along the road would be excluded. For the single-lane dirt roads most common in the area, public access would usually be restricted for only a couple of hours during actual construction. For roads of two or more lanes, cut-and-fill construction would usually be conducted in steps so that only one lane (or one lane in each direction) is blocked at a time, and public access would not be prevented.

In addition to construction of the power plant and pipelines, an above-ground transmission line up to 1,000 feet long and supported by 3 to 6 poles would connect the power plant with the existing SCE Casa Diablo Substation. Construction of the transmission line may temporarily restrict access on roads located between the power plant and the SCE substation.

With the exception of permanent closure of a small portion of NFSR 03S129E and small sections or rerouted road, construction impacts would be temporary. Even with permanent closure of a portion of NFSR 03S129E, construction of the CD-IV Project would not result in the division of an established community. The impact would be less than significant.

Operation and Maintenance

A segment of NFSR 03S129E would be closed adjacent to the proposed power plant as a result of the Proposed Action. NFSR 03S129E would dead end at the power plant fence and reopen on the other side, which would be accessible by Antelope Springs Road (03S05) or Substation Road. Alternate routes would provide access to areas of Inyo National Forest typically accessed by this segment of NFSR 03S129E. The construction of some wells would require some existing NFSRs to be permanently modified; however, the relocation would be minor and would not impact access to the area. Pipelines would cross under existing roads and therefore not impact access past construction. Similarly, operation of the above-ground transmission line would not restrict movement on existing roads in the long-term. Overall, modifications to the existing road network would not result in the division of an established community so the impact would be less than significant.

Decommissioning

Decommissioning activities would cause temporary USFS road closures similar to those described above under Construction. These closures would be temporary and would not result in the division of an established community; the impact would be less than significant.

b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.

As discussed above in Section 4.10.4, the CD-IV Project would not conflict with any land use plan, policy, or regulation applicable to the CD-IV Project, including the BLM Geothermal Steam Act, BLM Bishop Field Office RMP, LRMP, Mono County General Plan, Mono County Zoning Ordinance, and Town of Mammoth Lakes General Plan. Furthermore, the CD-IV Project would

not result in substantial changes in the pattern, scale, or character of use in the Project area. The area is already developed with geothermal energy, so the CD-IV Project would not conflict with current land uses and would not interfere with the existing geothermal uses. Therefore, the CD-IV Project would not conflict with an applicable land use plan, policy, or regulation and the impact would be less than significant.

4.10.5 Alternative 2: Plant Site Alternative

4.10.5.1 Direct and Indirect Impacts

Consistency with Land Use Plans, Policies, and Regulations

The same land use plans, policies, and regulations applicable to the Project would be applicable to Alternative 2. Like the CD-IV Project, Alternative 2 would be consistent with the BLM Geothermal Steam Act, LRMP, Mono County Zoning Ordinance, and Town of Mammoth Lakes General Plan. A portion of the above-ground transmission line would cross private land in Mono County. Construction of the above-ground line on the private land would be inconsistent with the Land Development Regulations found in the Land Use Element of the Mono County General Plan. Specifically, Section 11.010 (D) requires that utility lines be installed underground.

4.10.5.2 CEQA Significance Determination

Construction, operation and maintenance activities associated with Alternative 2 would be similar to or the same as the CD-IV Project. Although this Alternative would not require closure of NFSR 03S129E, construction and operation of the power plant would result in the closure of the western portion of NFSR 28E207. The eastern portion of NFSR 03S130 would be rerouted around the power plant to maintain through access. The above-ground transmission line connecting the power plant with the existing SCE Casa Diablo Substation would be substantially longer than proposed under the CD-IV Project. However, there are few roads in the path of the proposed transmission line route; therefore, temporary construction restrictions on roads would be similar to the CD-IV Project. Construction of the above-ground transmission line on private land in Mono County would be consistent with the General Plan upon approval of a variance by the County to construct such a line. Alternative 2 would not physically divide any established communities and would be consistent with local land use plans, policies and regulations. Consequently, CEQA significance determinations would be the same as described above for the CD-IV Project: less than significant.

4.10.6 Alternative 3: Modified Pipeline Alternative

4.10.6.1 Direct and Indirect Impacts

Consistency with Land Use Plans, Policies, and Regulations

The same land use plans, policies, and regulations applicable to the CD-IV Project would be applicable to Alternative 3. Like the CD-IV Project, Alternative 3 would be consistent with the

BLM Geothermal Steam Act, LRMP, Mono County General Plan, Mono County Zoning Ordinance, and Town of Mammoth Lakes General Plan.

4.10.6.2 CEQA Significance Determination

Construction, operation and maintenance activities associated with Alternative 3 would be similar to or the same as the CD-IV Project. Alternative 3 would not physically divide any established communities and would be consistent with local land use plans, policies and regulations. Consequently, CEQA significance determinations would be the same as described above for the CD-IV Project: less than significant.

4.10.7 Alternative 4: No Action

4.10.7.1 Direct and Indirect Impacts

The No Action Alternative would result in no impacts to land use at the Project site because the proposed power plant and pipeline would not be constructed and the existing uses would not change.

4.10.7.2 CEQA Significance Determination

Compared to the CD-IV Project, this Alternative would result in reduced impacts as no roads would be blocked or temporarily closed; they would remain available for use. Implementation of this Alternative would result in no impact.

4.10.8 Cumulative Impacts

4.10.8.1 Geographic Extent/Context

The geographic scope of the cumulative effects analysis for land use includes the northeastern portion of the Mammoth Lakes region of Inyo National Forest, the Town of Mammoth Lakes, and portions of Mono County in the vicinity of the CD-IV Project. This geographic scope was established based on the boundaries of the land use planning entities with jurisdiction over the CD-IV Project.

4.10.8.2 Existing Cumulative Conditions

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect effects of the construction, operation and maintenance, and closure and decommissioning of the CD-IV Project are analyzed above. The project area consists of relatively rural and forested land, administered primarily by the USFS as part of the Inyo National Forest in unincorporated Mono County. Existing geothermal power plants, pipelines, and ancillary facilities are located in the project area (collectively referred to as the Casa Diablo Geothermal Complex).

4.10.8.3 Reasonably Foreseeable Projects

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to the cumulative conditions regarding land use in the cumulative analysis area. Table 4.1-1, in Section 4.1.5, *Cumulative Scenario Approach*, lists cumulative projects in the vicinity of the project site and surrounding area that were used to develop this analysis of cumulative effects. Among this list, applications for geothermal projects that could be developed in the vicinity of the CD-IV Project include the MP-I Replacement Project, which could be developed approximately 0.25 mile southeast of the proposed power plant. This project would continue to utilize the existing geothermal resource in Basalt Canyon and use the existing pipeline that connects to the current MP-I power plant. The Digital 395 project would also occur in the project area. The proposed cable would be installed in Sawmill Cutoff Road (NFSR 03S08). Construction activities would need to be coordinated if the proposed Project and Digital 395 were to take place at the same time.

4.10.8.4 Construction, Operation and Maintenance, and Decommissioning

Cumulative impacts related to land use could occur during the projected 30-year lifespan of the CD-IV Project if future projects were constrained by the placement of Project-related facilities. The CD-IV Project would not constrain lands for reasonably foreseeable projects that would make them infeasible or that would result in adverse impacts to land use. Therefore, it could not contribute to cumulative effects related to these land use and planning issues.

4.10.8.5 CEQA Significance Determinations

The CD-IV Project would have less than significant impacts with respect to the physical division of an established community, conflict with an applicable land use plan or policy, or conflict with a habitat conservation plan or natural community conservation plan. The CD-IV Project would not contribute to cumulative impacts regarding land use.

4.10.9 Mitigation Measures

No mitigation measures are required to reduce impacts related to land use planning.

4.10.10 Residual Impacts after Mitigation Incorporated

Because no mitigation measures are recommended, impacts to land use would be the same as discussed in Section 4.10.4, *Alternative 1: Proposed Project*.

4.11 Noise and Vibration

This section describes the conditions related to noise that would occur during construction, operation, maintenance, and decommissioning of the CD-IV Project and Alternatives. The methods for analysis and the CEQA significance criteria are followed by direct and indirect impact discussions and CEQA significance conclusions for the CD-IV Project and Alternatives. Cumulative impacts and mitigation measures to reduce any cumulative impacts also are identified.

4.11.1 Methodology for Analysis

This analysis evaluates potential noise impacts of the CD-IV Project and Alternatives based on review of nearby noise receptors, ambient noise levels, and projected noise levels that would be associated with construction, operation, maintenance, and decommissioning of the CD-IV Project and alternatives. Impact discussions are based, in part, on measured representative noise levels as presented in the noise report prepared by the ORNI 50, LLC (Ormat, 2011). The following methods were used to evaluate impacts.

4.11.1.1 Short-term Construction and Decommissioning Noise Impacts

Modeled short-term construction noise levels were estimated for the main components of the proposed CD-IV Project, including well site clearing, well drilling, pipeline construction, and power plant construction. CD-IV Project-related construction noise is compared to Mono County and Town of Mammoth Lakes construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime, respectively. In addition, the Federal Transit Administration (FTA) has identified daytime and nighttime 8-hour L_{eq} levels of 80 dBA and 70 dBA, respectively, as noise levels where adverse community reaction to short-term construction noise could occur (FTA, 2006). Therefore, noise levels at nearby receptor locations that would be associated with short-term construction and decommissioning activities are also compared to the daytime and nighttime 8-hour L_{eq} levels.

4.11.1.2 Long-term Operation and Maintenance Noise Impacts

Long-term operation and maintenance noise levels were estimated for the proposed well pumps and the power plant. The USEPA-recommended residential noise guideline is an L_{dn} of 55 dBA. This level is not a regulatory goal but is “intentionally conservative to protect the most sensitive portion of the American population” with “an additional margin of safety” (USEPA, 1974). Long-term CD-IV Project-related operation and maintenance noise is also compared to the Mono County and Town of Mammoth Lakes exterior noise standards for rural suburban residences of 40 dBA L_{eq} during nighttime hours (i.e., 10:00 p.m. to 7:00 a.m.) and 50 dBA L_{eq} during daytime hours (i.e., 7:00 a.m. to 10:00 p.m.) at a residential property. This analysis also identifies whether L_{dn} noise level increases associated with long-term operation and maintenance activities would exceed 3 dBA at sensitive receptor locations.

Vibration Impacts

A PPV threshold identified by Caltrans is used in this analysis to determine the level of vibration impacts related to adverse human reaction and risk of architectural damage to normal buildings.[1] The PPV threshold is 0.20 inches per second (in/sec) (Caltrans, 2004). This PPV level has been found to be annoying to people in buildings and can pose a risk of architectural damage to buildings.

4.11.2 Project Design Measures

The analysis assumes that the following PDMs related to noise are fully implemented:

1. *NOI-1*: Mufflers will be used on all drilling rig engines.

2. *NOI-2*: Construction noise will be minimized through operational practices which avoid or minimize those practices which may typically generate greater noise levels, or generate distinctive impact noise.

3. *NOI-3*: Prior to commencing any construction activity associated with the Project, Ormat will submit, and secure the approval of the USFS, a program designed to adequately respond to noise complaints. As part of the program, Ormat will publish a telephone number for use by individuals for the lodging of complaints or inquiries regarding the level of noise from construction operations. A designated representative of the permittee will be available 24 hours a day to record any lodged complaints or inquiries, and Ormat will make reasonable efforts to investigate and respond to any such complaint or inquiry within 24 hours of the complaint or inquiry. Ormat will record each lodged complaint or inquiry, and the results of its investigation and response, on a form, a copy of which will be delivered to the BLM and USFS staff designated to receive these forms within 24 hours of the complaint or inquiry.

4.11.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse noise impacts if it would result in:

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

b) Exposure of persons to or generation of, excessive ground borne vibration or ground borne noise levels;

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the Project;

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;

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[1] Architectural damage could be structural damage, such as cracking of floor slabs, foundations, columns, beams, or wells, or cosmetic architectural damage, such as cracked plaster, stucco, or tile (Caltrans, 2004).

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the Project area to excessive noise levels; or

f) For a project within the vicinity of a private airstrip, exposure of people residing or working in the Project area to excessive noise levels.

The thresholds for determining the CEQA significance of impacts in this analysis are based on the environmental checklist in Appendix G of the CEQA Guidelines, on guidance provided by the Mono County General Plan and County Code and the Town of Mammoth Lakes Municipal Code, and on a comparison of estimated CD-IV Project-related noise levels relative to ambient conditions. For the purposes of this analysis, the CEQA significance thresholds used to assess criteria a) through d) are the same as those identified in the methods used to evaluate impacts described in Section 4.11.1.

4.11.4 Alternative 1: Proposed Action

4.11.4.1 Direct and Indirect Impacts

Construction Noise

Construction of the proposed power plant is expected to be completed over a period of approximately 16 months. Construction of the power plant would be concurrent with construction of the proposed well pads and pipeline installations. The well pads would require approximately 12 months to complete, but would be phased during two summer seasons. Construction of the geothermal, injection, and pipelines would require approximately six months (one summer season). Below are descriptions of the anticipated construction noise levels that would occur associated with power plant construction activities, well drilling and pipeline construction, and off-site worker and truck delivery trips.

Power Plant Construction

Construction of the proposed CD-IV power plant would occur over a period of approximately 16 months and would involve the short-term use of heavy equipment such as backhoes, cranes, loaders, dozers, graders, excavators, compressors, and generators. Based on the types of construction equipment that would be required to construct the power plant and typical noise levels from representative pieces of construction equipment as identified by the FTA (FTA, 2006), it is anticipated that power plant construction activities would result in average noise levels of up to 85 dBA at 50 feet (see Table 4.11-1 below).

Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces, the distances of the closest receptors to the CD-IV power plant site, and the construction equipment representative noise level, noise levels that would be associated with power plant construction at the nearest noise receptor locations have been estimated and are presented in Table 4.11-2. As described in the table, the noise level from power plant construction would be 30 dBA or less at the nearby noise receptor locations, which would not likely be audible.

TABLE 4.11-1
TYPICAL MAXIMUM NOISE LEVELS FROM CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)
Backhoe	80
Flatbed Truck	88
Air Compressor	81
Dozer	85
Air Compressor	85
Grader	85
Front End Loader	85
Water Trucks	88
Cranes	83
Concrete Trucks	88

SOURCE: FTA, 2006.

TABLE 4.11-2
ESTIMATED CD-IV POWER PLANT CONSTRUCTION NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Closest Source	Power Plant Construction L_{eq} (dBA)
Residence at Chance Ranch	1.5 miles	30
Sherwin Creek Campground	1.6 miles	29
John Muir Wilderness Area	2.5 miles	25

NOTES: Estimated noise levels are based on representative noise levels obtained from FTA, 2006. It should be noted that the noise levels identified in the table are considered to be conservative because they do not account for the forest surrounding the CD-IV power plant site, which would provide additional sound attenuation that would decrease the estimated noise levels at the noise receptor locations.

Because CD-IV power plant construction activities would not occur within 500 feet of residential or commercial occupancies, the proposed activities would not be subject to Mono County workday hour limits. In addition, daytime and nighttime construction noise levels would not exceed the county construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime, respectively. Also, short-term power plant construction noise would result in noise levels at the nearest receptor locations that would be substantially less than the FTA's daytime threshold for community annoyance of 80 dBA.

Well Drilling and Pipeline Construction

On-site well drilling and pipeline construction activities would introduce temporary noise sources to the CD-IV Project area that would result in noise levels above the ambient noise levels in the immediate vicinity of the well sites and pipeline routes. The principal noise sources would be heavy-duty construction equipment, such as excavators, loaders, graders, backhoes, etc., that would be required to clear the well sites and construct the pipeline, and the drill rig and associated

support equipment. Well site clearing and pipeline construction activities would be conducted during daylight hours; however, well drilling activities would occur 24 hours per day, 7 days a week for approximately 30 days at each well site. Pipeline construction activities would proceed in a linear fashion and would not be expected to occur at any one location for longer than a combined total of 5 days, with the exception of the U.S. Highway 395 crossing, which would likely require up to several weeks to complete.

Noise level exposures would fluctuate, depending on the construction activity, equipment type, and distance between noise sources and receptors. Based on the types of construction equipment that would be required for well site clearing and pipeline construction activities and typical noise levels from representative pieces of construction equipment as identified by the FTA (FTA, 2006), it is anticipated that well site clearing and pipeline construction activities would result in average noise levels of up to 85 dBA at 50 feet (see Table 4.11-1). To estimate drill rig noise levels at nearby receptor locations, this analysis uses measured drill rig noise levels as representative drill rig noise level that would be associated with the CD-IV Project. ORNI 50, LLC measured drilling noise at a geothermal well in rural Mineral County, Nevada on October 21, 2010 (Appendix E). The drill site was near the bottom of a flat, wide valley, with high desert brush; the weather was cloudy with little to no wind, and there were no background noise sources noted other than the drilling rig (Ormat, 2011). Noise measurements were collected at seven locations, ranging from approximately 50 feet to 0.5 mile from the drill rig. The average noise level calculated from the seven measurements was approximately 61 dBA at 400 feet from the drill rig (Ormat, 2011).

Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces (see Section 3.11.1.1), the distances of the noise receptors to the closest well sites, and the representative noise levels discussed above, noise levels that would be associated with well site clearing and drilling at the nearest noise receptor locations have been estimated and are presented in Table 4.11-3. Because the closest parts of the proposed pipelines to the noise receptor locations coincide with the approximate locations of the well sites, the estimated well site clearing and pipeline construction noise levels are expected to be equivalent.

TABLE 4.11-3
ESTIMATED CD-IV WELL SITE CLEARING, PIPELINE CONSTRUCTION, AND DRILLING NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Closest Well Site (Well #)	Clearing and Pipeline Construction L_{eq} (dBA)	Drilling L_{eq} (dBA)
Mammoth Elementary School	4,800 feet (38-25)	36	34
Residences along Trails End Road	4,200 feet (38-25)	37	35
Shady Rest Park	160 feet (38-25)	72	71
Shady Rest Campground	2,600 feet (38-25)	42	41
Sherwin Creek Campground	4,800 feet (55-61)	36	34

NOTES: Estimated noise levels are based on representative noise levels obtained from Ormat, 2011, and FTA, 2006. It should be noted that the noise levels identified in the table are considered to be conservative because they do not account for the forest surrounding the CD-IV Project well sites, which would provide additional sound attenuation that would decrease the estimated noise levels at the noise receptor locations.

As described in Table 4.11-3, well site clearing and pipeline construction activities would result in slightly higher noise levels compared to drilling activities. However, well site clearing and pipeline construction would occur only during daylight hours, whereas the well drilling activities would occur continuously for approximately 30 days at each of the well sites. It is possible that well drilling may occur in close proximity to pipeline construction. In those instances, the average noise levels experienced at local sensitive receptors would be approximately 2 to 3 dBA higher than the site clearing and pipeline construction noise levels identified in Table 4.11-3.

The average estimated ambient daytime and nighttime noise levels at noise receptors in the area range between 40 dBA and 50 dBA, and between 30 dBA and 40 dBA, respectively. These noise levels equal an L_{dn} range of 40 dBA to 50 dBA. Noise levels from daytime construction activities at Well Site 38-25 would easily be audible at Shady Rest Park. However, the noise levels would not be expected to be intrusive, considering the typically noisy nature of activities supported by the park. Daytime construction activities may also be audible at the Shady Rest Campgrounds, but at much lower levels. Given the estimated low ambient noise levels at the receptor locations, nighttime well drilling activities may be audible at each of the receptors identified in Table 4.11-3. It should also be noted that the noise levels in Table 4.11-3 would occur only for the closest well site; construction activities and drilling at more distant well sites would result in lower noise levels at those sensitive receptors.

Because proposed pipeline and well site construction activities would not occur within 500 feet of residential or commercial occupancies, the proposed activities would not be subject to Mono County workday hour limits. In addition, daytime and nighttime construction noise levels would not exceed the Mono County and Town of Mammoth Lakes construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime, respectively. Also, short-term noise would result in noise levels at the nearest sensitive receptor locations that would be substantially less than the FTA's daytime and nighttime adverse community reaction thresholds of 80 dBA and 70 dBA L_{eq}, respectively.

Off-Site Vehicle Travel

In addition to on-site construction equipment noise levels, off-site traffic associated with CD-IV Project construction activities would contribute to overall environmental noise levels. As described in Section 4.16, Traffic, *Transportation, and Circulation*, construction-related traffic would be expected to result in a total of up to 654 daily trips. Based on the estimated amount of traffic that would be generated by the CD-IV Project, the estimated daily vehicle trips associated with concurrent construction activities would represent an 8 and 14 percent increase in daily traffic volumes on SR 203 and U.S. Highway 395, respectively. This increase in traffic volumes would be expected to increase average ambient noise levels along SR 203 and U.S. Highway 395 by less than 1 dBA L_{dn}, which would not be a perceivable increase in noise.

Construction Vibration

Temporary sources of groundborne vibration and noise during construction would result from operation of conventional heavy construction equipment such as graders, bulldozers, and loaded

haul trucks. These pieces of equipment can generate vibration levels of up to 0.09 in/sec at a distance of 25 feet (Caltrans, 2004). However, vibration levels attenuate rapidly from the source. At a distance of 160 feet, which is the approximate distance between the closest receptor and any of the CD-IV Project components involving active heavy construction equipment, vibration would not be perceivable. Groundborne noise is the rumbling sound of structure surfaces caused by high vibration levels. Because CD-IV Project construction would not result in exposure of persons to or generation of excessive groundborne vibration, it also would not expose them to or generate excessive groundborne noise levels.

Operation and Maintenance Noise

Below are descriptions of the estimated long-term operation and maintenance noise levels that would be associated with the CD-IV Project.

Power Plant

The principal noise sources that would be associated with the CD-IV power plant would be turbine operations and the fans in the air condensers. For a representative power plant noise level, ORNI 50, LLC measured existing noise levels at various distances from the Galena-3 geothermal power plant located near Reno, Nevada (Ormat, 2011). The Galena-3 plant is relatively new with similar technology and equipment as proposed for the CD-IV power plant. Average measured and calculated noise levels at Galena-3 were 71.5 dBA at 150 feet, 64.5 dBA at 400 feet, 54 dBA at 0.25 mile (1,320 feet), and 48 dBA at 0.50 mile (2,640 feet) from the center of the plant. These levels can be considered representative of the proposed CD-IV power plant. Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces, the distances of the closest noise receptors to the CD-IV power plant site, and the representative noise level at 0.50 mile, L_{eq} and L_{dn} noise levels that would be associated with the proposed power plant at the nearest noise receptor locations have been estimated and are presented in Table 4.11-4.

TABLE 4.11-4
ESTIMATED CD-IV POWER PLANT NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Power Plant Site	Power Plant L_{eq} (dBA)	Power Plant L_{dn} (dBA)
Residence at Chance Ranch	1.5 miles	36	42
Sherwin Creek Campground	1.6 miles	35	41
John Muir Wilderness Area	2.5 miles	31	37

NOTES: Estimated noise levels are based on representative noise levels obtained from Ormat, 2011. It should be noted that the noise levels identified in the table are considered to be conservative because they do not account for the forest surrounding the CD-IV Project power plant site, which would provide additional sound attenuation that would decrease the estimated noise levels at the noise receptor locations.

Noise levels identified in Table 4.11-4 would be below ambient conditions during daytime and would be similar to ambient conditions during nighttime. Power plant noise would not be expected to be audible at the noise receptor locations. The noise levels at the Chance Ranch residence and at the campgrounds would be below the county applicable nighttime residential

exterior noise limit (i.e., 40 dBA L_{eq}), as well as the USEPA-recommended residential noise guideline (55 dBA L_{dn}). In addition, the proposed CD-IV power plant would generate a noise level of up to 48 dBA at 0.5 mile; therefore, the CD-IV Project would comply with BLM GRO Order No. 4, which requires geothermal operations not to exceed a noise level of 65 dBA, as the power plant is located over 0.5 mile from the lease boundaries (0.65 mile at the closest location).

Well Pumps

The CD-IV Project would include production and injection wells. The injection wells would not have pumps and would therefore be silent. Production wells would have electric-powered pumps that would generate a steady hum in the immediate area around the well. For a representative pump noise level, ORNI 50, LLC took noise measurements of existing Well 57-25. The existing well is surrounded by slatted chain link fences. The representative noise level was collected outside of the fence and was measured to be 58 dBA at 100 feet from the well pump (Ormat, 2011).

Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces, the distances of the closest receptors to the CD-IV well sites, and the representative noise level discussed above, L_{eq} and L_{dn} noise levels that would be associated with well pumps at the nearest receptor locations have been estimated and are presented in Table 4.11-5. The L_{dn} noise levels are estimated only for the nighttime sensitive receptor locations. As described in the table, the L_{dn} noise level from the well pumps would be less than 30 dBA at the nearby receptor locations, which would not likely be audible.

TABLE 4.11-5
ESTIMATED CD- 4 WELL PUMP NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Closest Well Site (Well #)	Well Pump L_{eq} (dBA)	Well Pump L_{dn} (dBA)
Mammoth Elementary School	4,800 feet (38-25)	16	NA
Residences along Trails End Road	4,200 feet (38-25)	17	23
Shady Rest Park	160 feet (38-25)	53	NA
Shady Rest Campground	2,600 feet (38-25)	23	29
Sherwin Creek Campground	4,800 feet (55-61)	16	22

NOTES: Estimated noise levels are based on representative noise levels obtained from Ormat, 2011. It should be noted that the noise levels identified in the table are considered to be conservative because they do not account for the forest surrounding the CD-IV Project well sites, which would provide additional sound attenuation that would decrease the estimated noise levels at the noise receptor locations.

NA: Not Applicable (not a nighttime sensitive receptor location).

Noise levels from the well pump at Well Site 38-25 would likely be audible at the baseball fields at Shady Rest Park. However, the noise would not be expected to be disruptive, considering the typically noisy nature of activities conducted at the park. Noise levels at other receptors identified in Table 4.11-5 would be below ambient conditions and would not be expected to be audible. In addition, the noise levels at the residences along Trails End Road and at the campgrounds would be well below the county and town applicable nighttime residential exterior noise limit (i.e.,

40 dBA L_{eq}), as well as the USEPA-recommended residential noise guideline (55 dBA L_{dn}). It should also be noted that the noise levels in Table 4.11-5 would occur only for the closest well site; well pumps at more distant well sites would result in lower noise levels at those sensitive receptors.

Well pumps would require regular maintenance and/or replacement every two to five years. When necessary, well pumps would be removed and re-installed in the well bore in the same manner as the initial installation. The resulting noise levels would be approximately the same as well site construction activities for the one to two days required to change out the pump. It may be necessary to re-drill, work-over, or stimulate the wells, and/or drill one or more replacement wells over the life of the CD-IV Project. The noise levels associated with these infrequent maintenance activities would be expected to be no greater than identified above for well drilling activities.

Other Operational Noise Sources

Operations of the CD-IV Project would require approximately six new employees that would be required to perform operations and maintenance activities of the new facilities. As a result, once the facilities are fully operational, approximately six new vehicle trips would be generated (up to 12 one-way trips); however, this marginal increase in vehicle trips would not result in a long-term increase in ambient noise levels.

In addition, typical pipeline operations would produce almost no noise, only a very slight rumble as the geothermal fluid moves down the pipeline and an occasional "creak" noise as the pipe would flex. However, with the insulation around the pipes, there would be no audible noise immediately adjacent to the pipeline.

Operation and Maintenance Vibration

Operation and maintenance of the CD-IV Project would not introduce any new sources of perceivable groundborne vibration to the study area. Consequently, the CD-IV Project would cause no operation- or maintenance-related effects associated with groundborne vibration. Because implementation of the CD-IV Project would not result in exposure of persons to or generation of excessive groundborne vibration, it also would not expose them to or generate excessive groundborne noise levels. Consequently, there would be no groundborne noise-related adverse effects associated with operation and maintenance of the CD-IV Project.

Decommissioning

At the end of the 30-year term of the CD-IV Project, operation would cease and associated facilities would be decommissioned and dismantled, and the site would be restored in conformance with BLM and USFS requirements. Decommissioning activities could generate temporary noise levels similar to those that would occur during construction of the CD-IV Project (see Tables 4.11-2 and 4.11-3, above). Project-related decommissioning activities would not occur within 500 feet of a residence or commercial facility; therefore, the proposed activities would not be subject to Mono County workday hour limits. In addition, decommissioning noise

levels would not exceed the Town of Mammoth Lakes construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime hours, respectively. Also, decommissioning noise would result in noise levels at the nearest receptor locations that would be substantially less than the FTA's daytime and nighttime thresholds for adverse community reaction of 80 dBA and 70 dBA L_{eq}, respectively.

4.11.4.2 CEQA Significance Determination

Significance determinations for the impacts identified for the CD-IV Project are provided below based on the CEQA Significance Criteria presented in Section 4.11.3.

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Construction and Decommissioning

CD-IV Project construction and decommissioning activities would be exempt from the time of day work restrictions in the Mono County Code because the construction activities would not occur within 500 feet of a residence or commercial facility. The closest component of the CD-IV Project to any inhabited dwelling would be Well Site 38-25, at a distance of approximately 0.8 mile. In addition, as shown in Tables 4.11-2 and 4.11-3, construction and decommissioning noise levels would not exceed the Mono County or Town of Mammoth Lakes construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime hours, respectively. Therefore, the short-term construction- and decommissioning-related impacts would be less than significant.

Operation and Maintenance

As described in Section 4.11.4.1, long-term operation and maintenance noise (i.e., noise from the well pumps and power plant) would not exceed either Mono County or Town of Mammoth Lakes noise standards, including the daytime (50 dBA L_{eq}) and nighttime (40 dBA L_{eq}) exterior standards for one and two family residences. The maximum noise exposure at a residence would be as high as 35 dBA L_{eq} as a result of the proposed power plant operations (see Table 4.11-4). This noise exposure level would be less than Mono County's nighttime exterior standard, and would therefore be less than significant.

b) Exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels.

Construction, Operation, Maintenance, and Decommissioning

Temporary and long-term sources of groundborne vibration and noise that would be associated with the CD-IV Project would not be perceivable at the nearest receptor locations (see Section 4.11.4.1, above). Therefore, the CD-IV Project would cause no vibration or groundborne noise impacts.

c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the Project.

Construction and Decommissioning

Construction and decommissioning of the CD-IV Project would not result in permanent noise sources. No impact would occur

Operation and Maintenance

The CD-IV Project would result in semi-permanent (i.e., approximately 30 years) noise sources due to operation and maintenance of the proposed well pumps and power plant. However, maximum noise exposure due to the CD-IV Project at the nearest residence would be no higher than 42 dBA L_{dn} as a result of power plant operation noise (see Section 4.11.4.1, above). This noise exposure would not be expected to exceed the existing ambient noise level at the nearest residence due to the elevated ambient noise levels in the vicinity of U.S. Highway 395. Therefore, the related impact would be less than significant.

d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Construction and Decommissioning

Construction and decommissioning of the CD-IV Project would result in temporary noise levels at the nearest receptor locations (see Tables 4.11-2 and 4.11-3). Noise levels from daytime construction activities at Well Site 38-25 would be readily audible at the baseball fields at Shady Rest Park. However, the noise levels would not be expected to be disruptive, considering the typically noisy nature of activities conducted at the park. Given the estimated low ambient noise levels at the receptor locations, nighttime well drilling activities at the closest well site may be audible at each of the receptors identified in Table 4.11-3; however, the noise levels do not represent a substantial increase in ambient noise levels. CD-IV Project short-term construction and decommissioning noise levels at the nearest receptors would be considerably less than the FTA's daytime and nighttime community annoyance thresholds of 80 dBA and 70 dBA L_{eq}, respectively. Thus, any CD-IV Project-related temporary increase in ambient noise levels due to construction or decommissioning would not be substantial, and associated impacts would be less than significant.

Operation and Maintenance

Temporary or periodic noise levels associated with operation of the power plant would be limited primarily to breaker noise at the proposed substation, which would be very short duration sound events, expected to occur only a few times throughout the year. However, breaker noise would not be expected to be audible at the nearest noise receptor locations, which are approximately 1.6 miles from the proposed substation site. In addition, the CD-IV Project would require periodic maintenance. These maintenance-related activities would not be audible at the nearest sensitive receptor locations, which are located approximately 1.6 miles from the site. Therefore, operation and maintenance of the CD-IV Project would not result in temporary or periodic increases in ambient noise levels at the nearest receptor locations. No impact would occur.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, exposure of people residing or working in the Project area to excessive noise levels.

The proposed CD-IV power plant site would be located approximately 3 miles northwest of the Mammoth Yosemite Airport. The closest component of the CD-IV Project to the Mammoth Yosemite Airport would be Well Site 65-32, which would be approximately 2.5 miles to the northwest. Therefore, the CD-IV Project would not expose CD-IV Project workers to excessive airport noise levels. In addition, the CD-IV Project would not involve the development of noise-sensitive land uses that would be exposed to excessive aircraft noise. No impact would occur.

f) For a project within the vicinity of a private airstrip, exposure of people residing or working in the Project area to excessive noise levels.

Construction, Operation and Maintenance, and Decommissioning

No components of the CD-IV Project would be within the vicinity of a private airstrip. Because the CD-IV Project would not be within the immediate vicinity of an airstrip, there would be no impact.

4.11.5 Alternative 2: Plant Site Alternative

4.11.5.1 Direct and Indirect Impacts

Construction

Construction of the Alternative 2 power plant would involve the short-term use of the same heavy equipment that would be required to construct the CD-IV power plant (i.e., backhoes, cranes, loaders, dozers, graders, excavators, compressors, and generators). Based on the types of construction equipment that would be required to construct the Alternative 2 power plant and typical noise levels from representative pieces of construction equipment as identified by the FTA (FTA, 2006), it is anticipated that alternative power plant construction activities would result in average noise levels of up to 85 dBA at 50 feet. The residence at Chance Ranch would be approximately 0.5 mile from the Alternative 2 power plant site, and the Sherwin Creek Campground and John Muir Wilderness Area would be approximately 2.0 miles from the Alternative 2 power plant.

Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces, the distances of the closest receptors to the Alternative 2 power plant site, and the construction equipment representative noise level, noise levels that would be associated with Alterative 2 power plant construction at the nearest noise receptor locations have been estimated and are presented in Table 4.11-6. As described in the table, the noise level from power plant construction would be up to 42 dBA at the closest noise receptor location, which would be approximately 12 dBA higher than the CD-IV power plant, but would still not likely be audible.

TABLE 4.11-6
ESTIMATED ALTERNATIVE 2 POWER PLANT CONSTRUCTION NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Closest Source	Power Plant Construction L_{eq} (dBA)
Residence at Chance Ranch	0.5 mile	42
Sherwin Creek Campground	2.0 miles	27
John Muir Wilderness Area	2.0 miles	27

NOTES: Estimated noise levels are based on representative noise levels obtained from FTA, 2006.

Because the Alternative 2 power plant construction activities would not occur within 500 feet of residential or commercial occupancies, the activities would not be subject to Mono County workday hour limits. Also, short-term power plant construction noise would result in noise levels at the nearest receptor locations that would be substantially less than the Mono County construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime, respectively. Also, short-term power plant construction noise would result in noise levels at the nearest receptor locations that would be substantially less than the FTA's daytime threshold for community annoyance of 80 dBA.

Compared to the Proposed Action, Alternative 2 would result in a slightly greater short-term construction impact relative to the Proposed Action because the alternative power plant site would be closer to the residence at Chance Ranch, and construction noise levels at the residence would be higher than under the Proposed Action.

Operation

The base noise levels that would be associated with the Alternative 2 power plant would be the same as those that would be associated with the CD-IV power plant. Therefore, the representative noise levels measured by ORNI 50, LLC associated with the Galena-3 power plant were also used to evaluate noise levels at nearby receptors that would be associated with the Alternative 2 power plant (Ormat, 2011). Using the excess ground attenuation rate (i.e., 7.5 dBA per doubling of distance) for absorptive ground surfaces, the distances of the closest noise receptors to the Alternative 2 power plant site, and the representative noise level at 0.50 mile (i.e., 48 dBA), L_{eq} and L_{dn} noise levels that would be associated with the Alternative 2 power plant at the nearest noise receptor locations have been estimated and are presented in Table 4.11-7.

Noise levels identified in Table 4.11-7 for the closest receptor (the residence at Chance Ranch) would be below ambient conditions during daytime and would be similar to ambient conditions during nighttime. Alternative 2 power plant noise may be audible during nighttime hours when traffic levels along U.S. Highway 395 are relatively low; however, power plant noise would not be expected to be audible at the residence during daytime hours. The noise levels at the Chance Ranch residence would exceed the Mono County applicable nighttime residential exterior noise limit (i.e., 40 dBA L_{eq}), but would be within the USEPA-recommended residential noise

TABLE 4.11-7
ESTIMATED ALTERNATIVE 2 POWER PLANT NOISE LEVELS AT NEARBY NOISE RECEPTORS

Noise Receptor	Distance from Power Plant Site	Power Plant L_{eq} (dBA)	Power Plant L_{dn} (dBA)
Residence at Chance Ranch	0.5 mile	48	54
Sherwin Creek Campground	2.0 miles	33	39
John Muir Wilderness Area	2.0 miles	33	39

NOTES: Estimated noise levels are based on representative noise levels obtained from Ormat, 2011.

guideline of 55 dBA L_{dn}. The Alternative 2 power plant would generate a noise level of up to 48 dBA at 0.5 mile; therefore, Alternative 2 would comply with BLM GRO Order No. 4, which requires geothermal operations not to exceed a noise level of 65 dBA.

Compared to the Proposed Action, Alternative 2 would result in a greater longer-term operation and maintenance impact relative to the Proposed Action because the alternative power plant site would be closer to the residence at Chance Ranch, and operation noise levels at the residence would be higher than under the Proposed Action.

Decommissioning

At the end of the 30-year term of Alternative 2, operation would cease and associated facilities would be decommissioned and dismantled, and the site would be restored in conformance with BLM and USFS requirements. Decommissioning activities could generate temporary noise levels similar to those that would occur during construction of the Alternative 2 power plant (see Table 4.11-6, above). Alternative 2-related decommissioning activities would not occur within 500 feet of a residence or commercial facility; therefore, the activities would not be subject to Mono County workday hour limits. Also, short-term power plant decommissioning noise would result in noise levels at the nearest receptor locations that would be substantially less than the Mono County construction equipment residential noise limits that are as low as 60 dBA and 50 dBA for stationary equipment during daytime and nighttime, respectively. In addition, decommissioning noise would result in noise levels at the nearest receptor locations that would be substantially less than the FTA's daytime and nighttime thresholds for adverse community reaction of 80 dBA and 70 dBA L_{eq}, respectively.

4.11.5.2 CEQA Significance Determination

With the exception of criterion a) related to operation and maintenance of Alternative 2, the CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts related to criteria b) through f) would remain less than significant, or there would be no impact.

a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

Operation and Maintenance

As described in Section 4.11.5.1 (see Table 4.11-7), long-term operation and maintenance noise (i.e., noise from the alternative power plant) under Alternative 2 would be 48 dBA L_{eq} at the Chance Ranch residence. This noise level would exceed the Mono County nighttime exterior noise standard of 40 dBA $L_{eq,}$ and would therefore potentially result in a significant impact. Due to the location of the Alternative 2 power plant site and the necessary open design of the geothermal power plant air-cooled tube condensers, traditional mitigation techniques (e.g., sound walls, blankets, enclosures, etc.) to reduce power plant operation noise by at least 8 dBA would not be practicable or feasible. Therefore, Alternative 2 would result in a significant unavoidable impact.

4.11.6 Alternative 3: Modified Pipeline Alternative

4.11.6.1 Direct and Indirect Impacts

Construction

Under Alternative 3, the geothermal production and injection pipeline route east of U.S. Highway 395 and north of Shady Rest Park would be modified. The Alternative 3 modified pipeline route east of U.S. Highway 395 would not be within the vicinity of any noise receptors; however, the modified route north of Shady Rest Park would be approximately 350 feet closer to the baseball fields than the proposed route. Regardless, the modified route would not be closer to the area noise receptors than the shortest distance described in Table 4.11-3. Therefore, the pipeline construction noise levels presented in Table 4.11-3 are also applicable to Alternative 3, and construction impacts under Alternative 3 would be the same as those described in Section 4.11.4.1 for the Proposed Action.

Compared to the Proposed Action, Alternative 3 would result in a comparable short-term construction impact relative to the Proposed Action because average construction noise levels at nearby noise receptors would be the same as under the Proposed Action.

Operation and Maintenance

Operation and maintenance impacts under Alternative 3 would be the same as those described in Section 4.11.4.1 for the Proposed Action.

Decommissioning

Decommissioning impacts under Alternative 3 would be the same as those described in Section 4.11.4.1 for the Proposed Action.

4.11.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts of Alternative 3 would be less than significant.

4.11.7 Alternative 4: No Action

4.11.7.1 Direct and Indirect Impacts

Under the No Action Alternative, long-term noise and vibration levels in the vicinity of the CD-IV Project site would not be expected to change noticeably from existing conditions.

However, drilling of authorized geothermal exploration wells in Basalt Canyon, not part of the CD-IV project, could continue per previous NEPA and CEQA analysis and approvals. Therefore, the No Action Alternative could result in similar short-term drilling noise levels at nearby noise receptors as would occur under the Proposed Action (see Table 4.11-3).

The other construction-related activities that would occur under the Proposed Action would not occur. Therefore, compared to the Proposed Action, the No Action Alternative would result in a reduced short-term construction impact relative to the Proposed Action.

4.11.7.2 CEQA Significance Determination

Under the No Action Alternative, the construction and operation of the CD-IV Project would not occur and there would be no short or long term noise related impacts associated with the project. However, drilling of authorized geothermal exploration wells in Basalt Canyon could continue and the impacts from short-term well drilling noise levels could occur.

4.11.8 Cumulative Impacts

4.11.8.1 Geographic Extent/Context

Noise levels tend to diminish quickly with distance from a source; therefore, the geographic scope for cumulative impacts associated with noise would be limited to projects located within approximately 0.5 mile of the CD-IV Project. The temporal scope for cumulative impacts associated with noise would include the construction, operation, maintenance, and decommissioning phases of the CD-IV Project.

4.11.8.2 Existing Cumulative Conditions

The project site is located within the Casa Diablo Geothermal Complex, which is currently developed with three geothermal power plants: MP-I, MP-II, and PLES-I. The CD-IV Project would constitute the fourth geothermal power plant in the complex.

4.11.8.3 Reasonably Foreseeable Projects

There are several projects within 0.5 mile of the CD-IV Project that are reasonably foreseeable and could be constructed and/or operated simultaneously with the CD-IV Project, including the MP-I Replacement Project, the Digital 395 Middle Mile Project, and the Sawmill Cutoff Road Reconstruction Project.

4.11.8.4 Construction and Decommissioning

If the cumulative projects identified above are constructed or decommissioned at the same time as the CD-IV Project, the combined construction or decommissioning noise levels at nearby noise receptors could exceed the noise levels estimated for the CD-IV Project (see Tables 4.11-2 and 4.11-3). However, because the CD-IV Project construction and decommissioning noise levels would be relatively low at the nearest sensitive receptors, and the cumulative projects would be at greater distances from the sensitive noise receptors, it is unlikely that cumulative noise levels from construction and decommissioning would result in an adverse effect. There are no quantitative noise data available for cumulative projects within 0.5 mile of the CD-IV Project.

4.11.8.5 Operation and Maintenance

The MP-I Replacement Project would be operated within the Casa Diablo Geothermal Complex, approximately 0.5 mile south of the CD-IV power plant site. This project is anticipated to begin construction in spring or summer of 2012 and will replace the aging MP-I power plant with a new, more modern and efficient binary power plant (M-I). The CD-IV plant site is located approximately 2,000 feet north of the proposed M-1 plant site and the existing MP-I, MP-II, and PLES-I plants. Because the MP-I facility would be replaced with a facility that would include lower noise-generating equipment, the MP-I Replacement Project would not be expected to increase noise levels in the vicinity of existing noise receptors (Mono County, 2012). In addition, the CD-IV power plant would generate long-term noise levels at nearby noise receptors that would be relatively low (see Table 4.11-4); therefore, it is unlikely that cumulative noise levels from operation and maintenance would result in an adverse effect.

4.11.8.6 CEQA Significance Determinations

For the reasons described above, when considered in combination with the impacts of other projects in the cumulative scenario, the CD-IV Project's incremental contribution to noise impacts would not be cumulatively considerable and the cumulative impact would be less than significant.

The CD-IV Project would not cause or contribute to any cumulative vibration or groundborne noise impact.

4.11.9 Mitigation Measures

None recommended.

4.11.10 Residual Impacts after Mitigation Incorporated

No mitigation measures are recommended.

4.12 Population and Housing

4.12.1 Methodology for Analysis

This analysis of potential environmental consequences of the CD-IV Project and Alternatives focuses on the possible impacts to population and housing. Impacts are identified and evaluated based on relevant BLM and USFS, and local standards, policies, and guidelines.

4.12.1.1 Growth Inducing Effects

The CEQ's *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 CFR Parts 1500-1508; reprinted in CEQ, 2005) provides guidelines for addressing social and economic effects in preparing an environmental impact statement. Section 1508.14 of these regulations states that

> "Human environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. . . . This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.

In Section 1508.8(b), the regulations state that indirect effects of an action "may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

The analysis of potential socioeconomic effects of the CD-IV Project and Alternatives takes place in the context of physical effects related to population and housing. See Section 4.15, *Socioeconomics and Environmental Justice*, for further discussion of the methodology regarding socioeconomic effects resulting from changes in population and housing.

4.12.2 Project Design Measures

There are no PDMs related to population and housing.

4.12.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to population and housing if it would:

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

4.12.4 Alternative 1: Proposed Action

4.12.4.1 Direct and Indirect Impacts

Growth Inducing Effects

Construction

Construction of the Proposed Action would be temporary and is expected to occur in two phases. During Phase I (anticipated to last 8 months) six wells would be drilled, the main pipeline would be constructed, and the first OEC unit would be constructed. The second OEC unit would be constructed in Phase II, along with additional wells and pipeline to support operation of this OEC unit. Although the start date of Phase II is uncertain until further wellfield testing and development has been completed, it is anticipated to last approximately 8 months.

The distance between workers' residences and the construction sites would affect the choice of transportation and decision on whether to engage in "weekly commuting" or other forms of temporary relocation while working on the Proposed Action.

The number of construction workers on-site during Phase I would range from 60 to 80 workers for the proposed power plant, 40 to 60 workers for the pipeline, and 12 to 15 workers per well. During Phase II, 60 to 80 workers would be working on the power plant, 40 to 60 would be working on the pipeline, and 12 to 15 workers per well. The average workforce would range from 10 to 20 workers during low activity periods and 100 to 120 during high activity periods.

Most construction workers are anticipated to come from the local labor pool in unincorporated Mono County and the Town of Mammoth Lakes. It is also possible that some workers would commute to the Project area from Inyo County, including the City of Bishop (approximately 40 miles southeast of Mammoth Lakes).

Since construction is a temporary assignment, it is not expected that workers from outside the Mammoth Lakes area would relocate permanently in order to work at the Project site. Some workers may engage in "weekly commuting," in which they find temporary or transient housing closer to the jobsite during the workweek, typically at motels, rental units, or local campgrounds. It is expected that such workers would seek temporary housing in the Mammoth Lakes area, where both rental housing as well as a large number of hotel or motel rooms would be available.

According to the U.S. Census Bureau's 2006-2010 American Community Survey, Mono County had rental vacancy rate of 12.9 percent over the 2006-2010 period and Mammoth Lakes had a rental vacancy rate of 15.3 percent (CA DOF, 2011). As indicated in Table 3.12-1, there are thousands of vacant units available in Mammoth Lakes and Mono County. In addition, other forms of housing, such as RV facilities and campgrounds, are available that could provide

alternative forms of temporary housing. Thus, there would be a sufficient supply of temporary housing options to accommodate workers who may seek temporary housing near the jobsite.

Operation and Maintenance

Because the new power plant would be operated collectively with the existing Casa Diablo Geothermal Complex, only about six new employees would be required for operation of the CD-IV Project. It is anticipated that these workers would either be hired locally or, if hired from outside the Mammoth Lakes area, would relocate to the area. As indicated in Table 3.12-1, there are thousands of vacant units available in Mammoth Lakes and Mono County. As such, there would be minimal impact to the local housing supply or the community, even if all permanent workers were to relocate to the Mammoth Lakes area.

Decommissioning

As in the case of CD-IV Project construction, the temporary decommissioning workforce would likely come mostly from the Town of Mammoth Lakes or unincorporated Mono County. Some workers would likely commute to the Project site. For workers who choose to commute weekly and temporarily relocate to the Mammoth Lakes area during the workweek, it is expected that sufficient numbers of rental properties and hotel and motel accommodations would be available in the area.

4.12.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the CD-IV Project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.12.3.

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).

Construction, Operation and Maintenance, and Decommissioning

As discussed above, construction is expected to require an average of 100 to 120 workers with a peak of up to 120 workers over the course of the Proposed Action at any one time. The total population of Mono County is 14,308 and the Town of Mammoth Lakes is approximately 8,286 (see Table 3.12-1). The January 2012 unemployment rate for Mono County was 9.0 percent while the unemployment rate for the Town of Mammoth Lakes was 6.0 percent (EDD, 2012). The majority of the construction, operation, and maintenance workforce is expected to come from the existing labor pool in Mammoth Lakes and Mono County. Due to the temporary nature of construction work, substantial numbers of workers are not expected to relocate permanently to the local area in order to work on the CD-IV Project. Permanent employees, if they are recruited from areas outside the Mammoth Lakes area, may choose to relocate to the area. However, as noted in Section 3.12, there is a sufficient supply of housing to accommodate those workers. Even if all six workers were to relocate to the area, this would not represent substantial growth in either the Town of Mammoth Lakes or Mono County. The decommissioning workforce is anticipated to be

similar to the construction period. Although the CD-IV Project would produce additional electricity, it is not expected to produce levels that would indirectly induce growth in the Project area. Therefore, the CD-IV Project would have a less than significant impact on growth, either directly through employment or indirectly through increased electric generating capacity.

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere.

There is no existing housing on the CD-IV Project site. Development of the CD-IV Project would not displace any housing units and would not require construction of new housing. Consequently, the Proposed Action would cause no impact related to this criterion.

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

There are no residents on the CD-IV Project site. The Proposed Action would not displace any people and would not require replacement housing to be built elsewhere. Therefore, the CD-IV Project would cause no impact related to this criterion.

4.12.5 Alternative 2: Plant Site Alternative

4.12.5.1 Direct and Indirect Impacts

Growth Inducing Effects

Construction, Operation and Maintenance, and Decommissioning

The construction, operation and maintenance, and decommissioning workforce for Alternative 2 is expected to be the same as for the CD-IV Project; therefore, there would be a sufficient supply of temporary or permanent housing options to accommodate workers who may seek housing in the Project area.

4.12.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-4 Project. Potential impacts of Alternative 2 would be less than significant for criterion a), and no impact for criteria b) and c).

4.12.6 Alternative 3: Modified Pipeline Alternative

4.12.6.1 Direct and Indirect Impacts

Growth Inducing Effects

Construction, Operation and Maintenance, and Decommissioning

The construction, operation and maintenance, and decommissioning workforce for Alternative 3 is expected to be the same as for the CD-IV Project; therefore, there would be a sufficient supply

of temporary or permanent housing options to accommodate workers who may seek housing in the Project area.

4.12.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts of Alternative 3 would be less than significant for criterion a), and no impact for criteria b) and c).

4.12.7 Alternative 4: No Action

4.12.7.1 Direct and Indirect Impacts

Growth Inducing Effects

No jobs would be created related to the CD-IV power plant, wells or pipeline construction that could induce population growth in the area and no housing or people would be displaced. Therefore, Alternative 4 would have no impact with respect to population and housing.

However, under prior approvals, up to 11 geothermal exploratory wells could be drilled in Basalt Canyon. As a result, jobs associated with drilling and constructing wells could be similar to the Proposed Action if exploration is continued, but for five fewer wells.

4.12.7.2 CEQA Significance Determination

Because Alternative 4 would not directly or indirectly induce growth, displace housing, or displace people, there would be no impact regarding the CEQA significance criteria for population and housing.

4.12.8 Cumulative Impacts

The potential for cumulative population and housing impacts exists where there are multiple projects proposed in an area that have overlapping construction schedules and/or project operations that could induce substantial population growth in an area, or displace substantial numbers of existing housing or people, necessitating the construction of replacement housing. Projects with overlapping construction schedules and/or operations could collectively result in a demand for labor that cannot be met by the region’s labor pool, which could lead to an influx of non-local workers and possibly their dependents.

4.12.8.1 Geographic Extent/Context

The Proposed Project is immediately northeast of U.S. Highway 395 and SR 203, and would be the fourth power plant within a complex that already includes three geothermal power generating facilities. The Casa Diablo Geothermal Complex is across U.S. Highway 395 and approximately 2 miles east of the Town of Mammoth Lakes to the west along SR 203. The local community

experiencing the most immediate population and housing impacts from the CD-IV Project would be the Town of Mammoth Lakes and surrounding areas of Mono County.

4.12.8.2 Existing Cumulative Conditions

The largest economic driver of growth in Mono County has been the ski industry and the resort-based second-home community focused on the Town of Mammoth Lakes. In addition, past development of geothermal power generation capacity in the project area has had an incremental effect on population and housing demand in Mammoth Lakes and Mono County. As the population increases through direct and indirect influences of development, housing demand increases. Past and existing projects would contribute to the cumulative impact of the Proposed Action and Alternatives. These types of past and existing projects, together with the reasonably foreseeable projects described below, could combine with impacts of the CD-IV Project or an Alternative to affect population and housing demand within the geographic extent of this cumulative analysis.

4.12.8.3 Reasonably Foreseeable Projects

Table 4.1-1 in Section 4.1.5, *Cumulative Scenario Approach*, provides a listing of current and reasonably foreseeable projects in the project area. Most of the other projects listed are urban development or redevelopment projects associated with the Town of Mammoth Lakes, and are part of the routine upkeep of municipal streets, parks, and infrastructure. A new terminal for the Mammoth Yosemite Airport is also planned south of the Proposed Action along U.S Highway 395. A few of the listings, such as the Sierra Star Master Plan Project, are large land development proposals that were planned before the real estate collapse that began in 2008, and may or may not move forward in the foreseeable future in the same form. One geothermal project that could be developed in the vicinity of the CD-IV Project is the MP-I Replacement Project, which could be developed approximately 0.25 mile southeast of the proposed power plant. This project would continue to utilize the existing geothermal resource in Basalt Canyon and use the existing pipeline that connects to the current MP-I power plant. The larger projects presented in Table 4.1-1 have either undergone independent environmental review pursuant to NEPA and/or CEQA or will do so prior to approval. Even if environmental review has not yet been completed for projects determined to be located within the geographic extent of this cumulative analysis, the potential effects of all projects comprising the existing and reasonably foreseeable cumulative conditions relevant to the Proposed Action were considered in the cumulative impacts analyses in this EIS/EIR.

4.12.8.4 Construction

Construction of the proposed project would utilize the same workforce skills as the other geothermal plant development projects in the area. There may also be some construction skill types that would be relevant to both the proposed project and other projects planned in the area, such as construction of a new airport terminal. However, many of the skilled craft trades required for construction of a geothermal power plant, pipelines and wells will be different from the majority of the streets and roads construction projects ongoing within the Town of Mammoth Lakes.

Due to the large surplus of housing currently available in the county, and other forms of available housing such as RV facilities and campgrounds, it is highly unlikely that the cumulative impacts of all of the planned and proposed construction projects combined would have a noticeable impact on population growth or housing displacement in Mammoth Lakes or Mono County. Therefore, no major adverse cumulative impacts would be expected to result.

4.12.8.5 Operation and Maintenance

The Proposed Action is the addition of a fourth geothermal power generation plant to a complex that already contains three existing geothermal plants. All four facilities would be operated by the same workforce, and that workforce would need to be expanded by an estimated six additional workers to handle the fourth power plant. The proposed new terminal for the Mammoth Yosemite Airport will be larger than the existing facilities and may require the addition of a few more employees, and other projects planned as listed in Table 4.1-1 will also likely need a few more people for their ongoing operations once they are built and in place. Given that the Town of Mammoth Lakes and Mono County have a large inventory of available housing, however, it is unlikely that there would be any significant population growth or housing displacement due to the cumulative operation of any or all of the planned and proposed projects.

4.12.8.6 Decommissioning

It is assumed that many of the same impacts that occurred during construction activities would occur during decommissioning, and the CD-IV Project's decommissioning contribution to these cumulative impacts would be approximately the same as described above for construction.

4.12.8.7 CEQA Significance Determinations

The CD-IV Project would have less than significant impacts with respect to the inducement of substantial population growth in the area. The CD-IV Project would not contribute to cumulative impacts regarding displacement of substantial numbers of existing housing or people.

4.12.9 Mitigation Measures

No mitigation measures are required to reduce impacts related to population and housing.

4.12.10 Residual Impacts after Mitigation Incorporated

Because no mitigation measures are recommended, impacts to population and housing would be the same as discussed in Section 4.12.4, *Alternative 1: Proposed Project*.

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4.13 Public Safety, Hazardous Materials, and Fire

4.13.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to the health and safety of the public from hazardous materials and fire. Studies and other information provided by ORNI 50, LLC also were reviewed, including the following:

1. Mammoth Pacific L.P., Hazardous Materials Business Plan, April 7, 2008.
2. Hadden Environmental Solutions Company, Risk Management Plan, Certification Statement and Executive Summary, Prepared for Mammoth Pacific L.P., June 8, 1999.
3. Upper Basalt Canyon Geothermal Exploration Project, Environmental Assessment, Long Valley KGRA Federal Geothermal Leases CA-11672 and CA-14407, Mono County, California, EA Number: CA-170-05-04, January 2005.
4. Air Liquide, Material Safety Data Sheet, Chemical Name; Class: Pentane and Isomers, August 31, 2005.

4.13.1.1 Hazardous Materials

In order to assess the potential for a release of hazardous materials to affect the public or the environment, this analysis evaluates several aspects of the proposed use of these materials at the facility. It is recognized that hazardous substances must be used at the facility. Therefore, this analysis was conducted by examining the type and amount of chemicals to be used, the manner in which ORNI 50, LLC would use and store the chemicals, the manner by which they would be transported to the facility, and the way in which ORNI 50, LLC would dispose of hazardous wastes.

Engineering and administrative controls concerning the use of hazardous materials are included as part of the Proposed Action. Engineering controls are the physical or mechanical systems, such as storage tanks, secondary containment or automatic shut-off valves, that can prevent the spill of hazardous material from occurring, or that can either limit the spill to a small amount or confine it to a small area. Administrative controls are the rules and procedures that workers at the facility must follow that would help to prevent accidents or to keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off-site and causing harm to the public.

4.13.1.2 Fire Hazards

This analysis evaluates the potential for construction and operation of the Proposed Action and Alternatives to cause impacts related to a wildland fire by assessing the fire hazard severity zoning of the project area, the actions that could initiate a wildland fire, and the methods proposed to address fire safety. In addition, the Proposed Action requires the use of a large quantity of flammable liquid in the power plant. Engineering and administrative controls, as

described above, act to minimize fire hazards as well, through the use of shut-off valves that can limit the release of flammable materials and by establishing a fire safety plan and procedures to prevent and suppress an incident resulting from a flammable liquid release.

4.13.1.3 Emergency Response

Potential impacts of the Proposed Action and Alternatives on public safety could result if construction or implementation resulted in impaired implementation of an emergency response or evacuation plan.

4.13.2 Project Design Measures

The analysis assumes that the following PDMs related to hazardous materials are fully implemented:

Hazardous Materials Use

1. *HAZ-1*: ORNI 50, LLC will comply with all local, state, and federal regulations regarding the use, transport, storage, and disposal of hazardous materials and wastes. Its Hazardous Materials Business Plan (HMBP) will be updated to incorporate the new power plant.

2. *HAZ-2*: N-pentane usage and storage at the CD-IV facility will be incorporated into ORNI 50, LLC's Risk Management Plan and Process Safety Management program.

Fire Prevention and Control

3. *HAZ-3*: All construction equipment will be equipped with spark arresters. All vehicles will be equipped with fire extinguishers and shovels.

4. *HAZ-4*: Fire extinguishers will be available during all construction activities. Water that is used for construction and dust control will be available for fire fighting.

5. *HAZ-5*: The power plant will have an emergency fire pump to provide water for fire suppression.

6. *HAZ-6*: Cooking, campfires, or fires of any kind shall not be allowed.

7. *HAZ-7*: Personnel will be allowed to smoke only in designated areas, and they will be required to follow applicable Inyo National Forest regulations regarding smoking.

8. *HAZ-8*: Any special permits required for welding or other similar activities will be applied for through, and received from, the District Ranger before these operations are conducted.

Emergency Contingency Plans

9. *HAZ-9*: ORNI 50, LLC shall prepare an emergency plan to provide guidance to field personnel and management in the event of an uncontrolled well flow, pipeline break or other field related emergency. The plan shall address the various hazards or problems that might be encountered and it specify appropriate preventive or anticipatory actions, equipment requirements, as well as specific responses, notifications and follow up

procedures in the event of such a field emergency. The plan shall include emergencies such as accidents and injuries.

10. *HYD-13*: ORNI 50, LLC shall prepare and implement a "Spill or Discharge Contingency Plan" and "Well Blowout Contingency Plan" to prevent, control, contain, clean up and mitigate the impacts of any large spills of geothermal fluid.

Environmental Monitoring

11. *HAZ-10:* ORNI 50, LLC and/or its contractors shall conduct daily routine visual inspections of the construction areas during construction to identify and correct any operational problems that could lead to a hazardous materials release. ORNI 50, LLC operators stationed at the Casa Diablo operations center will continuously monitor the well and pipeline operations through the data transmitted to the center by the well and pipeline monitoring sensor. In addition, these operators will also conduct regular, routine visual inspections of the well sites and pipeline.

Protection of Erosion and Surface Waters

12. *HYD-1*: Appropriate erosion control measures will be used to control any offsite discharges, and the Project will adopt any relevant LRWQCB and USFS best management practices to prevent soil erosion, including the preparation of a Storm Water Pollution Prevention Plan (SWPPP).

13. *HYD-7*: The CD-IV Project will obtain coverage under, and comply with, the California Construction General Storm Water Permit.

4.13.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to hazards and hazardous materials if it would:

a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials;

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within 0.25 mile of an existing or proposed school;

d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would create a significant hazard to the public or the environment;

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would result in a safety hazard for people residing or working in the project area;

f) For a project within the vicinity of a private airstrip, would result in a safety hazard for people residing or working in the project area;

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

4.13.4 Alternative 1: Proposed Action

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following project phases: construction; operation and maintenance; and decommissioning.

4.13.4.1 Direct and Indirect Impacts

Hazardous Materials

Construction

Hazardous materials anticipated to be used during construction activities include diesel fuel, lubricants, drilling mud and drilling mud additives, paints, and solvents. The use, storage, and disposal of hazardous materials and wastes associated with geothermal drilling, power plant and pipeline construction could result in potential adverse health and environmental impacts if hazardous materials were used, stored, or disposed of improperly. Direct impacts of such releases could include contamination of vegetation, soil, and water, as well as exposure to the harmful effects of these materials. Further indirect impacts to human and wildlife populations could also result.

Geothermal well drilling would be conducted at the well pads according to standard geothermal industry practice and procedures as described in Section 2.2.3.5, Well Drilling and Construction. Prior to drilling, ORNI 50, LLC would submit a geothermal drilling permit application to BLM. The permit application requires details of the proposed drilling program and operation plan, including blowout[1] protection program and procedures to protect the environment. Prior to drilling permit issuance, the application and proposed technical program would be reviewed by BLM related to the geothermal resources and by USFS with respect to the surface activities. The Agencies could require additional measures, if needed, as conditions of approval prior to authorization.

A sump/containment basin would be constructed on each well pad to contain drilling mud and rock cuttings from the drilling operations. Prior to construction, ORNI 50, LLC must prepare a SWPPP for review by the LRWQCB (see Section 4.19, Water Resources). The SWPPP would describe construction BMPs to be implemented to prevent and contain stormwater discharges and potential releases of geothermal fluid from spills or well blowouts at the well pads during construction. ORNI 50, LLC would adhere to all BMPs established by the USFS and LRWQCB for reducing soil erosion and stormwater runoff (PDM HYD-1). Typical BMPs would reduce the potential for releases of hazardous materials to affect the environment. For example, BMPs would

[1] A blowout is an uncontrolled release of geothermal fluid from a well.

require secondary containment and berming of temporary onsite storage areas for diesel fuel, drilling muds and additives, and other hazardous materials used during construction. All equipment and materials storage would be routinely inspected for leaks and records maintained documenting compliance with regulations for the storage and handling of hazardous materials. These types of BMPs would be applicable to geothermal well drilling, pipeline installation, and power plant construction. Additional BMPs specific to geothermal well drilling would ensure that potential releases of geothermal fluids are contained in the drilling sumps to avoid adverse impacts to nearby surface water resources. In addition, ORNI 50, LLC would prepare a Spill or Discharge Contingency Plan and Well Blowout Contingency Plan (PDM HYD-13) to prevent, control, contain, clean up and mitigate the impacts of any large spills of geothermal fluid.

As discussed above, geothermal fluids could be accidentally released to the environment as a result of spills on the well sites or well blowouts. Geothermal fluids contain low concentrations of hazardous materials, but more importantly, could pose a threat to health and safety from the high temperature of the geothermal fluid if released in an uncontrolled manner. Geothermal fluids produced from the well would be at a temperature of approximately 325°F; however, once the geothermal fluid was released to the environment, such has during a well blowout, some of the fluid would flash to steam and the temperature would immediately drop to the temperature of boiling water. Geothermal fluid discharged to the surface would continue to cool and reach safe temperatures within a short while. Direct contact with the initial geothermal fluid discharge, before it cooled, could cause scalding burns and the potential of serious injury. BOPE would be utilized while drilling below the surface casing. Following the cementing of the surface casing for the production wells, BOPE would be installed, tested and ready for use to ensure that geothermal fluids encountered do not flow uncontrolled to the surface. The BOPE would be installed on the well head and kept in operating condition, and tested in compliance with federal regulations and industry standards. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-hazardous barite (barium sulfate) would be stored at the well site for use in preventing well flow (“killing the well”), if needed.

During well drilling and testing, there is a possibility of encountering hazardous non-condensible gases. The three primary gases expected are steam, hydrogen sulfide, and carbon dioxide. As discussed above, steam can cause burning and serious injury. Hydrogen sulfide is a colorless gas with a rotten egg odor in concentrations under 100 parts per million; above this level it could cause health problems and even death. Carbon dioxide is a colorless, odorless gas that is combustible at concentrations above 5 percent and harmful at high concentrations. Automatic gas detectors would be stationed around the drilling rig. A warning light and horn would flash when dangerous levels are detected. Gas concentrations would diminish with distance from the wellhead to safe levels in the site vicinity. Prior to field work, personnel would be trained according to the Emergency Contingency Plan (PDM HAZ-9) on the appropriate procedures to follow in this event, including notification of local emergency response agencies and other actions as appropriate.

During construction, ORNI 50, LLC or its contractors would store all hazardous materials in the manner specified by the manufacturer and in accordance with local, State, and federal regulations.

In addition, as required under OSHA regulations, all employees would receive training in the proper use, storage and handling of hazardous materials. ORNI 50, LLC or its contractors would be required to implement the BMPs established in the SWPPP to reduce the potential for spills and establish procedures to minimize the effect of accidental releases. Further, ORNI 50, LLC would prepare an Emergency Contingency Plan, (PDM HAZ-9), a Well Blowout Contingency Plan and Spill or Discharge Contingency Plan (PDM HYD-13) which would outline the notification procedures to alert emergency response agencies, as well as measures to be followed to contain and clean up potential releases of geothermal fluid, drilling mud, fuel oils and petroleum products. With compliance with existing regulations and implementation of PDMs, hazards to the workers, the public or the environment would be reduced but would not be completely avoided. The Blowout Contingency Plan is a required component of the geothermal drilling permit application that is reviewed by BLM prior to drilling authorization; however, the other emergency contingency plans are not required. **Mitigation Measure PHS-1**[2] is proposed to require Agency review of emergency contingency plans prior to authorization and ensure that these plans address all potential field-related emergencies, and include adequate emergency measures to protect public health and safety and the environment.

Operation and Maintenance

Project operation would require the routine transport, use and disposal of hazardous materials. Hazardous materials that would be used by the CD-IV Project would be similar as those used by the existing Casa Diablo geothermal power plants in the vicinity, as described in Section 3.13. Bulk storage of hazardous materials for the CD-IV Project would be located at the shared maintenance building and oil storage area. Oils would be used in the turbines and transformers at the power plant; a drum of lubricating oil and anti-scalant, if needed, would be stored at each well pad.

The working fluid proposed for the CD-IV power plant is n-pentane (rather than isobutane, as is currently used by the existing power plants). According to the manufacturer's Material Safety Data Sheet (MSDS), pentanes are colorless, flammable liquids which can rapidly turn into a gas at standard atmospheric temperatures and pressures, with a gasoline-like odor; these liquids are typically packaged in cylinders under pressure. Inhalation of pentane vapors can cause central nervous system depression, producing symptoms such as headaches, nausea, dizziness, drowsiness and unconsciousness. Inhalation of high concentrations of the vapors may be fatal. Pentane vapors are flammable, are heavier than air, and may spread long distances; distant ignition and flash-back are possible (Air Liquide, 2005).

Numerous federal, state and local regulations ensure the safe transportation, use, storage and disposal of hazardous materials. Prior to power plant operation, ORNI 50, LLC must update its existing HMBP for the Geothermal Complex to include the CD-IV power plant (PDM HAZ-1). The HMBP provides an inventory of hazardous materials, describes emergency response procedures, and demonstrates facility compliance with applicable handling, storage and disposal regulations. The BLM and the Mono County Health Department Environmental Health Division (MCEHD) would review and approve the HMBP, and perform inspections as needed to document compliance.

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2 See Section 4.13.9 below for all mitigation measures.

In addition, the use of n-pentane requires a Risk Management Plan (RMP) due to the potential risk of explosion and fire. ORNI 50, LLC would update its existing RMP and incorporate the CD-IV facility into its Process Safety Program. Both the HMBP and RMP must be reviewed and approved by the local fire agency with oversight of fire safety at the power plant, the LVFPD. According to Mr. Fred Stump, LVFPD Fire Chief, n-pentane is considered to be a safer working fluid than the isobutane used by the existing plants because it requires approximately 50 percent less product to operate; therefore, a smaller volume would be used and stored at the power plant. In the event of a release, there is sufficient isolation distance surrounding the proposed plant that it would not pose a threat to the surrounding area. For flammable gases such as n-pentane, the safest way to extinguish a fire would be to stop the flow and allow the fire to burn out (Stump, 2011). Engineering and administrative controls are included in the Proposed Action. The proposed power plant would be equipped with gas detection systems, fire suppression and alarm systems, and emergency shutoff valves that would minimize the potential for a substantial release. As required by law, all plant personnel would receive health and safety training in the appropriate procedures to prevent harmful exposures to hazardous materials used at the plant.

Operation of the well field and geothermal fluid pipelines could pose a hazard of exposure to hot geothermal fluid in the event of a well blowout or pipeline rupture. The production of hot geothermal fluid from each well would be flow rate controlled. Pressure limit sensors would automatically shut down each pump in the event of an excessively high discharge pressure. The pumps would be monitored by the power plant computer control systems which would shut down the pumps in the event of a mismatch in the geothermal fluid flow measured to and from the plant (which could result from a pipeline leak). The facility's Blowout Contingency Plan and Spill or Discharge Contingency Plan (PDM HYD-13) would outline procedures to control and contain accidental spills and releases, as well as notification procedures to alert the appropriate local entities if public safety is threatened.

Routine transportation of hazardous materials, particularly n-pentane, to the project site could create a hazard to the public or the environment if materials were improperly handled or could indirectly result in an incremental increase in the potential for accidents; however, Caltrans and the California Highway Patrol regulate the transportation of hazard materials and wastes, with stringent packaging requirements, licensing and training for hazardous materials truck operators, chemical handlers, and hazardous waste haulers.

With compliance with existing laws and regulations, potential impacts related to the routine use, storage, transportation and disposal of hazardous materials would be reduced but not completely avoided. Implementation of **Mitigation Measure PHS-1** would ensure that emergency contingency plans are reviewed by appropriate agencies and confirm that emergency measures would protect public health and safety and the environment.

Decommissioning

Project decommissioning would require the routine transport and disposal of hazardous materials used at the facility. Hazardous materials, including n-pentane, would be transported offsite by a licensed transporter to an appropriate recycling or disposal facility. Construction equipment and

vehicles used for decommissioning of facilities would use diesel fuel or gasoline. Inadvertent releases of hazardous materials from spills or leaks could occur. With compliance with existing laws and regulations, potential impacts related to the routine use, storage, transportation and disposal of hazardous materials would be reduced but not completely avoided. Implementation of **Mitigation Measure PHS-1** would ensure that emergency contingency plans are reviewed by appropriate agencies and confirm that emergency measures would protect public health and safety and the environment.

Fire Hazards

Construction

The project is located within areas designated as moderate to high fire hazard severity (CAL FIRE, 2007). Wildfires are a concern in the Inyo National Forest, especially in the areas of wildland urban interface surrounding the Town of Mammoth Lakes. The use of construction equipment and temporary onsite storage of diesel fuel could pose a wildland fire risk during construction. The time of greatest fire danger would be during the clearing phase, when people and equipment would be working among vegetative fuels that can be highly flammable. Potential sources of ignition would include equipment with internal combustion engines, gasoline-powered tools, welding equipment or tools that produce a spark, fire, or flame. Such sources would include sparks from blades or metal parts scraping against rock, overheated brakes on wheeled equipment. Smoking onsite by construction personnel would also be a potential source of ignition during construction.

Regulations governing the use of construction equipment in fire-prone areas are designed to minimize the risk of wildland fires during construction activity. These regulations restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on construction equipment that has an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided onsite for various types of work in fire-prone areas. As described in PDMs HAZ-3 to HAZ-8, ORNI 50, LLC would equip all construction equipment with spark arrestors and all vehicles with fire extinguishers, cooking or campfires would not be allowed, personnel would only be allowed to smoke in designated areas, and any permits for operations would be obtained from the Inyo National Forest prior to construction. Water trucks used for dust suppression also would be available for firefighting; however, this equipment may not be well suited for fire suppression, where direct application of water would be needed.

Because construction would occur within areas designated as having moderate to high fire hazards during the dry summer months when fire danger is highest, there would be a moderate risk of fire. **Mitigation Measure PHS-2** would require that a Fire Protection and Prevention Plan be developed in consultation with the local fire jurisdictions and approved by the USFS prior to construction. Any additional BMPs required by the USFS shall be implemented. This measure also requires that an adequate number of water trucks equipped with 50 feet of fast response hose with fog nozzles, be onsite during construction for immediate response to fire incidents. With compliance with regulations, implementation of PDMs and **Mitigation Measure PHS-2**, the potential hazard from fires during construction would be reduced, but impacts would not be completely avoided.

Operation and Maintenance

Power plant operations involve the use of n-pentane, a flammable liquid, as the working fluid for energy exchange. The principal methods of accident prevention in the Proposed Action include equipment design safeguards, written procedures, and operator/employee training. The power plant design features include pressure safety systems, n-pentane and fire detection systems, a fire suppression system, a water storage tank and pump, and automatic emergency shutdown systems to ensure the safe operation of the facility. The preliminary fire suppression system design has been submitted to the LVFPD for initial review; the final designs and Risk Management Plan would also be submitted to the LVFPD for review prior to permit approval. According to Mr. Fred Stump, LVFPD Fire Chief, n-pentane is considered safer than isobutane, which is used as the working fluid at the existing facilities, because less product is required for operation. The facility would be required to comply with all OSHA regulatory programs for process safety management, emergency action planning, hazardous waste operations and emergency response planning.

The proposed power plant would be located within a forested area surrounded by flammable vegetation. If uncontained, a fire at the plant would have the potential to spread to adjacent areas. In addition, a wildland fire would have the potential to burn in close proximity to the plant, potentially exposing the facility and its personnel to a substantial risk of loss, injury or death. As required by fire regulations, the facility would be constructed with a 30-foot defensible space cleared of vegetation surrounding the plant structures to provide protection with respect to wildland fires. Because the proposed plant would be designed with fire protection systems and there is sufficient isolation distance surrounding the proposed plant, it is not considered to present a fire threat to the nearby Town of Mammoth Lakes (Stump, 2011).

Routine operations and maintenance in the geothermal well field would require vehicle trips to the well sites, occasional transport of lubricating oil, and maintenance of the geothermal fluid pipeline. Project activities in moderate to high fire hazard areas have the potential to result in fire hazards if proper precautions were not taken. With compliance with existing fire safety regulations and PDMs HAZ- 4 through HAZ-8, which require fire extinguishers for construction activities and an emergency fire pump for fire suppression, designated smoking areas, and adherence to all fire permit requirements, the impact of fire hazards to the public and the environment would be reduced, but not completely avoided. **Mitigation Measure PHS-2** is proposed to require that ORNI 50, LLC prepare a Fire Protection and Prevention Plan in consultation with local fire jurisdictions for approval by USFS prior to construction and operation of the geothermal facility.

Decommissioning

Activities related to decommissioning of facilities would involve similar construction vehicles and equipment and, therefore, the potential impacts related to fire would be similar to those described above for construction. Project activities in moderate to high fire hazard areas have the potential to result in fire hazards if proper precautions were not taken. With compliance with existing fire safety regulations, and PDMs HAZ- 4 through HAZ-8, which require fire extinguishers for construction activities and an emergency fire pump for fire suppression,

designated smoking areas, and adherence to all fire permit requirements, the impact of fire hazards to the public and the environment would be reduced, but not completely avoided. Mitigation Measure PHS-2 would require that ORNI 50, LLC prepare a Fire Protection and Prevention Plan in consultation with local fire jurisdictions for approval by USFS prior to construction and operation of the geothermal facility.

Emergency Response

Construction

Project construction would occur in undeveloped areas, primarily accessed by secondary National Forest System Roads. Project construction would not interfere with emergency evacuation routes designated by the Town of Mammoth Lakes, such as SR 203 and Mammoth Scenic Loop Road. Further, in accordance with PDM TRA-3, construction vehicles would not be permitted to block Sawmill Road (03S25) or Sawmill Cutoff Road (03S08) (see Section 4.16, *Traffic, Transportation and Circulation*).

As discussed above, ORNI 50, LLC would prepare emergency contingency plans for project construction that outline procedures for notification and prompt response to emergency situations that could arise during construction, such as fires, well blowouts, gas releases, spills. While implementation of safe work practices and precautions during construction would reduce the potential need for emergency response, training of construction workers in appropriate emergency response actions, as outlined in emergency response plans, would minimize the effect on such an event on construction workers, the public, and the environment. Although the potential for impacts would be reduced, they would not be completely avoided. **Mitigation Measures PHS-1** and PHS-2 would ensure that emergency response providers are consulted during contingency and fire plan preparation and that appropriate measures are implemented to protect public health and safety.

Operation and Maintenance

Project operation would not interfere with emergency evacuation routes designated by the Town of Mammoth Lakes. All project personnel would receive health and safety training, including training on appropriate emergency response actions in the event of emergency situations which could occur during geothermal facility operations, such as fires, well blowouts, gas releases and spills. While potential for impacts would be reduced by compliance with existing regulations and implementation of PDMs, they would not be completely avoided. Mitigation Measures PHS-1 and PHS-2 would ensure that emergency response providers are consulted during contingency and fire plan preparation and that appropriate measures are implemented protect public health and safety.

Decommissioning

Similar to construction, project decommissioning would require the use of trucks and construction vehicles primarily on secondary NFSRs. Road closures would not be needed, therefore, decommissioning would not physically interfere with designated emergency evacuation routes. ORNI 50, LLC’s emergency contingency plans would be applicable to decommissioning activities.

As above, implementation of **Mitigation Measures PHS-1 and PHS-2** would ensure that emergency response providers are consulted during contingency plan and fire plan preparation and that appropriate measures are implemented protect public health and safety.

4.13.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.13.2.

a) Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials.

As described above in Section 4.13.4.1 in the discussion of Hazardous Materials, construction, operation and decommissioning of the CD-IV Project would require the routine transport, storage, use, and disposal of hazardous materials. Compliance with existing hazardous materials regulations would ensure that hazards to construction workers, the public, and the environment from the routine transport, use, or disposal of hazardous materials during construction would be less than significant.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

As discussed above in Section 4.13.4.1 in the discussion of Hazardous Materials, the storage and use of hazardous materials necessary for the CD-IV Project could create a hazard to the public or the environment if an upset or accident were to occur. Although CD-IV Project construction, operation and decommissioning would comply with all laws and regulations related to hazardous materials, the potential for unanticipated accidents exists, including well blowouts, pipeline rupture, hazardous gas release, and spills or leaks of hazardous materials. ORNI 50, LLC would update its existing HMBP and RMP for the existing Casa Diablo Geothermal Complex to incorporate the proposed CD-IV facilities. Construction would require preparation of a SWPPP that would describe site-specific BMPs for preventing storm water and other geothermal fluid releases and containing them should they occur. The LRWQCB would review the SWPPP and ensure that proposed measures are adequate to protect water quality (see Section 4.19, *Water Resources*). Additionally, ORNI 50, LLC proposes to prepare emergency contingency plans (PDM HAZ-9 and HYD-13) to provide guidance to field personnel and management in the event of an uncontrolled well flow, pipeline break or other field related emergency. To ensure that emergency contingency plans prepared by the ORNI 50, LLC, are protective of construction workers, the public, and the environment, **Mitigation Measure PHS-1** requires that these plans be submitted to local emergency response providers, the BLM, and the USFS for review and consultation prior to BLM approval of the application. With implementation of **Mitigation Measure PHS-1,** the CD-IV Project would not create a significant hazard to the public or the environment resulting from a release of hazardous materials and the impact would be less than significant.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

There are no schools located within 0.25 mile of the CD-IV Project site; therefore, Proposed Action would cause no impact related to this criterion.

d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code section 65962.5 and, as a result, would create a significant hazard to the public or the environment.

According to searches of the DTSC Envirostor and the SWRCB Geotracker databases of regulatory agency lists of hazardous materials sites, including those compiled pursuant to Government Code section 65962.5, the CD-IV Project is not proposed on a known hazardous materials site (DTSC, 2011; SWRCB, 2011).Therefore, the Proposed Action would cause no impact related to this criterion.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within 2 miles of a public airport or public use airport, would result in a safety hazard for people residing or working in the project area.

The CD-IV Project would not be located within an airport land use plan or within two miles of a public airport or public use airport. Therefore, it would cause no impact related to this criterion. The Mammoth Yosemite Airport, located approximately four miles southeast, is the nearest airport to the CD-IV Project.

f) For a project within the vicinity of a private airstrip, would result in a safety hazard for people residing or working in the project area.

Because the CD-IV Project would be outside the vicinity of the private airstrip, this criterion was determined to be inapplicable or to result in no impact.

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

Project construction, operation and decommissioning would not interfere with an adopted emergency response or evacuation plan. As discussed in Section 4.13.4.1, under Emergency Response, the Mono County Emergency Operations Plan (Mono County Sherriff's Department, 2007) outlines actions that would activate the Emergency Operations Center, describes potential scenarios within the County that could require emergency response, and describes agencies responsible for responding to various types of emergencies. The CD-IV Project would not interfere with the established response actions and no emergency evacuation routes are specifically designated. The Town of Mammoth Lakes has designated SR 203 and Mammoth Scenic Loop Road as emergency evacuation routes; the Project would not obstruct these routes. Therefore, the impact would be less than significant.

h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

As discussed above in Section 4.13.4.1 under Fire Hazards, wildfires are a particular concern in the Project vicinity. Although compliance with regulations for construction in fire-prone areas would reduce the potential for accidental fires, **Mitigation Measure PHS-2** would require that a Fire Protection and Prevention Plan be developed in consultation with the local fire jurisdictions and approved by the USFS prior to construction. Any additional BMPs required by the USFS shall be implemented. This measure also requires that an appropriate number of water trucks equipped with 50 feet of fast response hose with fog nozzles be onsite during construction for immediate response to fire incidents. With compliance with regulations, implementation of PDMs and Mitigation Measure PHS-2, the potential hazard from fires during construction would be less than significant.

Power plant operations would involve the use of n-pentane, a flammable liquid, as the working fluid for energy exchange. The principal methods of accident prevention include equipment design safeguards, written procedures, and operator/employee training. The power plant design features include pressure safety systems, a combustible gas detection system, a fire suppression system, and automatic emergency shutdown systems to ensure the safe operation of the facility. The preliminary fire suppression system design has been submitted to the LVFPD for initial review; the final designs and RMP would also be submitted to the LVFPD for review prior to permit approval. **Mitigation Measure PHS-2** requires that the USFS and local fire jurisdictions review and approve the Fire Protection and Prevention Plan, which would include specific measures for maintenance of defensible space and emergency response to fires.

With implementation of **Mitigation Measure PHS-2**, the impact of fire hazards on public safety and health and the environment would be less than significant.

4.13.5 Alternative 2: Plant Site Alternative

4.13.5.1 Direct and Indirect Impacts

Hazardous Materials

Potential hazardous materials impacts during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts from the use or release of hazardous materials, but impacts would not be completely avoided. **Mitigation Measure PHS-1** is proposed to require Agency review of emergency contingency plans prior to authorization and ensure that these plans address all potential field-related emergencies that could result in a release of hazardous materials, and include adequate emergency measures to protect public health and safety and the environment.

Fire Hazards

Potential impacts associated with fire hazards during the construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts of fire, but impacts would not be completely avoided. **Mitigation Measure PHS-2** would require that ORNI 50, LLC prepare a Fire Protection and Prevention Plan in consultation with local fire jurisdictions for approval by USFS prior to construction and operation of the geothermal facility.

Emergency Response

Potential impacts on emergency response during construction, operation and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts of fire, but impacts would not be completely avoided. **Mitigation Measures PHS-1 and PHS-2** would ensure that emergency response providers are consulted during contingency and fire plan preparation and that appropriate measures are implemented to protect public health and safety.

4.13.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 2 would be less than significant with implementation of **Mitigation Measures PHS-1 and PHS-2**.

4.13.6 Alternative 3: Modified Pipeline Alternative

4.13.6.1 Direct and Indirect Impacts

Hazardous Materials

Potential hazardous materials impacts during construction, operation and decommissioning of Alternative 3 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts from the use or release of hazardous materials, but impacts would not be completely avoided. **Mitigation Measure PHS-1** is proposed to require Agency review of emergency contingency plans prior to authorization and ensure that these plans address all potential field-related emergencies that could result in a release of hazardous materials, and include adequate emergency measures to protect public health and safety and the environment.

Fire Hazards

Potential impacts associated with fire hazards during the construction, operation and decommissioning of Alternative 3 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts of fire, but impacts would not be completely avoided. **Mitigation Measure PHS-2** would require that ORNI 50, LLC prepare a Fire Protection and Prevention Plan in consultation with local fire jurisdictions for approval by USFS prior to construction and operation of the geothermal facility.

Emergency Response

Potential impacts on emergency response during construction, operation and decommissioning of Alternative 3 would be the same as described for the Proposed Action. Compliance with existing laws and regulations would reduce potential impacts of fire, but impacts would not be completely avoided. **Mitigation Measures PHS-1 and PHS-2** would ensure that emergency response providers are consulted during contingency and fire plan preparation and that appropriate measures are implemented to protect public health and safety.

4.13.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Potential impacts of Alternative 3 would be less than significant with implementation of **Mitigation Measures PHS-1 and PHS-2**.

4.13.7 Alternative 4: No Action

4.13.7.1 Direct and Indirect Impacts

Under this alternative, the BLM would not approve the proposed CD-IV Project. Direct and indirect impacts related to the construction, operation and decommissioning of the power plant and pipelines would not occur.

However, drilling of geothermal exploration wells could still occur for the geothermal exploration wells that have already been authorized by BLM. The potential impacts were analyzed in previous NEPA and CEQA documents and include the potential for accidental releases of geothermal fluids and hazardous materials used during drilling, the potential for fires associated with geothermal drilling operations, and the potential need for emergency response.

If Alternative 4 were implemented, fewer hazardous materials would be utilized during construction, as the proposed power plant and pipeline would not be built. In addition, the use of hazardous materials, such as n-pentane, for project operation and maintenance would not occur. The fire hazards of construction and operation would also be reduced. As a result, the No Action Alternative would have less impact than the Proposed Action related to public health and safety.

4.13.7.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Alternative 4 would result in reduced impacts on public health and safety relative to the CD-IV Project.

4.13.8 Cumulative Impacts

4.13.8.1 Geographic Extent/Context

The geographic scope for cumulative impacts from public health and safety generally encompasses the project area and surrounding community of the Town of Mammoth Lakes, with the exception of cumulative impacts specifically relating to the transportation of hazardous materials. The geographic scope for transportation-related hazardous materials impacts would extend to include the roadways over which hazardous materials and wastes are transported. Accidents involving transporters of hazardous materials could result in locations relatively remote from the project site, whereas hazardous materials impacts and other hazards discussed in this section are typically highly localized.

Various types of projects could contribute to the cumulative impact of the Proposed Action and alternatives, including existing and proposed geothermal developments, housing development projects, public infrastructure, and recreational trail system projects. These types of past, current and future projects could combine with potential impacts of the Proposed Action or an alternative to affect public health and safety within the geographic extent of this cumulative analysis.

Most of these projects have either undergone independent environmental review pursuant to NEPA and/or CEQA or would do so prior to approval. Even if environmental review has not been completed for the cumulative projects described in Table 4.1-1, presented in Section 4.1.5, *Cumulative Scenario Approach*, their effects were considered in the cumulative impacts analyses in this EIS/EIR.

4.13.8.2 Existing Cumulative Conditions

The project area consists of open space land within the Inyo National Forest, where there is little likelihood of encountering significant soil or groundwater contamination, based on a lack of existing and proposed uses that involve hazardous materials. Fire hazards are considered moderate to high in the project area and surrounding areas. The existing power plants at the Casa Diablo Geothermal Complex use similar types and quantities of hazardous materials as would the Proposed Action.

4.13.8.3 Reasonably Foreseeable Projects

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to the cumulative conditions for public health and safety in regards to emergency response in the cumulative analysis area. Table 4.1-1, presented in Section 4.1.5, *Cumulative Scenario Approach*, lists cumulative projects in the vicinity of the project site and surrounding area that were used to develop this analysis of cumulative effects for public health and safety.

4.13.8.4 Construction

Cumulative impacts associated with construction of the Proposed Action and all alternatives would be limited to those projects under construction at the same time and general location as the project. Hazardous materials anticipated to be used during construction activities include diesel fuel, lubricants, drilling mud and drilling mud additives, paints, and solvents which could cause potential adverse impacts resulting from spills or releases. Geothermal fluids or non-condensible gases could also be accidentally released to the environment as a result of spills on the well sites or uncontrolled releases from the wells ("well blowouts"). ORNI 50, LLC would handle, use, and dispose of all hazardous materials in accordance with local, State, and federal regulations, including BMPs set forth in the SWPPP. **Mitigation Measures PHS-1 and PHS-2** would ensure that emergency contingency plans contain measures to adequately protect public health and safety and the environment from accidental releases.

The CD-IV Project is located within areas designated as moderate to high fire hazard severity (CalFIRE, 2007). If construction of multiple projects overlapped in high fire hazard areas, particularly in areas where access and haul roads would be shared, there could be a cumulative increase in wildland fire risk. The potentially compounded increase in wildland fire risk could place an additional burden on local fire departments, particularly if access for emergency vehicles were impeded. Compliance with all fire prevention regulations related to the use of construction equipment in fire-prone areas and implementation of PDMs and Mitigation Measures related to fire safety would reduce the contribution to any localized cumulative wildland fire impacts as a result of construction of the Proposed Action, although the impacts would not be completely avoided.

While the impacts of well drilling under the CD-IV Project are similar to those associated with other geothermal wells in the area, these impacts would be site-specific and would not overlap in time. No additional construction activities are anticipated to occur in the vicinity at the same time as construction. Therefore, it is unlikely that CD-IV Project-related construction impacts related to hazardous materials would result in a combined impact that would cause an adverse cumulative effect.

4.13.8.5 Operation and Maintenance

Operation and maintenance of the Proposed Action, Alternative 2 and Alternative 3 would occur over approximately the next 30 years, and would require the routine use of hazardous materials, similar to those used by the existing and proposed geothermal projects (MP-II, PLES-I, and MP-I Replacement) at Casa Diablo. These existing and proposed projects are within the same geographic area and temporal period, and would cause operational impacts like those of the Project, including the potential for accidental fires or releases of hazardous materials. Therefore, the impacts of these projects could be cumulative with those of the CD-IV Project.

The operation of all of the Casa Diablo geothermal projects requires compliance with existing laws and regulations designed to reduce the potential for release of hazardous materials and to minimize the harmful effects of such as release. Because the MP-I Replacement Project and the CD-IV Project propose the use of n-pentane rather than isobutane as the working fluid in the

power plants, which would reduce the volume of working fluid to be used and stored on-site, there would be no net increase from the existing volume of flammable working fluid stored at the Casa Diablo Geothermal Complex when both of these projects are fully operational (Stump, 2011). Further, the proposed CD-IV plant location would have sufficient isolation distance that a release of flammable working fluid would not affect the other geothermal plants; consequently, it is unlikely that Project-related impacts related to a release of flammable working fluid would result in a combined impact that would cause an adverse cumulative effect.

The CD-IV Project would cause an incremental increase in the amount of fuels, lubricants, and other hazardous materials used and stored at the power plant and well field. The potential impacts of a hazardous materials release would be site-specific and are not expected to combine with similar impacts of past, present, or reasonably foreseeable projects. Therefore, when considered in combination with the impacts of the other projects, it is unlikely that Project-related impacts related to the storage and use of hazardous materials would result in a combined impact that would cause an adverse cumulative effect.

Hazardous materials, such as flammable n-pentane, and wastes would be transported on local and regional roadways. If numerous cumulative projects were constructed concurrently, traffic volumes on roadways and the related risk of transportation-related hazardous materials incidents could increase. Transportation of hazardous materials, however, is subject to regulations to reduce the potential for accidents resulting in releases of hazardous materials. Compliance with these regulations would ensure that impacts related to transport of hazardous materials would be minimized and/or avoided. Further, because the CD-IV Project has a relatively low number of truck trips associated with transportation of hazardous materials to and from the CD-IV Geothermal Complex, the CD-IV Project's contribution to a cumulative impact related to the transportation of hazardous materials would be low. Therefore, when considered in combination with the impacts of the other projects, it is unlikely that Project-related impacts from the transport of hazardous materials would result in a combined impact that would cause an adverse cumulative effect.

Operation and maintenance of the No Action Alternative would not involve the transportation, storage, use or disposal of hazardous materials and would not contribute to an adverse cumulative effect.

4.13.8.6 Decommissioning

Impacts of decommissioning of the Proposed Action and Alternatives (including the No Action Alternative, assuming that any approved geothermal wells constructed would need to be properly abandoned) would be similar to construction impacts and would be primarily related to an inadvertent release of hazardous materials from facilities and construction equipment and potential fire hazards of operating equipment and vehicles in terrain with a moderate to high fire hazard. Similar to construction discussed above, this impact would be site-specific and would not be expected to combine with similar impacts of past, present, or reasonably foreseeable projects. **Mitigation Measures PHS-1 and PHS-2** would ensure that emergency contingency plans contain measures to adequately protect public health and safety in the event of an accident, and the impacts would not be cumulatively considerable.

4.13.8.7 CEQA Significance Determination

For hazards and hazardous materials, there would be no Project-specific impacts related to the development of the CD-IV Project on a known hazardous materials site, within 0.25 mile of an existing or proposed school, or within 2 miles of a private airstrip. In addition, there would be no impacts on adopted emergency response or evacuation plans. Consequently, the CD-IV Project would not contribute to cumulative impacts in that regard. The Proposed Action's individual impact resulting from accidents or upsets involving the release of hazardous materials into the environment during construction, operation and maintenance, and decommissioning would be less than significant with implementation of **Mitigation Measure PHS-1**. Similarly, the CD-IV Project's individual impact resulting from wildland fire during construction, operation and maintenance, and decommissioning would be less than significant with implementation of **Mitigation Measure PHS-2**. For the reasons discussed above in Sections 4.13.8.4 through 4.13.8.6, the Project's individual impacts from wildland fire and from the accidental release of hazardous materials would be site-specific and would not be expected to combine with similar impacts of past, present, or reasonably foreseeable projects. Consequently, the CD-IV Project's incremental contribution in that regard would not be cumulatively considerable and the cumulative impact would be less than significant.

4.13.9 Mitigation Measures

Mitigation Measure PHS-1: ORNI 50, LLC shall prepare emergency contingency plans, including a Spill or Discharge Contingency Plan, a Hazardous Gas Contingency Plan, and an Injury Contingency Plan, and submit these plans for technical review to the USFS, the BLM, the LVFPD, and the MLFPD prior to construction. The Spill or Discharge Contingency Plan shall be designed to apply to spills or other releases at all proposed facilities where potential water quality pollutants would be utilized or stored, including proposed geothermal fluid pipelines, the power plant, the substation, and other proposed facilities where fuels, oils, and other chemicals may be stored or utilized. In consultation with the local agencies, the BLM and USFS will determine any additional measures that shall be included in the emergency contingency plans and these measures shall be implemented by ORNI 50, LLC. The emergency contingency plans shall include, but not be limited to, the following:

1. Identification of blowout prevention equipment and emergency containment equipment that shall be maintained and readily accessible at all times. Equipment could include construction equipment, water trucks, tanks, and absorbents.

2. Specific procedures to shut-in or control the flow, and appropriate control procedures if the means to control the flow is lost.

3. Specific procedures and equipment to construct sumps, dikes and contain flows, spills or leaks of geothermal fluid, drilling mud, and petroleum products.

4. Hazardous gas monitoring, action levels, and emergency procedures.

5. Identification of emergency response providers and appropriate regulatory agencies to be notified in the event of an emergency.

6. Training of all site personnel and construction workers in emergency contingency procedures described in the plans and maintenance of records of worker training.

Mitigation Measure PHS-2: ORNI 50, LLC shall prepare a Fire Protection and Prevention Plan for construction, operation, and maintenance activities. The Fire Protection and Prevention Plan must be submitted to and approved by the Inyo National Forest, the LVFPD, and the MLFPD prior to construction. In consultation with the local agencies, the USFS will determine any additional BMPs that shall be implemented. The Fire Protection and Prevention Plan shall include, but not be limited to, the following:

1. Requirement for the number and size of water trucks equipped with 50 feet of fast response hose with fog nozzles that shall be maintained on-site during construction for immediate response to fire incidents

2. Training of all construction workers on fire prevention methods, the proper use of firefighting equipment and procedures to be followed in the event of a fire.

3. Maintenance of fire extinguishers and fire-fighting equipment at each construction site sufficient to extinguish small fires.

4. Definition of appropriate defensible spaces that shall be maintained around permanent structures for acceptable wildland fire protection

There would be no adverse secondary impacts of Mitigation Measures PHS-1 and PHS-2.

4.13.10 Residual Impacts after Mitigation Incorporated

Although unlikely, following implementation of the PDMs and mitigation measures provided above, it is possible that an accidental hazardous material release could occur and could cause a public health and safety risk to individuals or the environment. No other residual impacts to public health and safety would be expected to occur as a result of construction, operation and maintenance, and/or decommissioning of the CD-IV Project or an alternative.

4.14 Recreation

This section describes the impacts associated with construction, operation, and decommissioning of the Proposed Action or its Alternatives with respect to recreational resources within the Proposed Action area.

4.14.1 Methodology for Analysis

Methods used to assess potential impacts on recreational resources included site visits to the project area in 2010 and review of local planning documents and maps to identify the recreational resources in the project vicinity that, because of their proximity, could be directly or indirectly affected by the Proposed Action or its Alternatives. Construction and operations activities were assessed for their potential to result in direct and indirect adverse impacts on recreational resources given the proximity of the identified recreation resource, the type of recreational activity expected to occur, and the availability and proximity of alternative recreational resources.

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the potential impacts to recreation. Impacts are identified and evaluated based on relevant BLM and USFS standards, policies, and guidelines, including the LRMP, and Inyo National Forest Travel Management Plan. Additional studies and other information reviewed, including the following:

1. Mono County General Plan.
2. Town of Mammoth Lakes General Plan.
3. Mammoth Lakes Trail System Master Plan.
4. Eastern High Sierra Recreation Topo Map.

4.14.1.1 Trails and Roads

Local planning documents and maps were reviewed to identify the roads, bicycle routes, and trails that serve as recreational resources within the project vicinity and that, because of their proximity, could be directly or indirectly affected. Recreational resources in the project vicinity include roads and trails that are used for walking, jogging, bicycling, OHV use, snowmobiling, cross-country skiing, and snow shoeing. In addition, there are designated bicycle routes in the project vicinity.

To determine the potential for construction and operations activities to cause direct effects on USFS roads, bicycle routes, and trails, the proposed construction areas were compared with the locations of identified recreational resources (Figures 3.14-1 and 3.14-2). Potential indirect effects on recreational resources were identified through the same means, as well as by reviewing the impact findings presented in other pertinent sections of this EIS/EIR. For example, indirect effects that typically result from other environmental impacts and that could adversely affect the recreational experience include construction- and operations-related noise along recreational routes.

4.14.1.2 Recreation Facilities and Sites

Local planning documents and maps were reviewed to identify recreation facilities located in the project vicinity, which includes Shady Rest Park, and three campgrounds nearby. To determine the potential for construction and operations activities to cause direct effects on recreation facilities and sites, the proposed project areas were compared with the locations of identified recreational resources. Potential indirect effects on recreational resources were also identified by reviewing the impact findings presented in other pertinent sections of this EIS/EIR. For example, indirect effects that typically result from other environmental impacts and that could adversely affect the recreational experience include construction-related noise in the vicinity of recreation facilities.

4.14.2 Project Design Measures

The analysis assumes that the following PDMs related to recreation are fully implemented:

1. *LU-1*: All geothermal pipelines potentially visible in scenic highway corridors or important visual areas will be obscured from view to the extent reasonably feasible by fences, natural terrain, vegetation, or constructed berms (consistent with Mono County Conservation/Open Space Element, Goal I, Objective D, Action 1.18).

2. *TR-2*: ORNI 50, LLC will maintain Sawmill Road and Sawmill Cutoff Road during construction operations to ensure that the road beds are equal to pre-construction conditions.

3. *TR-3*: Project vehicles will not block Sawmill Road or Sawmill Cutoff Road by either waiting or parking on either road.

4. *TR-4*: Where the pipeline will be constructed under existing roads by open trench construction and restricting public access, appropriate traffic control measures will be established to warn traffic of temporary road closures.

5. *TR-6*: ORNI 50, LLC will attempt to work with the Town of Mammoth Lakes and the USFS to plow the road to and the parking lot at Shady Rest Park in the winter to better accommodate recreational traffic and parking for cross-country skiers and snowmobilers. This plan will provide the majority of the winter access for the new well pads proposed for the Project.

6. *TR-7*: All vehicle traffic will be restricted to designated access roads. Project-related vehicles will be restricted to travelling no faster than 25 mph on Sawmill Cutoff Road and on other unimproved roads in the project area.

7. *REC-1*: Sections of the pipeline route not located next to existing roads will be monitored for evidence of use by OHVs. If such evidence is found, ORNI 50, LLC will notify the USFS and comply with its requirements for funding or implementation of actions to prevent use by OHVs, such as the posting of signs and the physical blocking of access.

8. *REC-2*: ORNI 50, LLC will prepare and implement a winter access contingency plan in accordance with the requirements of the USFS. The plan will be designed to ensure that there is at least one location along Sawmill Road which is maintained to provide a safe and easy crossing by cross country skiers.

9. *REC-3*: For public safety, an appropriate temporary fence will be constructed around each drilling sump/pit when the associated drill site is not continuously staffed by personnel and until the pit is backfilled.

10. *AQ-1*: ORNI 50, LLC will apply water during the construction and utilization of pads and access roads as necessary to control dust. Dust will not be discharged into the air for a period or periods aggregating more than three minutes in any one-hour that is as dark or darker in shade as that designated as No. 1 on the Ringelmann Chart.

11. *AQ-2*: ORNI 50, LLC will also comply with any requirements prescribed by the GBUAPCD concerning emissions of air pollutants from construction engines or hydrogen sulfide from operating geothermal wells. The drilling rigs will be registered in the CARB PERP.

12. *AQ-3*: ORNI 50, LLC will utilize best available equipment and design to minimize emissions of n-pentane.

13. *AQ-4*: ORNI 50, LLC will apply for an air permit to construct and operate the wells and power plant. The Project will conform to GBUAPCD requirements for controlling emissions.

14. *NOI-1*: Mufflers will be used on all drilling rig engines.

15. *NOI-2*: Construction noise will be minimized through operational practices which avoid or minimize those practices which may typically generate greater noise levels, or generate distinctive impact noise.

16. *NOI-3*: Prior to commencing any construction activity associated with the Project, ORNI 50, LLC will submit, and secure the approval of the USFS, a program designed to adequately respond to noise complaints. As part of the program, ORNI 50, LLC will publish a telephone number for use by individuals for the lodging of complaints or inquiries regarding the level of noise from construction operations. A designated representative of the permittee will be available 24 hours a day to record any lodged complaints or inquiries, and ORNI 50, LLC will make reasonable efforts to investigate and respond to any such complaint or inquiry within 24 hours of the complaint or inquiry. ORNI 50, LLC will record each lodged complaint or inquiry, and the results of its investigation and response, on a form, a copy of which will be delivered to the BLM and USFS staff designated to receive these forms within 24 hours of the complaint or inquiry.

17. *VIS-1*: Any pipeline route selected within the pipeline corridor will either be located at least 300 feet from the developed portions of Shady Rest Park or will be substantially screened from view from the developed portions of the park by topography or vegetation.

18. *VIS-2*: In sections of the Project area with a USFS Visual Quality Objective (VQO) of “partial retention” and “retention”, ORNI 50, LLC will, with the approval of the USFS, locate the pipeline so that it is not immediately adjacent to existing roads where possible, and takes advantage of existing vegetation or terrain screening opportunities to reduce the visibility of the pipeline from these roads.

19. *VIS-3*: The pipeline segments to be constructed (a) in areas with a VQO of “retention” in the vicinity of Sawmill Cutoff Road, and (b) in Inyo National Forest managed-land in areas with the VQO of “retention” and visible from SR 203 and/or U.S. Highway 395 will use texture

and color or colors (approved by the authorized officer) selected to blend with the color and texture of the characteristic landscape.

20. *VIS-4*: All power plant and well pad facilities will be painted a neutral color to blend in with the environment, using a color that was approved and used for the existing Basalt Canyon facilities and/or another color scheme approved by the USFS.

21. *HAZ-9*: ORNI 50, LLC shall prepare an emergency plan to provide guidance to field personnel and management in the event of an uncontrolled well flow, pipeline break or other field related emergency. The plan shall address the various hazards or problems that might be encountered and it specify appropriate preventive or anticipatory actions, equipment requirements, as well as specific responses, notifications and follow up procedures in the event of such a field emergency. The plan shall include emergencies such as accidents and injuries.

4.14.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to recreation if it would:

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated; or

b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment.

Based on the nature of the proposed project, there would be no impact related to the following criterion b), because The Proposed Action and its Alternatives do not include recreational facilities and no construction would occur at neighborhood parks or schools that are used for recreation. The CD-IV Project would not result in neighborhood population growth or residential housing that would require the construction or expansion of additional recreational facilities. Therefore, this significance criterion is not applicable, and is not discussed further.

4.14.4 Alternative 1: Proposed Action

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following phases: construction; operation and maintenance; and decommissioning.

4.14.4.1 Direct and Indirect Impacts

Trails and Roads

Construction

Construction of the geothermal power plant, geothermal wells, associated pipelines, and road relocation would be in close proximity or within several designated trails and unpaved USFS and County-maintained roads used for recreational activities. In addition, construction vehicles would access the Alternative 1 sites via Sawmill Road (03S25) and Antelope Road (03S05), which are

County-maintained roads with USFS numbers used for recreational activities and Sawmill Cutoff Road (NFSR 03S08) and Pole Line Road (NFSR 03S123), which are NFSRs. NFSR 03S129E would be closed to public access within the fence line of the proposed CD-IV power plant. Road closures would occur at the nearest intersection to avoid creating dead ends. Road closing techniques would mirror USFS travel management implementation strategy – minimal closure techniques used first (disguising of road), barrier, signing. Some roads may require decommissioning (pulling back edges, re-contouring). Fences would not be used to close roads.

Construction activities would occur primarily in the non-winter seasons of 2013 and 2014 (and potentially 2015), and would increase use of Alternative 1 area roads and trails shown on Figure 3.14-1, which are also used for walking, jogging, bicycling, and OHV uses. Roads 03S08N and 03S08P, which are part of Knolls Loop, may be temporarily closed during construction, but would be reopened or rerouted after construction complete. In addition, other roads and underground crossings may be temporarily closed during construction. Alternative 1 includes several PDMs that would reduce the effect of construction activities in the vicinity of roads and trails used for recreational activities. Public use and access of Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08) will be maintained during Alternative 1 construction (PDM TR-3). In addition, where pipelines would cross existing roads, requiring restriction of public access, traffic control measures will be established to warn road users of temporary road closures (PDM TR-4). In addition, the road closures and restrictions would be short-term and there are nearby roads that would serve as detours for these roads, including detours that allow Knolls Loop recreation users to connect to the sections of the loop adjacent to closed portions. Alternative 1-related vehicles will be restricted to designated access routes and would be restricted to traveling no faster than 25 miles per hour on Sawmill Cutoff Road (NFSR 03S08) and other unpaved roads in the Alternative 1 area (PDM TR-7). However, speeds of 25 miles per hour by construction vehicles could result in conflicts and public safety hazards with recreation use of the area, particularly in areas with blind corners, narrow roads, or hills.

To reduce short-term air quality and noise effects, dust control and emissions control measures (PDM AQ-1 through AQ-4) and noise control measures (PDM NOI-1 through NOI-3) would be implemented. Finally, each drilling pit will be fenced when the drill site is not continuously staffed until the pit is backfilled (PDM REC-3) to avoid public safety impacts, particularly for bicyclists or OHV users that travel at rates of speed such that open pits may not be noticed if not they are not fenced and identified.

While the above described PDMs would reduce potential construction phase recreation effects, the public safety of road and trail recreation users could be affected during project construction. In addition to Alternative 1 PDMs, **Mitigation Measure REC-1** (See Section 4.14.9 below) would reduce temporary, construction-related recreation impacts by requiring ORNI 50, LLC to post informational materials about the Project at nearby recreation sites / campgrounds, access points, and the Mammoth Welcome Center. This material would include construction schedules and safety information regarding trucks and other heavy equipment use on County-maintained Roads and NFSRs, and identify route closures. In addition, construction vehicle speeds would be limited to 15 miles per hour.

Operation and Maintenance

Operation of the geothermal power plant and wells would include air emissions controls (AQ-4). While ambient noise levels would be increased in the immediate vicinity of the power plant and wells, trail and road users passing these sites would be in the vicinity of these facilities for brief periods. Therefore, substantial long-term air quality and noise impacts on recreation users would not occur.

Project siting would require some vegetation and tree removal at the plant and well facility locations, which would slightly alter the forested character of the project sites. As described in Section 4.18, Visual Resources, at project sites adjacent to Shady Rest Park (including well facility 38-25), Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08), the clearance of trees would be more noticeable to motorists and recreationists along these roads. Implementation of PDMs VIS-1 through VIS-3, LU-1 and LU-2 would help reduce the visibility of well facilities and the geothermal pipelines. Although these well sites would still be surrounded by a dense stand of trees, tree removal activities along these roadways could still be perceived as a negative visual impact by recreationists. However, the overall forest character of the project vicinity would largely remain intact.

Pipelines will be located away from existing roads and/or screened by existing vegetation or terrain (PDM LU-1 and VIS-2) and the pipelines in areas of higher visual quality value and all wells and the power plant will be of textures and color/colors that blend in with the environment (PDM VIS-3 and VIS-4). As described in section 4.18, Visual Resources, recreationists along Sawmill Cutoff Road (NFSR 03S08) may notice the “expansion loops” or square bends along the production pipeline route, where the pipeline lengthens and shortens. To reduce the visual impact of the proposed geothermal pipeline in this area, ORNI 50, LLC would implement PDMs VIS-1 and VIS-3, which would require that any pipeline route selected within the pipeline corridor either be 300 feet from the developed portions of Shady Rest Park or be substantially screened from view from the developed portions of the park by topography or vegetation and that the selected pipeline route not parallel Sawmill Cutoff Road (NFSR 03S08) within 300 feet of the road. However, as shown in Figure 4.18-2, a segment of the pipeline connecting to well facility 15-25 parallels Sawmill Road (03S25) within 300 feet of the road. Similarly, near well facilities 14-25 and 34-25, the proposed geothermal pipeline would cross Sawmill Cutoff Road (NFSR 03S08). Although the pipeline would be constructed beneath the road, recreationists would have immediate views of the pipeline on either side of Sawmill Cutoff Road (NFSR 03S08). Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate landscaping in front of the pipeline in locations where the pipeline would be clearly visible from Sawmill Cutoff Road (NFSR 03S08), would help screen views of the pipeline.

In addition, from Knolls Loop, recreationists would have immediate views of the production pipeline crossing over the injection pipeline (or vice versa) in the vicinity of well facility 34-25. At this particular site, recreationists using Knolls Loop could have immediate views of this pipeline crossing. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate landscaping in front of the pipeline crossing where the pipeline would be clearly visible from Knolls Loop, would help screen views of the pipeline. Nonetheless, even

with landscaping and given the height of these crossovers, the pipeline crossovers would be clearly visible to recreationists. Implementation of **Mitigation Measure VIS-2 (Underground Pipeline Crossovers)**, which requires belowground installation of either the existing pipeline, new injection pipeline or production pipeline, would minimize the visibility of such pipeline crossovers and would thereby reduce adverse visual effects on recreationists using Knolls Loop.

Pipeline routes could be seen as attractive for use by OHVs, as they would constitute new linear areas clear of vegetation. Therefore, sections of pipeline routes not located next to existing roads will be monitored for evidence of OHV use and if such use is identified, further OHV use would be prevented through posting of signs and the physical blocking of access, or other restriction measures (PDM REC-1). Where the pipeline is not immediately adjacent to an access road, pipeline construction equipment would “catwalk” over the top of the existing vegetation to avoid the need to grade the pipeline route or create an access road. Catwalking involves using a vehicle with large rubber tires to drive atop the scrub vegetation, which would trample but not remove vegetation (This method was used for construction of the existing Basalt Canyon pipeline, which has successfully revegetated). However, PDM REC-1 only addresses pipelines not located next to existing roads and while catwalking has resulted in successful revegetation at the existing Basalt Canyon pipeline, any failure of revegetation efforts for the proposed project could attract use by OHVs. Therefore, **Mitigation Measure REC-2** would require monitoring of all pipelines for evidence of use by OHVs, vegetation monitoring and replanting, if necessary.

PDM HAZ-9 requires an emergency contingency plan that includes preventative actions, equipment requirements, and response notifications and follow up procedures in the event of a field emergency, such as uncontrolled well flow or pipeline break. Implementation of this measure would ensure the safety of recreationalists in the vicinity of Alternative 1 facilities.

Operation of the geothermal power plant and some of the well facilities would require long-term closure of some portions of NFSRs, and as shown on Table 2-3. While, road closures would reduce the overall amount of roads available for recreation use in the project vicinity, roads that require closure would not restrict overall access through the area because there are other nearby roads that provide access around the closed road segment. Further, roads would be closed at the nearest intersection with another road, with the exception of NFSR 03S129E, where would only the section of road within the power plant fenceline would be closed to public access. Closure of roads at the nearest intersection would avoid the creation of dead ends that can lead to development of unauthorized trails.

Proposed well pipelines include a route that would run parallel to Sawmill Road (03S25), which serves as a popular recreation road and intersects with several other roads that serve recreational uses, particularly in the winter. Further, there are other locations where pipelines would cross NFSRs that provide recreation opportunities. During winter months, these roads are often used for snowmobiling and cross country skiing. The concentration of pipelines and well facilities near Shady Rest Park and the existing over snow vehicle (OSV) staging area could result in confusion safety hazards as OSV users attempt to cross the project area from the staging area to areas to the northwest commonly used for open riding. Alternative 1-related vehicles will be restricted to

designated access routes and will be restricted to traveling no faster than 25 miles per hour on Sawmill Cutoff Road (NFSR 03S08) and other unpaved roads in the Alternative 1 area (PDM TR-7). However, speeds of 25 miles per hour by operational vehicles could result in conflicts and public safety hazards with recreation use of the area, particularly in areas with blind corners, narrow roads, or hills.

Plowing and other road maintenance activities that would occur under the project (as described in Section 2.2.7.3, Access Road Maintenance and Plowing) would change the nature of the recreation experience of the project roads. Some recreationists would prefer use of the roads under the CD-IV Project that have more maintenance (i.e., fewer ruts, smoother surfaces), while other recreationists seeking a more rustic experience would prefer the less maintained conditions of roads that currently exist. Plowing and other road maintenance activities could encourage higher speeds by OSV and other motorized recreation uses. **Mitigation Measure REC-3** would require that information regarding access routing be provided at nearby recreation sites / campgrounds, access points, and the Mammoth Welcome Center. In addition, operational vehicle speeds would be limited to 15 miles per hour and road signage would be installed, consistent with USFS and County requirements.

The presence of underground pipeline crossings would not result in locations of snowmelt that could pose safety hazards. As described in Section 2.2.4.2, Pipeline Alignment, to prevent snow melt, the underground pipelines would be insulated and a 2 to 4 inch air gap maintained between the insulation and the casing pipe. The top of the casing pipe would be at least 3 to 6 feet below grade. In addition, the casing pipe would be insulated.

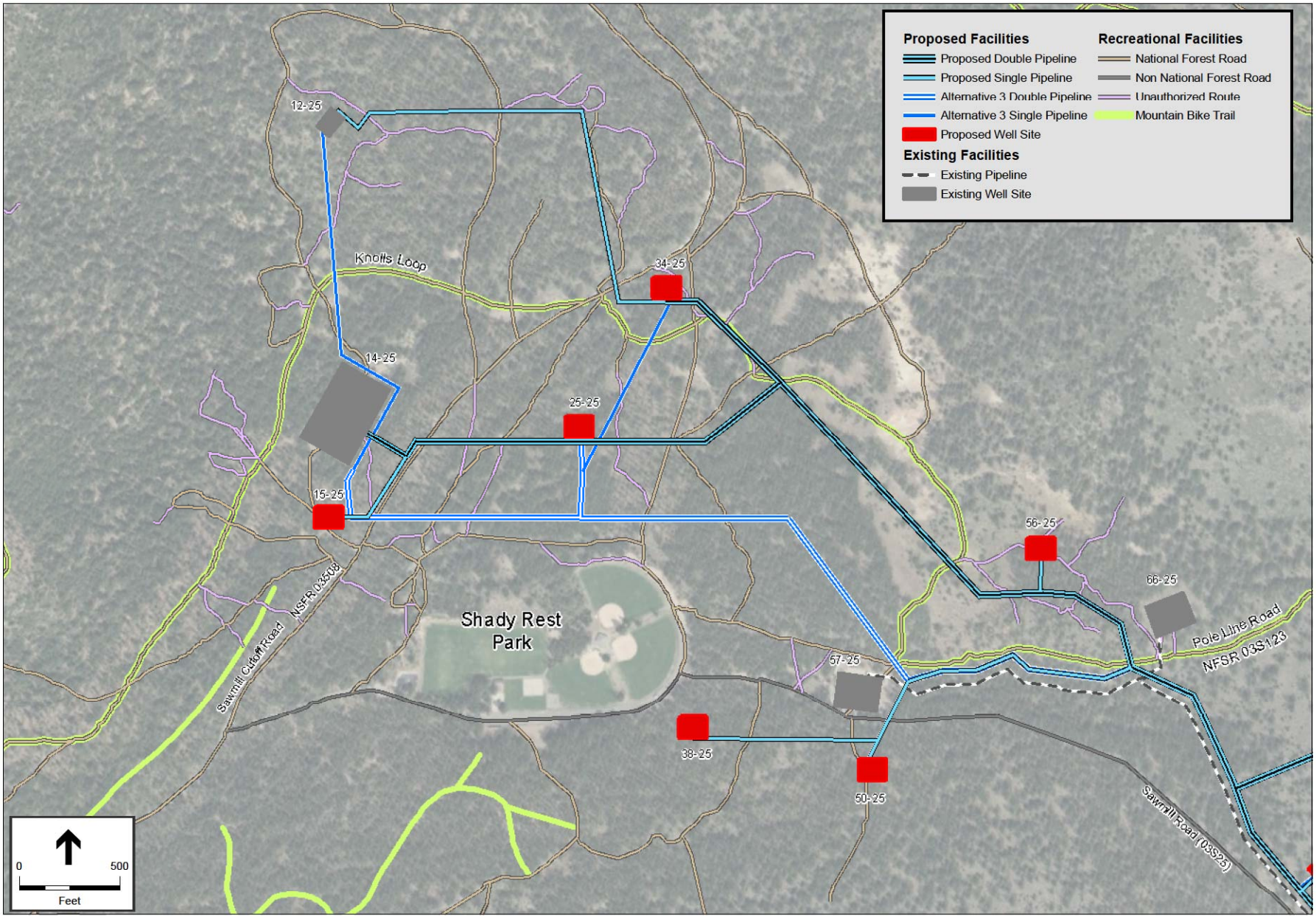
Decommissioning

After decommissioning, recreational users would experience a beneficial impact compared to project conditions as the Alternative 1 sites would be restored to an undeveloped state and would be available for recreational use (see Section 2.2.8, Project Decommissioning). Public use of NFSRs used for recreation would be restored.

Recreation Facilities and Sites

Construction

Construction of the geothermal power plant, geothermal wells, and associated pipelines would be in the vicinity of Shady Rest Park and campgrounds (Figure 4.14-1). Construction at Alternative 1 sites would not directly interfere with use of recreation sites. However, the presence of slower moving construction vehicles could result in delays in access to recreation sites. Alternative 1-related vehicles will be restricted to designated access routes (PDM TR-7). In addition, **Mitigation Measure REC-1** would reduce temporary, construction-related recreation impacts by requiring ORNI 50, LLC to post informational materials about the CD-IV Project at nearby recreation sites / campgrounds, access points, and the Mammoth Welcome Center. This material would include construction schedules and safety information regarding trucks and other heavy equipment use on County-maintained roads and NFSRs, and identify route closures.



SOURCE: USFS, 2011; Ormat, 2011

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Figure 4.14-1

Shady Rest Area Recreational Facilities

To reduce short-term air quality and noise effects, dust control and emissions control measures (PDM AQ-1 through AQ-4) and noise control measures (PDM NOI-1 through NOI-3) would be implemented.

Operation and Maintenance

Similar to construction phase activities, operational vehicles could be increased along the entrance road to Shady Rest Park and could result in delays in access to Shady Rest Park, which is a popular staging area for snowmobilers and cross country skiers. The addition of vehicular traffic associated with project maintenance activities in the vicinity of the OSV staging area could result in safety hazards near the staging area. ORNI 50, LLC will "attempt" to work with the Town of Mammoth and the USFS to plow the road and the parking lot at Shady Rest Park (the location of the OSV staging area) under PDM TR-6; however, that coordination is not required under PDM TR-6 and public safety hazards could occur if PDM TR-6 does not require coordination to be implemented. Therefore, **Mitigation Measure REC-3** requires ORNI 50, LLC to coordinate with the Town of Mammoth and the USFS to ensure that the OSV staging area, and road access to the staging area, is plowed during winter.

Operation of the geothermal power plant and wells would include air emissions controls (AQ-4). While ambient noise levels would be increased in the immediate vicinity of the power plant and wells, recreational facilities would not be in the immediate vicinity of the power plant and most wells. Therefore, substantial long-term air quality and noise impacts on recreation users would not occur. As discussed in Section 4.11, Noise, noise levels from the well pump at Well Site 38-25 would likely be audible at Shady Rest Park. However, the noise would not be expected to be disruptive, considering the typically noisy nature of activities conducted at the park.

Pipelines will be located away from existing roads and/or screened by existing vegetation or terrain (PDM LU-1 and VIS-2). In addition, the pipelines in areas of higher visual quality value and all wells, including those located near Shady Rest Park, will be of textures and color/colors that blend in with the environment (PDM VIS-3 and VIS-4). Therefore, the presence of Alternative 1 facilities would not appear as visual intrusions that affect the recreation experience of recreational facility users.

Decommissioning

After decommissioning, recreational facility users would experience a beneficial impact compared to the proposed CD-IV Project as operational vehicles that could cause delays in access to Shady Rest Park would no longer be present.

4.14.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.14.3.

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated.

Construction

As described above, Alternative 1 construction activities would result in short-term access restrictions to some trails and roads. In addition, some recreationists who currently use the Alternative 1 area and vicinity for activities such as hiking, bicycling, or dispersed camping would not want to use these areas due to construction activities. Some recreationists may instead use other similar regional recreational facilities and roads/trails, resulting in occasional increases in use of other recreational facilities and roads/trails. However, given the availability of recreation opportunities in the region, such as the hundreds of miles of NFSRs and unauthorized roads, increased use of regional recreational facilities and roads/trails would not result in substantial physical deterioration of recreational resources, or otherwise result in physical degradation of existing recreational resources, and the impact would be *less than significant*.

Operation and Maintenance

As described above, some road segments would be closed where the power plant and well facilities are sited on existing roads. Therefore, recreation use on nearby roads would increase somewhat to accommodate for detours away from closed areas. In addition, similar to construction phase impacts, some recreationists may instead use other similar regional recreational facilities and roads/trails, resulting in occasional increases in use of other recreational facilities and roads/trails. However, given the availability of recreation opportunities in the region, such as the hundreds of miles of NFSRs and unauthorized roads, increased use of regional recreational facilities and roads/trails would not result in substantial physical deterioration of recreational resources, or otherwise result in physical degradation of existing recreational resources, and the impact would be *less than significant*.

Decommissioning

Upon decommissioning, these lands would be available for recreation use, as described above.

4.14.5 Alternative 2: Plant Site Alternative

4.14.5.1 Direct and Indirect Impacts

Alternative 2 would result in the same types of construction, operations and maintenance, and decommissioning recreation-related impacts as the Proposed Action and would have the same direct effect on NFSRs and road crossings, and nearby recreation facilities and sites. However, the power plant site would be to the east of the existing power plant, and would avoid closure of NFSR 03S129E. In addition, the two pipelines that would extend north south from the power plant and would cross the unpaved Old Highway 395 under Alternative 1 would not be required. However, the Alternative 2 power plant siting would require closure of a portion of NFST 28E207, which is a motorized trail, and the closure and rerouting of a portion of NFSR 03S130. Pipelines required to connect the CD-IV plant to the existing plant would cross several NFSRs roads that are used by

recreationalists (see Figure 4.4-3). However, pipeline crossings would be below ground. Therefore, Alternative 2 would have similar recreation effects as compared to Alternative 1.

4.14.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for Alternative 1. Similar to Alternative 1, potential impacts of Alternative 2 would be less than significant.

4.14.6 Alternative 3: Modified Pipeline Alternative

4.14.6.1 Direct and Indirect Impacts

Alternative 3 would result in the same types of construction, operations and maintenance, and decommissioning recreation-related impacts as the Proposed Action and would have the similar effects on NFSRs and road crossings, and nearby recreation facilities and sites. While the pipeline routes under Alternative 3 would differ compared to Alternative 1, Alternative 3 pipelines would cross Knolls Loop and Sawmill Road (03S25) the same number of times as Alternative 1 (Figure 4.4-2). In addition, the number of pipeline crossings on other NFSRs would be similar to Alternative 1; however, Sawmill Cutoff Road (NFSR 03S08), which is a signed and groomed winter route, would be crossed once under Alternative 3, rather than twice under Alternative 1.

4.14.6.2 CEQA Significance Determination

CEQA significance determinations could be similar to that of Alternative 1, should the number of well pads, access road, and pipelines be less than under Alternative 1. Similar to Alternative 1, potential impacts of Alternative 3 would be less than significant.

4.14.7 Alternative 4: No Action

4.14.7.1 Direct and Indirect Impacts

Under this Alternative, the BLM would not approve the CD-IV Project. Direct and indirect impacts related to the construction, operation and decommissioning of the power plant and pipelines would not occur.

However, impacts related to drilling of geothermal exploration wells could still occur for the geothermal exploration wells that have already been authorized by BLM and are not considered part of the CD-IV project. These impacts, analyzed in previous NEPA and CEQA documents, include construction phase hazards to recreation users in the vicinity of construction area, and air quality and noise effects on recreation users.

If Alternative 4 were implemented, direct effect on NFSRs and road crossings, and nearby recreation facilities and sites would not occur.

4.14.7.2 CEQA Significance Determination

CEQA significance determinations could be reduced compared to that of Alternative 1, because access roads, pipelines, and some wells would not be included. Similar to Alternative 1, potential impacts of Alternative 4 would be less than significant.

4.14.8 Cumulative Impacts

4.14.8.1 Geographic Extent/Context

The geographic scope of the cumulative effects analysis for recreation includes the northeastern portion of the Mammoth Lakes region of Inyo National Forest. This geographic scope was established based on the boundaries of the affected recreation resources, which includes NFSRs that serve and/or connect to other portions of the Mammoth Lakes region of Inyo National Forest.

4.14.8.2 Existing Cumulative Conditions

The project area consists of open space land within the Inyo National Forest, in the vicinity of NFSRs and trails, Shady Rest Park, and three campgrounds nearby.

4.14.8.3 Reasonably Foreseeable Projects

Projects identified on the cumulative projects list on Table 4-1 that could result in cumulative recreation impacts include:

1. Town of Mammoth Lakes Parks and Recreation Master Plan (2011) – includes potential park improvements throughout the Town of Mammoth, including Shady Rest Park.

2. Town of Mammoth Lakes Trail System Master Plan (2011) – includes potential trail improvements throughout the Town of Mammoth, including the Shady Rest Park area.

3. MP-I Replacement Project – includes improvements at the existing Mammoth Pacific Plant.

4. Residential and other Town of Mammoth development projects – development projects could result in increased population, visitation, and/or employees.

5. USFS relocation and reconstruction of the Shady Rest OSV staging area to a location to the north of Shady Rest Park OSV, with potential plowing and/or trail construction connecting the proposed staging area to the Town of Mammoth.

6. Community-led initiative to designate and formalize mountain bike trails in project vicinity.

4.14.8.4 Construction

The construction schedule for the CD-IV Project would begin in the spring of 2013 and continue until December 2013. Construction would also occur during the non-winter months of 2014, and potentially 2015. Past, current, and future projects could require construction activities that use

the same access routes as the CD-IV Project, but are not expected to result in the physical degradation of any recreational facilities. These projects, when combined with past projects and the CD-IV Project, would not have a cumulatively considerable contribution to impacts on recreation resources.

4.14.8.5 Operation and Maintenance and Decommissioning

The increase in development associated with cumulative projects would be expected to result in an increase in residents and workers—as well as visitors, shoppers, and tourists—to the Town of Mammoth Lakes, who would collectively be expected to increase the use of recreational facilities and trails/roads in the region. However, the Town of Mammoth Lakes and Inyo National Forest includes extensive outdoor recreation opportunities. In addition, the Town of Mammoth Lakes Recreation and Parks Master Plan and Trail System Master Plan would result in improvements to recreation resources in the project vicinity. It is expected that sufficient recreation opportunities are available to serve the cumulative projects and increased use of regional recreational facilities would not result in substantial physical deterioration of recreational resources, or otherwise result in physical degradation of existing recreational resources due to the project and the cumulative projects. Relocation and reconstruction of the Shady Rest Park OSV staging area to a location to the north of Shady Rest Park would move the staging area to a location with fewer project pipelines and well facilities that would need to be crossed to access open areas popular for OSV use. Therefore, potential recreation conflicts and safety hazards would be reduced under cumulative project conditions. Formalization and designation of mountain bike trails in the project vicinity would improve circulation in the Project area, but would need to be coordinated with the project to identify routes that are consistent with the location of project facilities. As described above, project siting would require some vegetation and tree removal at the plant and well facility locations, which would slightly alter the forested character of the project sites. However, implementation of PDMs and mitigation measures would reduce adverse effects on recreationists. Noise from Well Site 38-25 would likely be audible at Shady Rest Park. However, the noise would not be expected to be disruptive, considering the typically noisy nature of activities conducted at the park. None of the cumulative projects would be expected to have additional visual resources and noise effects on recreationists beyond those described for the project. These projects, when combined with the CD-IV Project, would not have a cumulatively considerable contribution to impacts on recreational resources. The impact would be less than significant.

4.14.8.6 CEQA Significance Determination

CEQA cumulative impacts would be the same as described above.

4.14.9 Mitigation Measures

The following measures would be required to avoid or reduce impacts on the quality of the human environment. The following mitigation measures would avoid or minimize impacts on recreation:

Mitigation Measure REC-1: ORNI 50, LLC shall post informational materials about the CD-IV Project at nearby recreation sites / campgrounds, access points, and the Mammoth Welcome Center. This material shall include construction schedules and safety information regarding trucks and other heavy equipment use on local roads and NFSRs, and identify route closures. In addition, construction vehicle speed shall be limited to 15 miles per hour; with temporary signage warning construction vehicles to reduce speeds in areas with blind corners, narrow roads, or hills.

Mitigation Measure REC-2: ORNI 50, LLC shall monitor all pipeline routes for evidence of OHV use and if such use is identified, further OHV use shall be prevented through posting of signs and the physical blocking of access, or other restriction measures. ORNI 50, LLC shall also monitor revegetation of pipeline alignments and replant vegetation if necessary.

Mitigation Measure REC-3: ORNI 50, LLC shall provide information regarding pipeline crossing locations and road closures at nearby recreation sites / campgrounds, access points, and the Mammoth Lakes Visitor Center. In addition, operational vehicle speed shall be limited to 15 miles per hour road and signage shall be installed, consistent with USFS and County requirements. ORNI 50, LLC shall also coordinate with the Town of Mammoth and the USFS to ensure that the OSV staging area and access to the staging area is plowed to provide winter access.

In addition, implement **Mitigation Measures VIS-1 though VIS-3** (See Section 4.18.9).

4.14.10 Residual Impacts after Mitigation Incorporated

Following implementation of mitigation measures provided in Section 4.14.9, all adverse impacts on recreation resulting from construction, operations and maintenance, and decommissioning of the CD-IV Project and Alternatives would be avoided or substantially reduced.

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4.15 Socioeconomics and Environmental Justice

4.15.1 Methodology for Analysis

For the socioeconomic and environmental justice analyses, population, housing, employment, and unemployment rate data from federal and state agencies were compared to labor force projections during operations and construction estimates for the proposed project. These comparisons were evaluated under the significance indicators presented below. The applicable standards, policies, and guidelines were presented in Section 3.15.2, and are mirrored in the NEPA indicators described below.

A report on the anticipated economic benefits of the project was prepared for Ormat Technologies by Wahlstrom & Associates that provided additional detail about project spending and economic effects (2012). The report relied on construction workforce numbers in a different format from those provided by ORNI 50, LLC in its Application for Geothermal Drilling, Commercial Use, Site License, and Construction Permit (2012). The project description in the Application referred to personnel requirements in terms of the peak number of workers, which were expected to reach a maximum of 120 workers on site at any one time. The Wahlstrom report, on the other hand, measures employment in terms of the total number of annual-equivalent jobs that would be directly created over the 16-month to two-year construction period. In that analysis, construction activities are estimated to be creating the equivalent of 180 jobs, each lasting a full construction year, spread out over the entire construction period.[1]

4.15.1.1 Housing and Community

NEPA provides no specific thresholds of significance for socioeconomic impact assessment. Significance varies, depending on the context of the proposed action (40 CFR 1508.27[a]), but 40 CFR 1508.8(b) states that indirect effects may include those that are growth inducing and others related to induced changes in the pattern of land use, population density, or growth rate. BLM and USFS concerns in Mono County likely will closely mirror those typically addressed for California projects subject to CEQA regarding impacts on housing and community character. Specific concerns include availability of housing for workers necessary for construction, operation, and decommissioning of the proposed project; potential for inducing population growth in the area; and potential for displacing substantial numbers of people necessitating the construction of replacement housing.

[1] The report estimated a workforce which would be the equivalent of 180 full-time construction jobs for a year. The equivalent of 2 other jobs also would be directly created by construction activities through the Applicant's spending on other support services (e.g., transportation for employees and equipment) for a total of 182 jobs. Additionally, the report estimated that 46 of those workers would come from Mono or Inyo counties. In addition, another 57 jobs would be created through indirect and induced effects for a total of 103 jobs created in Mono and Inyo Counties.

4.15.1.2 Regional Employment, Economy, and Fiscal Resources

A second set of BLM and USFS concerns likely will be the degree to which the proposed project affects the regional economy, through job creation and generation of revenue for local government operations. Specific concerns include the potential for creation of additional jobs, both permanent and temporary positions, expansion of the Mono County economy through spending on the proposed project and by new employees within Mono County, and potential for generating net incremental revenues to local agency jurisdictions in Mono County for their operations.

4.15.1.3 Environmental Justice

BLM and USFS follow the federal regulations and guidance described in Section 3.15.2.1 regarding environmental justice concerns. From the population and demographic data presented in Section 3.15.1.1, however, it was demonstrated that minority population percentages in Mono County and in the Town of Mammoth Lakes are not meaningfully greater than the minority population percentages for the state of California. Similarly, the analysis of income distributions in Section 3.15.1.3 demonstrated that the concentrations of persons living below the poverty level in Mono County and the Town of Mammoth Lakes are not meaningfully greater than the percentage living in poverty for California as a whole. As a consequence, minority and low income communities do not exist in any substantial concentration in either Mono County or the Town of Mammoth Lakes, and thus, there is little likelihood of environmental justice effects occurring. For this reason, environmental justice will not be addressed further in the analysis of Alternatives presented below.

4.15.2 Project Design Measures

There are no PDMs related to socioeconomic or environmental justice issues.

4.15.3 CEQA Significance Criteria

CEQA Guidelines Section 15382 states, “An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant.” CEQA Guidelines Appendix G provides guidance as to when impacts related to population and housing could result in significant effects. Based on this guidance, the proposed project would cause adverse impacts to population and housing for purposes of CEQA if it would:

a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);

b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere; or

c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

4.15.4 Alternative 1: Proposed Action

4.15.4.1 Direct and Indirect Impacts

Housing and Community

Construction

Construction employment and spending is the primary mechanism by which the proposed project would cause a socioeconomic impact. Construction would be temporary and is expected to take place primarily over a 16-month to two-year period, subject to cessation or slowdown of activities during the winter snow months. Given the absence of existing economic uses on the site, other than the three current power generation installations, their pipelines and well fields operated by ORNI 50, LLC, project construction would not displace any current economic activity.

The residential location of construction workers is a key factor determining the extent of potential impacts to the local housing market and community character. Income from employment and its use to rent temporary housing units primarily would benefit the communities in which the construction workers and their families reside because this is where most household expenditures occur.

As described in Section 2.2.5, construction employment is estimated to peak at a maximum of 120 workers on site at any one time, and total the equivalent of 180 full time jobs, each held for a year, over the two-year construction period, 46 of which are expected to be residents of Mono or Inyo counties (Wahlstrom & Associates, 2012, p. 7). Although not likely to all be on site at the same time, the power plant could require 60 to 80 workers during each phase of construction, the pipeline another 40 to 60 workers, with 12 to 15 workers being involved in well drilling and preparation of well pads.

Some of these workers would be recruited locally, though most would be specialized craft workers from outside the Mono County area. Typically, non-local skilled craft workers do not bring families with them for short-term construction assignments, but rather rent temporary space in the local rental housing market, stay in local hotels, or bring RV and trailer home units to local RV parks and campgrounds.

Mono County is characterized by relatively high vacancy rates in its rental housing market, as was presented in Section 3.15.1. If all of the 134 construction workers expected to come from outside the region (i.e., 180 total minus 46 local Mono and Inyo residents) were to rent housing in Mono County, there are more than 1,000 vacant units currently for rent on a long-term basis, and another 6,000 units available for seasonal, recreational, or occasional use within the county. The Mono County housing market could easily absorb the entire anticipated peak workforce without generating any displacement in the housing market.

A temporary increase in the number of occupied units in rental housing, hotels, and RV/campgrounds during the two-year construction period would be perceived as beneficial by most people in Mono County.

Operation and Maintenance

As was described in Section 2.2.5, the proposed project would be operated by only about six additional employees beyond those currently employed to operate their three existing power plants. There are currently approximately 800 unemployed people in the Mono County labor force. It is possible that all six new operations positions could be filled by current Mono County residents, creating no impact on the local housing market. At the other extreme, if all six jobs were filled by new people moving into Mono County, and each jobholder brought an entire household with them, the Mono County housing market has more than adequate capacity to absorb all six new households with no displacement in the housing market. On the contrary, having additional income to pay for the cost of housing would be seen as beneficial to housing providers in Mono County, either to support new residents or existing residents.

Decommissioning

At the end of the useful life of the proposed power plant and associated pipelines and wells, the facilities would need to be decommissioned. It is assumed that at its maximum scale, a decommissioning and demolition/restoration process would be comparable in terms of employment requirements to the construction process. A two-year decommissioning process would then create temporary housing needs and beneficial impacts on the Mammoth Lakes and Mono County communities comparable to those experienced during the two-year construction cycle. At the conclusion of the decommissioning process, the local communities would be left with six fewer jobs, and if these former workers were to migrate away, it could reduce long-term housing demand by a maximum of six housing units in Mono County.

Regional Employment, Economy, and Fiscal Resources

Construction

As was described above under Housing and Community, the Mono County regional economy and the local economy, defined as the Town of Mammoth Lakes, are easily large enough to absorb the approximately 134 temporary construction workers expected to come from outside the region over the two-year construction period envisioned. The new employment, regardless of whether the jobs are filled by existing residents or short term non-local workers, would generate a temporary benefit to the local and regional economies. The anticipated direct spending on labor costs and contracts within Mono and Inyo counties associated with the employment for local firms would be $5,655,000 (Wahlstrom & Associates, 2012). Additionally, non-local construction workers would spend money on temporary lodging, food and beverage, and other sundry purchases. The value of this indirect economic benefit to Mono and Inyo counties is estimated at $6,741,000 (Wahlstrom & Associates, 2012).

ORNI 50, LLC anticipates that although it would not purchase or rent equipment and materials required to construct the power plant, pipeline, and well site facilities from local suppliers, it would spend $179,000 in Mono and Inyo counties associated with leasing office space, transporting Ormat employees and equipment to and from the project site, and other project-related costs (Wahlstrom & Associates, 2012). This spending activity associated with construction of the Proposed Action would have a small, positive effect on local and regional

businesses in Mono County. To the extent that temporary employees bring their families with them, or the extent to which construction jobs are filled by local residents, a greater portion of their household expenditures supported by construction incomes would likely be captured by businesses in Mammoth Lakes and Mono County creating a somewhat larger beneficial economic impact. Through economic multiplier effects, the direct spending by ORNI 50, LLC on construction would have small additional beneficial economic expansion impacts through indirect and induced effects. The total economic benefits captured locally through direct, indirect, and induced multiplier effects are estimated to be $13,383,000 (Wahlstrom & Associates, 2012). A minor portion of the economic activity thus generated would also be captured by municipal and county revenue systems through such mechanisms as the local share of the retail sales tax, and County permit requirements for construction.

Operation and Maintenance

Ongoing operation and maintenance of the project would generate beneficial economic impacts through the same mechanisms that were described above for construction, although at a much smaller scale. The six new permanent jobs in the county would each have an average annual salary of $100,000, resulting in a total of approximately $600,000 per year in new job wages with benefits being in addition (Wahlstrom & Associates, 2012). Operation of the proposed facilities would also likely create occasional spending within the local and regional economies for supplies, services, and repairs, estimated at $225,000 (Wahlstrom & Associates, 2012). Through economic multiplier effects, the direct spending by ORNI 50, LLC on operation and maintenance (including wages and salaries for the new workers) would have small additional beneficial economic expansion impacts through indirect and induced effects.

As described above for construction effects, spending by six additional workers and by the project operators on materials and equipment would create minor beneficial revenue impacts on municipal and county systems through the local sales tax and other miscellaneous revenue sources. Of more importance, 25 percent of the $700,000 in royalties paid to the federal government from the geothermal fluid produced by the proposed project are returned to Mono County. This would be a direct beneficial fiscal effect of ongoing project operations. Mono County would receive $175,000 per year (Wahlstrom & Associates, 2012).

Decommissioning

Decommissioning would likely have a short-term beneficial stimulus effect on the local and regional economies as workers are employed to decommission and demolish facilities, and restore the site. At the conclusion of the decommissioning process, not only would that stimulus effect cease, but the local and regional economies would shrink in proportion to the loss of the six ongoing permanent jobs supported by the facilities. The fiscal revenues associated with project operations would also drop by the same proportion.

4.15.4.2 CEQA Significance Determination

The CEQA issues identified in the Significance Criteria presented in Section 3.15.2.2 are essentially the same as those analyzed above in the NEPA discussion, especially the analysis of

impacts on Housing and Community, and require no further analysis here for construction, operation and maintenance, or decommissioning. The Proposed Action would have no impact in regard to CEQA criteria a), b), or c).

4.15.5 Alternative 2: Plant Site Alternative

4.15.5.1 Direct and Indirect Impacts

Housing and Community

Both the proposed plant site and the alternative plant site would be in remote locations and separated from the Town of Mammoth Lakes and other community concentrations of housing within Mono County. In terms of impact on housing markets and community character, there is no distinguishable difference between development on the alternative site from development on the proposed site. Impacts would be the same during all three phases, construction, operation and maintenance, and decommissioning.

Regional Employment, Economy, and Fiscal Resources

Similarly, in terms of impact on regional employment, economy, and fiscal resources, due to the remote nature of the power generation facilities there is no distinguishable difference between development on the alternative site from development on the proposed site. Economic and fiscal impacts would be the same for all Action Alternatives during all three phases, construction, operation and maintenance, and decommissioning.

4.15.5.2 CEQA Significance Determination

Due to the remote nature of the power generation facilities, separate from existing communities, there is no distinguishable difference between development on the alternative site from development on the proposed site. Impacts of concern to CEQA review would be the same for Action Alternatives during all three phases, construction, operation and maintenance, and decommissioning.

4.15.6 Alternative 3: Modified Pipeline Alternative

4.15.6.1 Direct and Indirect Impacts

Housing and Community

Construction

To the extent that the modified pipeline alternative would require somewhat more effort to construct access roads (0.1 mile or 13 percent more than Alternative 1) and somewhat less effort to construct the pipeline (0.1 mile or 1 percent less than Alternative 1), there could be a slight increase or decrease, respectively, in the number of construction workers employed to complete that segment of the CD-IV Project. Overall however, the impacts on the housing markets and community character of the Town of Mammoth Lakes and Mono County would be similar to the Proposed Action. The

scale of these differences would likely be so small as to make Alternative 3 indistinguishable from Alternative 1 (the Proposed Action) for its impact on Housing and Community Operation and Maintenance.

The modified pipeline alternative would not be likely to create operating or maintenance effects large enough to require an increase or decrease in employment from the six O&M staff currently envisioned.

Decommissioning

Similar to the construction impacts, the decommissioning process could have a very small influence on the amount of labor and cost effort required to decommission the facility for Alternative 1 compared with Alternative 3. The ongoing benefits of operations would disappear from the local economy under the Action Alternatives.

Regional Employment, Economy, and Fiscal Resources

Construction

To the extent that the modified pipeline alternative would require somewhat more or less effort to construct, there could be a slight difference in construction spending and employment between Alternative 3 and Alternative 1. The stimulus effect on the local economy would be slightly larger or smaller in proportion.

Operation and Maintenance

It is unlikely that there would be any distinguishable difference in the economic impact of operations and maintenance between the modified pipeline alternative and the Proposed Action.

Decommissioning

To the extent that the modified pipeline alternative is slightly easier or harder to decommission and remove, it could have a very small difference in short-term economic impact between Alternative 3 and Alternative 1. The ongoing benefits of operations would disappear from the local economy under both alternatives.

4.15.6.2 CEQA Significance Determination

CEQA concerns are essentially the same as those addressed above for the Proposed Action. The potential differences in impacts between Alternative 3 and Alternative 1, if any, would be very small and in proportion to the level of employment required to construct and decommission the facilities.

4.15.7 Alternative 4: No Action

4.15.7.1 Direct and Indirect Impacts

Under the No Action Alternative, BLM would not approve the proposed CD-4 Project. Direct and indirect impacts related to the construction, operation and decommissioning of the power plant or pipelines would not occur. However, in Basalt Canyon up to 11 additional wells which were authorized in previous NEPA and CEQA documents may be drilled for exploratory purposes.

If the No Action Alternative were implemented, no changes would be implemented on the power plant site and the existing environmental setting described in Chapter 3 would be maintained. Consequently, there would be no jobs created associated with the CD-IV project and therefore no effects on socioeconomic resources. Under this alternative, job creation from the construction of the pipelines and power plant would not take place and the demand for temporary rental housing would not occur.

However, exploratory well construction in Basalt Canyon could continue, not as part of the CD-IV project, but under prior approvals. These activities would result in some beneficial impacts to socioeconomics as a result of jobs created and increased demand for temporary rental housing by the construction of additional wells, but less than those created by the Proposed Action.

4.15.7.2 CEQA Significance Determination

Under Alternative 4, there would be no adverse impact in regard to CEQA criteria a), b), or c), although the potential beneficial effects of the Proposed Action would not occur.

4.15.8 Cumulative Impacts

The potential for cumulative socioeconomic impacts exists where there are multiple projects proposed in an area that have overlapping construction schedules and/or project operations that could affect similar resources. Projects with overlapping construction schedules and/or operations could collectively result in a demand for labor that cannot be met by the region's labor pool, which could lead to an influx of non-local workers and possibly their dependents. This population increase could impact social and economic resources if there are insufficient housing resources and/or infrastructure and public services to accommodate the new residents' needs.

4.15.8.1 Geographic Extent/Context

The Proposed Action is immediately northeast of U.S. Highway 395 and SR 203, and would be the fourth power plant within a complex that already includes three geothermal power generating facilities. The CD-IV Geothermal Complex is across U.S. Highway 395 and approximately 2 miles east of the Town of Mammoth Lakes. As was described in Section 3.15, the local community experiencing the most immediate socioeconomic impacts from the CD-IV Project would be the Town of Mammoth Lakes, although other socioeconomic effects could ripple throughout the entire regional economy, defined as Mono County.

4.15.8.2 Existing Cumulative Conditions

As was described in Section 3.15, the largest economic driver of growth in Mono County has been the ski industry and the resort-based second-home community focused on the Town of Mammoth Lakes. In addition, past development of geothermal power generation capacity in the project area has had an incremental effect on the population size and composition, settlement patterns, housing demand, and business revenues in Mammoth Lakes and throughout Mono County. As the population increases through direct and indirect influences of development, housing demand increases and the workforce expands. In addition, continued development creates more infrastructure affecting business operations, revenues, and economic growth in the region. Section 3.15 described the existing socioeconomic conditions within the region of influence, including demographics, housing characteristics, and laborforce characteristics, which have developed as a result of the past and present projects that comprise existing cumulative conditions.

These past and existing projects would contribute to the cumulative impact of the Proposed Action and Alternatives. These types of past and existing projects, together with the reasonably foreseeable projects described below, could combine with impacts of the Proposed Action or an alternative to affect socioeconomics within the geographic extent of this cumulative analysis.

4.15.8.3 Reasonably Foreseeable Projects

Table 4.1-1 provides a listing of current and reasonably foreseeable projects, including other proposed or approved geothermal energy projects in the project area. Most of the other projects listed are urban development or redevelopment projects associated with the Town of Mammoth Lakes, and are part of the routine upkeep of municipal streets, parks, and infrastructure. A new terminal for the Mammoth Yosemite Airport, owned and operated by the Town of Mammoth Lakes, Mono County's only airport with commercial service, is also planned south of the CD-IV Project along U.S. Highway 395. A few of the listings, such as the Sierra Star Master Plan Project, are large land development proposals that were planned before the real estate collapse that began in 2008, and may or may not move forward in the foreseeable future in the same form. The larger projects presented in Table 4.1-1 have either undergone independent environmental review pursuant to NEPA and/or CEQA or would do so prior to approval. Even if environmental review has not yet been completed for projects determined to be located within the geographic extent of this cumulative analysis, the potential effects of all projects comprising the existing and reasonably foreseeable cumulative conditions relevant to the CD-IV Project were considered in the cumulative impacts analyses in this EIS/EIR. Of the cumulative projects listed in Table 4.1-1, the following list provides a summary of the most relevant projects which characterize the reasonably foreseeable projects affecting socioeconomic conditions:

1. ***Mammoth Pacific I Replacement Project.*** ORNI 50, LLC proposes to replace the aging MP-I power plant on about 5.7 acres of land located between the existing MP-I and MP-II plant sites. The new M-I power generation facilities would replace the existing MP-I power generation facilities and the existing MP-I power generation facilities would be dismantled and removed. Project operations would result in increased generation of electricity and lower fugitive emissions of motive fluid, isobutene from plant equipment.

2. ***Mammoth Pacific II Project.*** Existing 15 MW geothermal electric generating facility and production and injection well field. Located approximately 1,200 feet northeast of the MP-I plant on land referred to as "G2," the MP-II project has been operating since 1990. The two projects have been integrated by MPLP and geothermal fluid discharged from either of the plants can be injected into any of the available injection wells.

3. ***PLES-I Project.*** This existing 15 MW PLES-I project includes a geothermal electric generating facility and is located immediately south of the MP-II project power plant. The plant site is also referred to as "G3."

Some possible cumulative effects include but are not limited to: increased temporary employment during construction, increased permanent employment during operation and maintenance, alteration of business revenues, need for construction or expansion of public services and infrastructure.

While Mono County is projected to continue to increase in population, requiring additional housing, public services, and utilities over time, the anticipated growth rates are not extraordinary, and a substantial surplus of housing of all types currently exists in both the Town of Mammoth Lakes and Mono County as a whole.

4.15.8.4 Construction

Construction of the Proposed Action would utilize the same workforce skills as the MP-I Replacement Project described above. This project is under the control of ORNI 50, LLC, however, and it is reasonable to expect that its development would be coordinated with the Proposed Action. There may also be some construction skill types that would be relevant to both the Proposed Action and other projects planned in the area, such as construction of a new airport terminal. However, many of the skilled craft trades required for construction of a geothermal power plant, pipelines, and wells would be different from the majority of the streets and roads construction projects ongoing within the Town of Mammoth Lakes.

Due to the large surplus of housing currently available in Mono County (more than 7,000 units potentially available for rent at this time), it is highly unlikely that the cumulative impacts of all of the planned and proposed construction projects combined would have a noticeable impact on displacement or growth inducement in housing markets, or on the character of the residential communities in Mono County. Therefore, no major adverse cumulative impacts would be expected to result.

Similarly, with approximately 800 members of the Mono County workforce currently unemployed and looking for work, there is capacity within the county labor pool to quickly fill the job needs if skill sets are compatible. Most likely, however, for the specialized construction trades required for the major projects listed in Table 4.1-1, some temporary workers would be attracted into the local economy. Simultaneous development of multiple projects from the list in Table 4.1-1 could have a beneficial, although small, impact on the Mono County economy and on public revenues to local jurisdictions.

4.15.8.5 Operation and Maintenance

The Proposed Action would be the addition of a fourth geothermal power generation plant to a complex that already contains three existing geothermal plants. All four facilities would be operated by the same workforce, and that workforce would need to be expanded by an estimated six additional workers to handle the fourth power plant. The proposed new terminal for the Mammoth Yosemite Airport would be larger than the existing facilities and may require the addition of a few more employees. Other projects planned as listed in Table 4.1-1 would also likely need a few more people for their ongoing operations once they are built and in place. Given that the Town of Mammoth Lakes and Mono County have a large inventory of available housing, however, it is unlikely that there would be any significant displacement or impact on housing markets or community character due to the cumulative operation of any or all of the planned and proposed projects combined.

The expanded employment opportunities, although very small in number, would be perceived as beneficial to the local and regional economy, and on the margin would generate minor new ongoing revenues to the Town of Mammoth Lakes and to Mono County. Operation of the geothermal power generation facilities would also produce revenue to Mono County through the revenue-sharing agreements with the federal and state governments.

4.15.8.6 Decommissioning

Upon permanent closure of the Proposed Action, the beneficial socioeconomic contributions to the cumulative economic conditions of the region would no longer occur. It is assumed that many of the same impacts that occurred during construction activities would occur during decommissioning, and the CD-IV Project's decommissioning contribution to these cumulative impacts would be approximately the same as described above for construction.

4.15.8.7 CEQA Significance Determinations

The CEQA issues identified in the Significance Criteria presented in Section 3.15.2.2 are essentially the same as those analyzed above in the NEPA discussion, especially the analysis of impacts on housing markets and community character. Given the ability of Mono County to easily house more temporary or permanent population, and the relatively small size of the projects currently planned and proposed in Mono County in terms of labor force needs, it is unlikely there would be any significant adverse cumulative impacts during any of the project phases: construction, operation and maintenance, or decommissioning, for either the Proposed Action or any of the alternatives.

4.15.9 Mitigation Measures

None recommended.

4.15.10 Residual Impacts after Mitigation Incorporated

Not applicable.

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4.16 Traffic, Transportation, and Circulation

4.16.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to traffic, transportation, and circulation. Impacts are identified and evaluated based on consistency with adopted transportation plans and policies. Effects on traffic flow (i.e., increases in delay experienced by motorists) may occur from physical changes to public roads, construction activities, introduction of construction- or operations-related traffic on local public roads, or changes in traffic volumes created by workforce changes in the area. This section does not include the evaluation of the Project's impacts on low-volume roadways owned and/or maintained by the USFS, or on access provided to recreational users of such roadways. Effects related to recreational use of NFSRs and facilities operated and maintained by the USFS are addressed in Section 4.14, *Recreation*.

4.16.1.1 Increased Traffic on Regional and Local Roads

The following includes a description of activities associated with the construction, operation and maintenance, and decommissioning of the CD-IV Project, and describes the anticipated increase in traffic along regional and local roadways due to such activities.

Description of Construction Activities

CD-IV Project traffic generation was determined for construction, O&M, and decommissioning phases based on the intensity of project-related activities at the project sites. Construction of the proposed power plant is expected to require approximately 16 months and would be divided into two sequential phases, with Phase I occurring over an eight-month period, and Phase II occurring over the next eight months. Phase I would include construction of power plant components and main pipeline, and up to six well pads (weather permitting). Phase II would include the continue construction of the remaining power plant components and the remaining planned pipelines and well pads. Construction of the power plant would be concurrent with the construction of the planned well pads and pipeline installations. Construction of the well pads would require a total of approximately 12 months, and would require approximately 60 days to complete each well site. Well pad construction would be phased during two summer seasons, six months per phase; however, weather-permitting, up to two well pads could be constructed during a third summer season. Construction of the geothermal fluid production and injection pipelines would require approximately six months (one summer season).

Project construction would be confined within a determined construction corridor such as a new, permanent access road, or adjacent to an existing public roadway, or within a designated site area. Staging of construction vehicles (temporary parking for construction machinery and workers' vehicles) would occur within designated staging areas or within approved easements, with no disruption to public right-of-ways (e.g., U.S. Highway 395, SR 203, Sawmill Road (03S25), etc.). Furthermore, vehicles not in immediate use during construction activities would be parked either on existing facilities (well pads and power plant) or at locations adjacent to existing access roads

to allow continued access. Short, permanent access roads would be constructed in areas with no direct access to a project site from an existing roadway; these access roads would be up to 15 feet wide, with a turning radius of no less than 50 feet (see Section 3.16 for list of access roads to each proposed well pad facility and adjacent pipeline route). Vehicle access to any off-road location would be limited to that specifically necessary for construction. No permanent removal of existing public roadways (regional, local) or work within such public right-of-ways would result from construction of the planned well pads and pipelines. A detailed description of NFSRs and the extent to which the CD-IV Project would affect circulation and access along these roads during construction activities is provided in Section 4.14, *Recreation*.

For sections of pipeline that would not be immediately adjacent to an access road, construction equipment would "catwalk" over the top of the existing vegetation without removing it to reduce potential ground disturbances or visual impact. As stated in Chapter 2, Section 2.2.4.3, *Pipeline Access*, catwalking involves using a vehicle with large rubber tires to drive atop the scrub vegetation, which would trample, but not remove, vegetation. No construction vehicles would be allowed to maneuver (turnaround or drive in) any area beyond a 40-foot-wide temporary construction corridor along the pipeline route. In areas where pipelines would cross public right-of-ways, cut-and-fill trenching methods would be applied. Pipeline installation under U.S. Highway 395 would require micro-tunneling methods, and there would be no disturbance to roadway traffic or restricted access to general and emergency vehicles.

Construction Traffic

The anticipated construction-related activities that would contribute to traffic at the project sites during construction include, but are not limited to, the following:

1. Clearing brush and grading for construction of temporary, short access roads
2. Clearing vegetation, earthwork, drainage, grading, and laying gravel for construction of well pads, power plant, and substation
3. Blading and clearing of vegetation for development of construction corridor along pipeline alignments
4. Grading for construction of turnout areas for vehicles
5. Transporting machinery and equipment for drilling operations
6. Transporting of welded-steel pipelines
7. Transporting (import) of fill materials and revegetation materials
8. Transporting (export) of excavated materials, debris, and spoils
9. Miscellaneous deliveries
10. Fuel delivery

Construction-related worker and haul truck traffic would vary depending on scheduling and phasing of construction activities. Table 4.16-1 summarizes the number of worker vehicles and construction trucks required by activity during the entire construction period.

TABLE 4.16-1
ESTIMATED MAXIMUM DAILY VEHICLE TRIPS FOR PROJECT CONSTRUCTION

Construction Activity[a]	Daily Vehicle Trips[b]	One-Way Trips
Well Pads		
Haul Trucks	44	88
Workers	38	76
Subtotal	*82*	*164*
Power Plant[c]		
Haul Trucks	15	30
Workers	100	200
Subtotal	*115*	*230*
Pipeline Installation[c]		
Haul Trucks	5	10
Workers	75	150
Subtotal	*80*	*160*
Total Trips		
Haul Trucks	64	128
Workers	213	426
Total Daily Vehicle Trips	***277***	***554***

NOTES:
[a] Haul truck and worker data provided by ORNI 50, LLC, as presented in Chapter 2, *Proposed Action and Alternatives*.
[b] Worker trips include total commute round trips per day x 1.25, to account for miscellaneous midday trips.
[c] Vehicle trips associated with power plant and pipeline construction only apply to Phase I of construction; the maximum daily trips for Phase II would be the same.

Well pad construction and drilling would require approximately 25 to 40 haul trucks for the initial delivery of machinery and equipment (e.g., diesel generators, fuel, air compressors) to the project sites. Construction and drilling of the well facilities would be conducted all day (24 hours a day), with crews working in two shifts per day. Crew size for well construction and drilling would require between 12 and 15 workers per shift. Two well facilities could be constructed concurrently, thus requiring a total of two crews (up to 30 workers per shift). Based on these estimates, the construction and drilling of the well facilities would generate up to 44 haul trucks, and accounting for worker commute trips and miscellaneous midday trips, approximately 38 worker vehicles would travel to and from the well sites per day. Therefore, construction and drilling of the well facilities would generate approximately 82 vehicle round trips (164 one-way trips) per day.

Power plant construction (for each phase of construction) would require an average of approximately 10 haul trucks for delivery of materials per day, and up to 15 haul trucks per day during peak construction periods. Construction of the power plant would be conducted on weekdays (6:00 a.m. to 6:00 p.m.), and no nighttime activities would occur. Construction would require up to 80 workers onsite per day. Based on these estimates, the construction of the power

plant would generate up to 15 haul trucks, and accounting for worker commute trips and miscellaneous midday trips, about 100 worker vehicles would travel to and from the power plant site per day. As a result, construction of the power plant would generate approximately 115 vehicle round trips (230 one-way trips) per day for each phase of construction.

The construction and installation of geothermal, production and injection pipelines during only Phase I of construction would require up to 5 haul trucks to travel to and from the project sites during a typical workday. Construction and installation activities would also require approximately 40 to 60 workers per day. Activities would occur on weekdays (6:00 a.m. to 6:00 p.m.), and no nighttime activities would occur. Based on these estimates, the construction and installation would generate up to 5 haul trucks, and accounting for worker commute trips and miscellaneous midday trips, approximately 75 worker vehicles would travel to and from the work sites per day. As a result, construction and installation of the pipelines would generate approximately 80 vehicle round trips (160 one-way trips) per day.

Construction Vehicle Trip Distribution

It is anticipated that the majority (about 70 percent) of the construction workforce for the CD-IV Project would be drawn from out of the project area and would require housing in local hotels or rental apartments and houses in nearby communities (e.g., Mammoth Lakes, Bishop). About 30 percent of the construction workforce is expected to reside in local towns and cities near the Project area.

Operations and Maintenance

After construction of the CD-IV Project is completed, these facilities would not require any haul trucks or construction vehicles. An additional six new employees would be added to the current workforce at the existing geothermal facilities to perform operations and maintenance activities for the new facilities. Routine maintenance activities would include regular plowing of roadways during the winter season to maintain access to the power plant and production wells; however, injection wells would not require winter plowing. As a result, once the facilities are fully operational, approximately six new vehicle trips would be generated (up to 12 one-way trips) per day.

Decommissioning

As discussed in Section 2.2.8, *Project Decommissioning*, the proposed power plant would be in operation over a 30-year period. At the end of this period, the CD-IV Project would cease operation, and at that time all facilities would be decommissioned and dismantled, and the site and all new access roads, no longer needed, would be restored to pre-existing conditions (see **Mitigation Measure TRA-1**, Section 4.16.9).

Decommissioning of the site would include removal of all equipment and buildings on-site (e.g., power plant, well pads, and geothermal wells), as well as excavation to remove underground facilities (e.g., well heads). The workforce required during these activities would be similar to construction activities, as described above. As such, decommissioning activities would

result in a maximum of 64 daily haul truck trips, up to 213 daily worker trips, and would require approximately 12 months to complete.

4.16.1.2 Emergency Access

Construction along affected public roadways could result in impaired access to other NFSRs, and subsequently to existing recreational areas (e.g., campground, information centers), trails, multi-use paths, and other existing buildings for both general and emergency vehicles in the vicinity of the work sites (see Section 4.14, *Recreation*, for additional information regarding access to recreational uses for emergency vehicles). This disruption could be particularly problematic for emergency service providers (e.g., police and fire).

4.16.1.3 Traffic Safety

Implementation of the proposed CD-IV Project and its facilities would involve work adjacent to existing public roadways, with potential traffic safety hazards due to conflicts where construction vehicles access a public right-of-way from the project area; or increased truck traffic in general (and their slower speeds and wider turning radii) during construction. Traffic safety hazards could also occur where delivery and haul trucks share the roadway with other vehicles, bicyclists, and pedestrians.

4.16.1.4 Alternatives Modes of Transportation

As discussed in Section 3.16.1, *Environmental Setting*, there are transit routes, bicycle facilities (shared road bicycle routes, and paths), and pedestrian paths and trails that operate on, or are located along, roadways, or are adjacent to the planned CD-IV Project facilities. The increase in construction-, operation-, and decommission-related traffic and presence of haul trucks along adjacent roadways could potentially disrupt transit service as well as potentially conflict with, or result in impaired access to users of, existing bicycle and pedestrian facilities.

4.16.2 Project Design Measures

The analysis assumes that the following PDMs related to traffic, transportation and circulation are fully implemented:

1. *TR-1*: ORNI 50, LLC will meet Caltrans' encroachment permit requirements in order to construct the pipeline under U.S. Highway 395.

2. *TR-2*: ORNI 50, LLC will maintain Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08) during construction operations to ensure that the road beds are equal to pre-construction conditions.

3. *TR-3*: Project vehicles will not block Sawmill Road (03S25) or Sawmill Cutoff Road (NFSR 03S08) by either waiting or parking on either road.

4. *TR-4*: Where the pipeline will be constructed under existing roads by open trench construction and restricting public access, appropriate traffic control measures will be established to warn traffic of temporary road closures.

5. *TR-5*: For those sections of the pipeline not immediately adjacent to an access road, pipeline construction equipment will "catwalk" over the top of the existing vegetation without removing it to avoid the need to grade the pipeline route or an access road and minimize both ground disturbance and visual impact. Vehicle access to these off-road construction areas will be limited to that specifically necessary for construction. No vehicles will be allowed to turn or drive in any area beyond a 20-foot wide temporary construction corridor along the pipeline route.

6. *TR-6*: ORNI 50, LLC will attempt to work with the Town of Mammoth Lakes and the USFS to plow the road to and the parking lot at Shady Rest Park in the winter to better accommodate recreational traffic and parking for cross-country skiers and snowmobilers which will eliminate Ormat's need to plow Sawmill Road (03S25) in the winter. This plan will provide the majority of the winter access for the new well pads proposed for the CD-IV Project.

7. *TR-7*: All vehicle traffic will be restricted to designated access roads. Project-related vehicles will be restricted to travelling no faster than 25 mph on Sawmill Cutoff Road (NFSR 03S08) and on other unimproved roads in the project area.

4.16.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to hazards and hazardous materials if it would:

a) Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit, non-motorized travel, and relevant components of the circulation system (including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit);

b) Conflict with an applicable congestion management program, including, but not limited to, level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in locations that results in substantial safety risks;

d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);

e) Result in inadequate emergency access; or

f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

4.16.4 Alternative 1: Proposed Action

4.16.4.1 Direct and Indirect Impacts

Increased Traffic on Regional and Local Public Roadways

Construction

Construction of each project component would result in short-term (up to 16 months) increases in the above-described vehicle trips on area roadways. The number of construction-related vehicle trips would vary each day, depending on the type of project component, construction phase, planned activity, and material needs. As such, the actual impact of construction vehicle traffic on local and regional public roadways would vary by the time of day, the number and type of construction-related vehicles, the number of travel lanes on the affected roadways, and the existing traffic volumes on the roadways. Impacts of construction traffic would be most noticeable on roadways in the immediate vicinity of the project work sites (e.g., NFSRs and local public roads that provide access to NFSRs) and less noticeable on roadways farther away from the sites (as project trips disperse over the road network) and on higher-volume regional roadways (e.g., U.S. Highway 395 and SR 203). Furthermore, because construction of the facilities would occur simultaneously within each phase of the project, construction activities could cause a compounded increase in traffic volumes, worsening traffic conditions along affected public roadways.

Based on the estimated amount of traffic generated by the proposed action, concurrent construction activities would result in as many as 213 worker trips and 64 haul truck trips on a daily basis, resulting in up to 554 one-way trips per day (primarily during the daytime hours). Generally, worker trips to and from the work sites would occur outside typical peak commute periods (i.e., commute trips prior to the a.m. peak traffic hours [7:00 a.m. to 9:00 a.m.] and after the p.m. peak hours [4:00 p.m. and 6:00 p.m.], with possible miscellaneous midday trips). Haul truck trips would be spread over the course of the day. Based on the fact that the well pads and pipeline alignments are not all located proximate to each other, and on the reasonable expectation that the workers' residences would be spread among nearby cities and towns, and project trips would be dispersed on different roads, the estimated daily vehicle trips associated with concurrent construction activities would represent between 8 and 14 percent of existing traffic volumes on regional roads (e.g., U.S. Highway 395 and SR 203). While more noticeable on two-lane local County-maintained roads (e.g., Antelope Springs Road and Sawmill Road (03S25)), the increased traffic volumes would remain at levels less than the carrying capacity of those roads (which is about 10,000 to 15,000 vehicles per day). In addition, no roadway or lane closures along regional or County-maintained roadways would occur (as stated in the above-mentioned PDMs, see Section 4.16.2).

As described in Section 3.16.1.2, *CD-IV Access*, construction vehicles would be required to use existing NFSRs to access the work sites. These roadways consist of paved and unpaved, one- and two-lane, curvilinear and sloping facilities that provide vehicular access and non-vehicular (bicycle, pedestrian) access to multiple scenic locations and recreational areas (picnic areas, campgrounds, information centers, etc.). As stated at the start of this section, the analysis of

potential environmental consequences of the Proposed Action and Alternatives in this section focuses on the possible impacts to traffic flow (i.e., increases in delay experienced by motorists) caused by the Project, and not impacts on low-volume roadways owned and/or maintained by the USFS, or on access provided to recreational users of such roadways. Traffic volumes on the affected NFSRs are low enough that the Project would have no material effect on traffic flow on those roads. A detailed description of NFSRs and the extent to which the CD-IV Project would affect access along NFSRs during construction activities is provided in Section 4.14, *Recreation*.

As noted in the PDMs (see Section 4.16.2), ORNI 50, LLC would minimize any restrictions to vehicular access along County-maintained, public roadways during construction activities, and would apply appropriate measures to ensure traffic flow along affected roadways during construction. Furthermore, ORNI 50, LLC would perform traffic control measures to provide appropriate travel route information for construction materials, construction workers, and also identify the process for complying with any State requirements and obtaining necessary permits. Traffic control measures would also be expected to reduce any potential adverse effects to the local and regional circulation system because these control measures would reduce construction-related traffic impacts on the roadways at, and near the work sites, reduce potential traffic safety hazards, and ensure adequate access for emergency responders. Because the construction of the CD-IV Project and its facilities would include these aforementioned measures, the increase in traffic from the CD-IV Project would not result in any adverse effects to the public roadways.

Operation and Maintenance

After construction of the CD-IV Project is completed, these facilities would not require any haul trucks or construction vehicles. As stated, existing personnel and about six new employees would be required to perform operations and maintenance activities of the new facilities. Routine maintenance activities would include regular plowing of roadways during the winter season to maintain access to the power plant and production wells; however, injection wells would not require winter plowing.

As a result, once the facilities are fully operational, approximately six new vehicle trips would be generated (up to 12 one-way trips). This marginal increase in vehicle trips during long-term operations would be negligible compared with existing traffic conditions. Therefore, the increase in traffic on surrounding public roadways from the CD-IV Project during operation and maintenance activities would not result in any adverse impacts to the existing network.

Decommissioning

Decommissioning activities and the number of workers and trucks required during such activities of the CD-IV Project and its components would be similar to the peak construction activities, as described above, and the increased traffic during decommissioning would have a similar effect on traffic conditions as during construction. Therefore, as discussed under construction activities, implementation of the PDMs during decommissioning of the CD-IV Project would result in no adverse effects to the existing network.

Emergency Access

Construction and Decommissioning

Construction and decommission activities would occur adjacent to existing public roadways and although no temporary lane closures are anticipated along public roadways, the potential of such temporary (up to 16 months) closures along these roads could result in impaired access to existing buildings and other recreational areas for both general and emergency vehicles in the vicinity of the work sites. Furthermore, SR 203 is designated as an evacuation route for the Town of Mammoth Lakes. Disruption to traffic flow on this roadway during construction and decommission activities could result in an adverse impact to emergency access. The PDMs listed above (i.e., TR-3 and TR-4) would ensure that access along public roadways for general and emergency vehicles would be maintained at all times by prohibiting vehicles from blocking roadways. Therefore, the CD-IV Project would result in no adverse effects to emergency access.

Operation and Maintenance

Once construction of the CD-IV Project is completed, existing public roadways and USFS routes would provide permanent access. Internal access roads would be used during operation and maintenance activities; these access roads would be approximately 15 feet wide, and would consist of unpaved, compacted road base.

Existing public roadways, ancillary NFSRs, and a series of access roads would be provided at the various project sites, and implementation of PDMs would maintain access along public roadways during all seasons. In order to maintain access during the winter season, “Snow Removal and Storage” Best Management Practice (BMP) (12.21 Exhibit 09, BMP 2.9), from the Soil and Water Conservation Handbook, would be applied as appropriate (See Appendix B, USFS, 2012). Additionally, PDM TR-6 states that during operation and maintenance of the project, access along public roadways and recreational facilities would be maintained through snow plowing. Based on these findings, the CD-IV Project would result in no adverse effects to emergency access during operation and maintenance activities.

Traffic Safety

Construction and Decommissioning

As described above, the percent increase in daily traffic volumes resulting from construction traffic generated by the CD-IV Project and decommissioning activities would not be substantial relative to the background traffic volumes on regional and local public roadways used to access various project sites; however, project traffic could temporarily (up to 16 months) disrupt traffic flows on these roadways and noticeably exacerbate conditions along narrow public roads (e.g., Sawmill Road (03S25), Sawmill Cutoff Road (NFSR 03S08), Antelope Springs Road (03S05)). Potential conflicts between construction- and decommission-related traffic and all other travel modes along affected roadways are considered adverse effects.

Implementation of PDMs, above**,** and the application of appropriate traffic control measures would minimize potential adverse traffic safety hazards for vehicles, bicyclists, and pedestrians

on public roadways due to construction- and decommission-related activities and vehicle trips, and would reduce any adverse effects related to temporary conflicts with traffic safety hazards.

Operation and Maintenance

The CD-IV Project and its facilities would not result in an increase in hazards once built and operational. The minimal amount of traffic associated with operation and maintenance activities at the various sites would not be substantial relative to background traffic volumes on public roads used to access project facilities, and would not result in any adverse traffic hazards on adjacent public roadways. Therefore, the CD-IV Project would not result in any adverse effects to traffic hazards during operation and maintenance activities.

Alternative Modes of Transportation

Construction and Decommissioning

As described in Section 3.16.1.3, *Public Transportation within the Vicinity of the CD-IV Project*, alternative transportation facilities located within the project area include bus transit service, bicycle paths, bicycle lanes, and pedestrian multi-use trails and paths.

The increases in traffic volumes generated by construction and decommission activities, and the presence of haul trucks along SR 203, could potentially disrupt transit service or cause the slowing of buses on Eastern Sierra Transit Authority routes, as well as potentially conflict with cyclists along the existing Class III bicycle route along the roadway. In addition, the influx in traffic along Sawmill Cutoff Road (NFSR 03S08) could restrict access to other facilities for cyclists traveling along the existing Class I bicycle path and could restrict access to the existing campground area east of Sawmill Cutoff Road (NFSR 03S08). Potential adverse effects to bicycle and pedestrian access along NFSRs by the CD-IV Project are discussed in Section 4.14, *Recreation*.

However, construction and decommission of the CD-IV Project would not permanently eliminate or modify alternative transportation corridors or facilities. In addition, such activities associated with the planned facilities would not include changes in policies or programs that support alternative transportation. Implementation of the PDMs (listed above) would reduce any adverse effects related to temporary (up to 16 months) conflicts regarding impaired access to alternative transportation facilities and temporary reduction in performance and safety of such facilities.

Operation and Maintenance

As stated under construction activities, the CD-IV Project and its facilities would not permanently eliminate or modify alternative transportation corridors or facilities, nor would the CD-IV Project result in any adverse effects related to policies or programs that support such facilities.

4.16.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (construction, operation and maintenance, decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.2.2.

a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit.

Construction and Decommissioning

As discussed above, construction and decommissioning of each project component would result in short-term (up to 16 months) increases in vehicle trips on area roadways. The number of construction- and decommission-related vehicle trips would vary each day, depending on the type of project component, construction phase, planned activity, and material needs. The actual impact of vehicle traffic on local and regional public roadways would vary by the time of day, the number and type of construction- and decommission-related vehicles, the number of travel lanes on the affected roadways, and the existing traffic volumes on these public roadways. Impacts of construction and decommission traffic would be most noticeable on public roadways in the immediate vicinity of the project work sites (e.g., Antelope Springs Road and Sawmill Road (03S25)) and less noticeable on roadways farther away from the sites (as project trips disperse over the road network) and on higher-volume regional roadways (e.g., U.S. Highway 395 and SR 203).

Based on the estimated amount of traffic generated by the CD-IV Project, the estimated daily vehicle trips associated with concurrent construction and decommission activities would represent between 8 and 14 percent of existing traffic volumes on regional roads (e.g., U.S. Highway 395 and SR 203). While more noticeable on two-lane local public roadways, the increased traffic volumes would remain at levels less than the carrying capacity of those roads (which is about 10,000 to 15,000 vehicles per day).

Because the construction of the CD-IV Project would include PDMs that address the need to maintain access and traffic flow, and implement traffic control measures during construction and decommission activities, these measures would reduce this impact related to temporary conflicts with established policies regarding transportation system performance to a less-than-significant level.

Operation and Maintenance

As described above, increases in traffic associated with the operations and maintenance activities would not be substantial relative to existing conditions, and the CD-IV Project would not adversely affect traffic conditions over the course of a workday. In addition, these activities would not result in the permanent closure of public roads or travel lanes. Lastly, the minimal

amount of traffic generated by the CD-IV Project would not interrupt, interfere with, or limit access to any transit, bicycle, and pedestrian facilities in proximity to the site. This impact would be less than significant.

b) Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways.

The level of service (LOS) standards established by the Mono County Local Transportation Commission (the congestion management agency) and documented congestion management plan (CMP) are intended to regulate long-term traffic impacts due to future development and do not apply to temporary construction projects. The CD-IV Project would require periodic operations evaluation and maintenance, similar to existing facilities, and operations would result in up to six additional daily vehicle trips over an extended period of time. Because the CD-IV Project would not result in long-term impacts on the roadways used to access the work sites, consideration of LOS impacts on CMP roadways or local roadways during operation of the project components is not applicable [note, however, that criterion a) above, addresses short-term (up to 16 months) effects on service levels (traffic congestion) related to roadway capacity during project construction]. Therefore, impacts related to applicable CMP standards would be less than significant.

c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risks.

The nearest airport to the Project site is Mammoth Yosemite Airport, located approximately 4 miles east of the site. The CD-IV Project would not change air traffic patterns, increase air traffic levels, or result in a change in location that would result in substantial safety risks. Therefore, the construction, operation, maintenance, and decommissioning of the CD-IV Project or any of the Alternatives would cause no impact related to this criterion.

d) Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment).

Construction and Decommissioning

As discussed above, the CD-IV Project would not change the roadway network, but truck trips associated with the construction and decommissioning of the proposed facilities on the CD-IV Project site would temporarily change the mix of vehicle types on area roads. During construction, there would be work that would occur adjacent to existing public roadways. Traffic safety hazards could occur due to: (1) conflicts where construction vehicles access a public right-of-way from the Project area; (2) conflicts where road width is narrowed; or (3) increased truck traffic in general (and their slower speeds and wider turning radii) during construction and decommissioning.

As described with respect to CEQA significance criterion a), above, the increase in traffic volumes resulting from construction and decommissioning-related traffic generated by the CD-IV Project would not be substantial relative to the background traffic volumes on public roads used

to access NFSRs and the various work sites. However, impacts associated with the potential conflicts between Project-related traffic and all other travel modes would be considered potentially significant. Implementation of PDMs, through the application of appropriate traffic control measures and maintaining access to public roadways during temporary construction and decommissioning activities, would minimize potential adverse traffic safety hazards on adjacent public roadways due to Project-related activities and vehicle trips, and would reduce this potential impact to a less-than-significant level. For discussion of construction and decommission activities and potential adverse effects to NFSRs, see Section 4.14, *Recreation*.

Operation and Maintenance

The CD-IV Project and its facilities would not result in an increase in hazards due to a design feature once built and operational. The minimal amount of traffic associated with operation and maintenance activities at the project site would not be substantial relative to background traffic volumes on public roads used to access the site, and would not result in any adverse traffic hazards on adjacent public roadways. Therefore, impacts to traffic hazards during operation and maintenance activities would be less than significant.

e) Result in inadequate emergency access.

Construction and Decommissioning

Construction and decommissioning activities would occur along specific corridors and easements, with no lane closures along public roadways. Drivers of vehicles traveling behind a slow-moving heavy truck would be slowed, but rules of the road dictate that emergency vehicles have the right-of-way, and Project-related activities would not substantially impair emergency access. In addition, public roadways damaged by construction- or decommission-related activities would be repaired to pre-existing conditions, where applicable (see PDM TR-2). Therefore, with implementation of PDMs and appropriate traffic control measures, this impact would be less than significant.

Operation and Maintenance

As discussed above, once construction of the CD-IV Project is completed, existing public roadways, NFSRs, and a series of access roads would be provided at the various sites, and these roadways would accommodate both general and emergency vehicles. Furthermore, the application of the “Snow Removal and Storage” BMP and through PDM TR-2, which includes the need to plow snow to maintain access during the winter season, would also reduce any impacts related to emergency access (See Appendix B for Snow Removal and Storage BMPs). As a result, the implementation of PDMs and the need for continued access to the project site would reduce any impacts to a less-than-significant level.

f) Conflict with adopted policies, plans or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Construction and Decommissioning

As discussed above, construction of the CD-IV Project would not permanently eliminate or modify alternative transportation corridors or facilities, nor would construction and decommissioning activities include changes in policies or programs that support alternative transportation. Furthermore, implementation of PDMs and the use of traffic control measures to maintain access and traffic flow along public roadways, would reduce potential impacts related to temporary (up to 16 months) conflicts regarding impaired access to alternative transportation facilities and temporary reduction in performance and safety of such facilities to a less-than-significant level.

Operation and Maintenance

The CD-IV Project during operation and maintenance activities would not reduce, disrupt, or eliminate access to existing bicycle and pedestrian facilities. As a result, the effect on alternative transportation facilities due to these activities of the CD-IV Project would be less than significant.

4.16.5 Alternative 2: Plant Site Alternative

4.16.5.1 Direct and Indirect Impacts

Increased Traffic on Regional and Local Public Roads

Potential impacts related to the increase in traffic on public roadways during construction, operation and maintenance, and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects to the regional and local circulation network.

Emergency Access

Potential impacts related to emergency access during construction, operation and maintenance, and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects related to access for emergency and general vehicles.

Traffic Safety

Potential impacts related to traffic safety during construction, operation and maintenance, and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects to hazards on adjacent roadways.

Alternative Modes of Transportation

Potential impacts related to alternative modes of transportation (including transit, bicycle, and pedestrian facilities) during construction, operation and maintenance, and decommissioning of Alternative 2 would be the same as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects to these facilities and users of such facilities.

4.16.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 2 would be less than significant.

4.16.6 Alternative 3: Modified Pipeline Alternative

4.16.6.1 Direct and Indirect Impacts

Increased Traffic on Regional and Local Public Roads

Potential impacts related to the increase in traffic on public roadways during construction, operation and maintenance, and decommissioning of Alternative 3 would be the same as described for the Proposed Action, as Alternative 3 would include the same components; however would emplace a small number of planned pipelines (production and injection pipelines) and well pads in different locations, than proposed under the Proposed Action (see Section 2.4.3.1 in Chapter 2). Alternative 3 would require the same amount of workers, vehicles, and haul trucks. Therefore, implementation of the PDMs would continue to be required under Alternative 3, and would reduce any adverse effects to the regional and local circulation network.

Emergency Access

Potential impacts related to emergency access during construction, operation and maintenance, and decommissioning of Alternative 3 would be similar as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects related to access for emergency and general vehicles.

Traffic Safety

Potential impacts related to traffic safety during construction, operation and maintenance, and decommissioning of Alternative 3 would be similar as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects to hazards on adjacent roadways.

Alternative Modes of Transportation

Potential impacts related to alternative modes of transportation (including transit, bicycle, and pedestrian facilities) during construction, operation and maintenance, and decommissioning of Alternative 3 would be similar as described for the Proposed Action. Implementation of the PDMs would reduce any adverse effects to these facilities and users of such facilities.

4.16.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 3 would remain less than significant.

4.16.7 Alternative 4: No Action

4.16.7.1 Direct and Indirect Impacts

Increased Traffic on Regional and Local Public Roads

The No Action Alternative would not include construction, operation and maintenance, and decommissioning of the CD-IV project pipelines, wells and power plant. Therefore there would be no impacts on traffic and transportation.

However, up to 11 geothermal exploratory wells could be constructed in the Basalt Canyon area, which have been approved previously. Although not part of the CD-IV project, traffic impacts related to well construction would be similar to the Proposed Action. Comparatively, these well exploration activities would generate much less traffic along existing public roadways compared with the Proposed Action and consequently would not result in any impacts to the local and regional circulation network.

Emergency Access

Except for negligible amounts of traffic associated with exploratory well development approved previously, vehicular access throughout the area under the No Action Alternative would be similar to existing conditions. Therefore, the No Action Alternative would result in no adverse effects to access for emergency and general vehicles.

Traffic Safety

Except for negligible amounts of traffic associated with exploratory well development approved previously, traffic conditions under the No Action Alternative would be similar to existing conditions. Therefore, the No Action Alternative would not result in any adverse effects to hazards on adjacent roadways.

Alternative Modes of Transportation

Except for negligible amounts of traffic associated with exploratory well development approved previously, traffic conditions under the No Action Alternative would be similar to existing conditions. Therefore the No Action Alternative would not result in any adverse effects to existing transit, bicycle, and pedestrian facilities or users therein, nor would the alternative conflict with any policies or programs that support such facilities.

4.16.7.2 CEQA Significance Determination

The No Action Alternative would generally result in no impacts to transportation and circulation. However, there could be a slight temporary increase in traffic related to development of up to 11 geothermal exploratory wells approved previously compared with existing conditions,

4.16.8 Cumulative Impacts

4.16.8.1 Geographic Extent/Context

For the purposes of the cumulative analysis of transportation and traffic impacts, only those other projects that make or would make a substantial contribution to traffic at the same public roadway segments as the CD-IV Project (e.g., SR 203, U.S. Highway 395, Sawmill Road (03S25), Sawmill Cutoff Road (NFSR 03S08), Old Highway 395) are considered. Because the volume of traffic generated during construction and decommissioning would occur over a short period of time and the increase in traffic from the CD-IV Project would be substantially less during operation and maintenance activities, only segments of SR 203 and U.S. Highway 395 in proximity to the CD-IV Project site would experience any appreciable increase in traffic. Therefore, the geographic scope for cumulative impacts consists of the immediate vicinity of the CD-IV Project sites where other projects might contribute traffic to the same segments of SR 203 and U.S. Highway 395. The temporal scope for cumulative traffic impacts includes the construction, operation and maintenance, and decommissioning phases of the CD-IV Project, because each phase would contribute traffic to roadways within the geographic scope.

4.16.8.2 Existing Cumulative Conditions

For the CD-IV Project, existing cumulative conditions include projects identified in Table 4.1-1, Section 4.1.5, *Cumulative Scenario Approach*. Table 4.1-1 identifies which renewable projects, other BLM authorized actions, and other known actions or activities are located or would occur within the cumulative analysis impacts area. The majority of projects listed in Table 4.1-1 have been, are being, or would be required to undergo their own independent environmental review under NEPA or CEQA or both, as applicable.

Notably, each project listed in Table 4.1-1 would have its own implementation schedule, which may or may not coincide or overlap with the CD-IV Project's schedule. However, to be conservative, the cumulative analysis assumes that all projects in the cumulative scenario are built and operating during the operating lifetime of the CD-IV Project.

4.16.8.3 Reasonably Foreseeable Projects

Development near the CD-IV Project area includes those projects listed in Table 4.1-1. The majority of the projects listed in the table have been implemented, are in the planning phases, or are to be constructed in the future; therefore, traffic associated with most of these projects would contribute to ongoing operational traffic to area roadways during the CD-IV Project's construction, operation and maintenance, and decommissioning phases. More so, traffic

associated with past projects are included in existing traffic volumes on the road network and, therefore, is accounted for as part of existing conditions for the CD-IV Project evaluated in Section 4.16.4.1, *Direct and Indirect Impacts*, above. Other foreseeable projects listed in Table 4.1.1 that are in the planning phase or are to be constructed in the future have the potential to affect the regional and local road network, and would generate traffic along the same public roadways as the CD-IV Project.

4.16.8.4 Construction

Cumulative impacts would be greatest if the peak construction period of all of these projects overlapped. Although this worst-case scenario is unlikely, even if it were to occur, it is unlikely that traffic conditions of the affected regional and local public roadways would degrade to unacceptable service levels because roadways near the CD-IV Project have a carrying capacity of about 10,000 to 15,000 vehicles per day (i.e., much more than current traffic volumes). Additionally, Project-generated traffic during any phase would not be substantial enough to degrade conditions along public roadways nor result in the exceedance of existing roadway capacities.

Cumulative impacts to segments of SR 203 and U.S. Highway 395 have been considered because it is likely that construction vehicle trips from foreseeable future projects and the CD-IV Project would have the greatest potential to combine cumulatively on these regional roadways. It is likely that a portion of construction traffic, including worker and haul trucks, for projects currently planned or to be construction in future years would traverse the same portion of SR 203 and U.S. Highway 395 as Project construction-related traffic. For example, the *Digital 395 Middle Mile Project*, as presented in Table 4.1.1, would begin construction in 2012 and would include the construction of a new 583-mile, fiber network that would mainly follow U.S. Highway 395. As such, construction-related traffic associated with the Digital 395 Project could utilize the same regional public roadways as construction vehicles associated with the CD-IV Project; thereby resulting in a compounded increase in traffic along U.S. Highway 395 during a short-term period. However, because there is no indication of when construction would begin for the CD-IV Project, the increase in traffic along U.S. Highway 395 from both the Digital 395 Project and the CD-IV Project may not occur.

Furthermore, although the construction period, workforce, and schedule for the majority of foreseeable future projects are generally unknown, in a worst-case scenario where construction peak periods overlap for all projects proposed in the CD-IV Project area, service levels along these public roadways could be temporarily degraded, but likely would not be degraded below acceptable conditions, and would not result in any permanent degradation. Levels of congestion along these regional roadways could be adversely affected due to the temporary (up to 16 months) influx of construction-related traffic; however, even a worst-case scenario would not likely exceed the capacity of these roadways, which in this area, public roadways have two lanes in both directions to accommodate the anticipated increase in traffic while maintaining adequate traffic flow along the freeway mainline.

The PDMs described in Section 4.16.2, above, would reduce the Project's construction-related contribution to cumulative traffic impacts. However, because the exact extent of construction

traffic overlap cannot be known at this time, it is possible that service levels along these roadways could be temporarily degraded. Therefore, even with implementation of the PDMs during construction of the CD-IV Project, implementation of a coordinated transportation management plan is recommended to reduce the Project's contribution to any potential traffic impacts to the surrounding network. Therefore, in addition to the established PDMs, implementation of **Mitigation Measure TRA-1** is required to reduce potential cumulative traffic impacts and ensure that adverse cumulative effects would be avoided.

4.16.8.5 Operation and Maintenance

Project operation and maintenance is estimated to generate a net new total of about 12 daily trips, with these trips likely occurring during normal hours of operations (trips arriving during the a.m. peak hour and departing during the p.m. peak hour). Given that roadways near the CD-IV Project have a carrying capacity of about 10,000 to 15,000 vehicles per day (i.e., much more than current traffic volumes), the addition of 12 daily trips during the operation and maintenance phase of the CD-IV Project would be unlikely to contribute substantially to adverse cumulative traffic impacts.

4.16.8.6 Decommissioning

During the closure and decommissioning of the CD-IV Project, the number and proximity of cumulative projects in 30 years (expected life of the power plant and related facilities) is unknown. However, it is reasonable to expect that the analysis of cumulative construction impacts discussed above could also occur during decommissioning, and that **Mitigation Measure TRA-1** implemented during construction activities also would be applicable to decommissioning activities. Consequently, after PDMs (see Section 4.16.2) and implementation of **Mitigation Measure TRA-1**, the CD-IV Project's incremental contribution to any cumulative effect to circulation and traffic during decommissioning would not be substantial.

4.16.8.7 CEQA Significance Determinations

For the reasons described above, with implementation of PDMs and **Mitigation Measure TRA-1** the CD-IV Project's contribution to the cumulative impact to transportation and circulation conditions, in combination with other cumulative projects, would not be substantial and therefore would not be cumulatively considerable.

4.16.9 Mitigation Measures

Mitigation Measure TRA-1: Prior to construction and/or decommissioning, ORNI 50, LLC shall develop a Coordinated Transportation Management Plan and work with Mono County to prepare and implement a transportation management plan for roadways adjacent to and directly affected by the planned CD-IV Project facilities, and to address the transportation impact of the overlapping construction projects within the vicinity of the CD-IV Project in the region. The transportation management plan shall include, but not be limited to, the following requirements:

1. Coordination of individual traffic control plans for the Project and nearby projects.

2. Coordination between the contractor and Mono County in developing circulation and detour plans that include safety features (e.g., signage and flaggers). The circulation and detour plans shall address:

    a. Full and partial roadways closures

    b. Circulation and detour plans to include the use of signage and flagging to guide vehicles through and/or around the construction zone, as well as any temporary traffic control devices

    c. Bicycle/Pedestrian detour plans, where applicable

    d. Parking along public roadways

    e. Haul routes for construction trucks and staging areas for instances when multiple trucks arrive at the work sites

    f. Repairing and restoring affected roadway rights-of way to their original condition after construction and decommissioning are completed, where applicable.

3. Protocols for updating the transportation management plan to account for delays or changes in the schedules of individual projects.

4.16.10 Residual Impacts after Mitigation Incorporated

Following the implementation of PDMs and Mitigation Measure TRA-1, the amount of Project-generated traffic within the area would not exceed thresholds and would not cause or contribute to adverse effects, either individually or cumulatively.

4.17 Utilities and Public Services

4.17.1 Methodology for Analysis

This section describes the conditions related to utilities and public services that would occur during construction, operation and maintenance, and decommissioning of the CD-IV Project and alternatives. The methods for analysis and the CEQA significance criteria are followed by direct and indirect impact discussions and CEQA significance conclusions for the CD-IV Project and alternatives. Cumulative impacts and mitigation measures to reduce any cumulative impacts also are identified.

4.17.1.1 Capacity of Utilities and Public Services

Regarding fire response and police protection matters, this analysis evaluates the CD-IV Project's effects on fire and police agencies' need for new or expanded facilities, the construction of which would result in adverse environmental impacts. Local fire and police department capabilities and performance goals are reviewed and compared to conditions with implementation of the CD-IV Project. Potential effects regarding wildland fire hazards and emergency response or evacuation routes are described in Section 4.13, *Public Health and Safety, Hazardous Materials, and Fire*. Regarding schools and other public facilities, this analysis evaluates the direct and indirect effects of the CD-IV Project on the capacity of these facilities to serve the appropriate populations within the relevant service goals and policies set forth in planning and policy documents. Water demands were evaluated in comparison with the available water supply and historic regional water consumption levels. Projected wastes were evaluated in terms of landfill capacity and compliance with applicable laws, ordinances, regulations, and policies, for both solid wastes and wastewater.

4.17.2 Project Design Measures

The analysis assumes that the following PDMs related to public services and utilities would be fully implemented:

1. *PSU-1*: Solid waste materials generated during project construction will either be collected by a licensed waste hauler or transported by ORNI 50, LLC and deposited at a facility authorized to receive and dispose of these materials. Portable chemical sanitary facilities will be used by all personnel. These facilities will be maintained by a local contractor.

4.17.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to public services or utilities if it would:

a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as fire protection, police protection, schools, parks, or other services;

b) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;

c) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

d) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;

e) Not have sufficient water supply available to serve the project from existing entitlements and resources, or require new or expanded water supply resources or entitlements;

f) Result in a determination by the wastewater treatment provider that would or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;

g) Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs; or

h) Not comply with federal, state, and local statutes and regulations related to solid waste.

Potential impacts related to increased demand on existing parks are addressed in Section 4.14, *Recreation*.

4.17.4 Alternative 1: Proposed Action

4.17.4.1 Direct and Indirect Impacts

Capacity of Utilities and Public Services

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following Project phases: construction; operation and maintenance; and decommissioning.

Public Services

Construction

Although Project construction would be temporary, construction-related population increases could occur in the local service area during a period of up to two years, particularly if as described in Section 4.12, *Population and Housing*, construction workers commute weekly to the local service area and make use of temporary housing options. This period could be long enough to affect planning for public service needs. Project construction would result in an increase of up to 120 workers at peak times.

Fire Protection. Although some construction workers are expected to temporarily move into the service area of the local fire protection districts from elsewhere, there are currently enough vacant housing units and hotels to accommodate them without the construction of new housing units. Substantial fire prevention, control, and response measures have been integrated into the CD-IV

Project. These measures are described in Chapter 2, *Proposed Action and Alternatives*, and Section 4.13, *Public Health and Safety, Hazardous Materials, and Fire* and include PDM HAZ-9, which would require ORNI 50, LLC to prepare and implement an Emergency Contingency Plan that would decrease the risk of fires and include fire response measures that employees would implement before emergency responders arrive on-site. The CD-IV Project would not adversely affect the ability of the local fire protection districts serving the project area to maintain acceptable response times for service to the Project site or result in the need for a new or expanded fire protection facility.

Police Protection. Although some construction workers are anticipated to temporarily move into the service area of the Mammoth Lakes Police Department or the Mono County Sheriff's Department from elsewhere, both could accommodate the small temporary increase in population while maintaining acceptable service ratios.

Schools. Although some construction workers are expected to temporarily move into the local area during construction, typically non-local skilled workers do not bring their families with them for short-term construction assignments. The short duration of the construction period, in combination with the anticipated low numbers of temporary construction workers that would move to the area permanently, would be expected to result in little demand for additional school services as a result of the CD-IV Project.

Operation and Maintenance

The CD-IV Project would result in approximately six full-time personnel workers during operation and maintenance, which is expected to last 30 years. Although operation and maintenance of the CD-IV Project would be long-term, even if all six full-time workers moved into the area from elsewhere this small increase would be expected to have negligible effect on the provision of public services in the CD-IV Project.

Decommissioning

Because decommissioning would require a similar number of workers as the construction phase, it would have a similar effect on the provision of public services in the Project vicinity compared to the construction phase, described above.

Utilities

Construction, Operation and Maintenance

Construction of the CD-IV Project would require up to 25,000 gpd of water for production and injection well drilling. Water requirements for well pad, road, pipeline, power plant, and substation construction, and dust control (all activities other than drilling) would average up to 20,000 gpd. One portable water tank holding at least 10,000 gallons would be maintained in the project area during construction. Two water trucks would be used to transport water to the site and would also be used to water roads for dust control. Potential water sources for the construction period include:

1. Casa Diablo power plant service water (non-potable shallow ground water used at the existing Casa Diablo geothermal plants for irrigation and other plant service purposes)

2. Casa Diablo power plant geothermal injection fluid (obtained by diverting a small stream of the geothermal injection fluid to a holding tank and/or directly to water trucks)

3. MCWD reclaimed water (tertiary treated waste water produced from the treatment plant)

Each of these water sources would be picked up from the source and delivered to the construction location or drilling site(s) by a water truck which would be capable of carrying approximately 4,000 gallons per load. Construction of the CD-IV Project may temporarily increase the demand for potable water at the project site for use by construction workers. No permanent potable water delivery infrastructure would be installed during operation of the CD-IV Project as new offices or restroom facilities would not be built as part of the Proposed Action.

The CD-IV Project would neither be supported by, nor need to be supported by, a wastewater treatment provider. Construction workers would use portable restroom facilities during construction, which would be maintained by a local contractor. Permanent employees would use existing facilities located in the existing Casa Diablo Geothermal Complex. All geothermal fluid from the proposed power plant would be injected back to the geothermal resource or as authorized by the LRWQCB and the BLM.

The CD-IV Project would implement PDM HYD-5, as discussed in Section 4.19, *Water Resources*, which entails preparation of a site-specific drainage and runoff management plan. This plan would apply to all new roads and would ensure that off-site stormwater would be intercepted in ditches and channeled around well sites. Changes in drainage patterns and increased impervious surface areas at other Project facilities would be mitigated through implementation of Mitigation Measure HYD-A. The preparation of a Comprehensive Drainage Plan under this mitigation would ensure that new stormwater drainage facilities would not result in adverse environmental effects.

Drilling mud and cuttings would be generated from the well drilling operations. These wastes would be temporarily stored in on-site containment basins or tanks. The contents of the containment basin or tanks would be tested and, if inert, and as authorized by the USFS, BLM and the LRWQCB, the materials buried on-site. If burial is not authorized, the inert materials may be removed and used as construction materials on the private lands or disposed of in a waste disposal facility authorized by the LRWQCB to receive and dispose of these materials. Solid waste materials (trash) would be routinely collected and deposited at an authorized landfill by a disposal contractor. The potential for the small amount of waste generated by the CD-IV Project to exceed the available landfill disposal capacity is negligible.

Decommissioning

During decommissioning, the wells would be plugged and abandoned and the pipelines would be recycled or taken to a landfill or other alternative that may exist at the time. The well head (and any other ancillary equipment) would be removed, the casing cut off at least six feet below ground surface, and the well site reclaimed. Typically, aboveground equipment would be dismantled and removed from the site. Some below ground facilities may be abandoned in place. Water use during decommissioning would be less than for construction, and would consist

primarily of watering for dust control. Consequently, decommissioning water use would not be considerable and would not result in adverse environmental effects. It is expected that much of the solid waste generated during decommissioning would be recyclable materials; the small amount of non-recyclable materials that would go to local or regional landfills would not be expected to exceed the available landfill disposal capacity.

4.17.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the CD-IV Project (Construction, Operation and Maintenance, and Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.17.3.

a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as fire protection, police protection, schools, parks, or other services.

Construction, Operation and Maintenance, and Decommissioning

Fire Protection. As described above, construction would not result in a significant increase of local population or housing that would increase demand for fire protection services. The operation and maintenance phase would result in only six full-time employees, and the decommissioning phase would result in a similar number of temporary employees as CD-IV Project construction; therefore, demand for fire protection services during operation or decommissioning would similar to or less than demand during construction. Thus, CD-IV Project construction, operation and maintenance, and decommissioning would not result in the need for new or physically altered fire protection facilities in order to maintain acceptable service ratios, response times, or other performance objectives. No impact would occur.

Police Protection. As described above, Project construction would not result in a significant increase of local population or housing that would increase demand for police protection services. The operation and maintenance phase would result in only six full-time employees, and the decommissioning phase would result in a similar number of temporary employees as CD-IV Project construction; therefore, demand for police protection services during operation or decommissioning would similar to or less than demand during construction. Thus, CD-IV Project construction, operation and maintenance, and decommissioning would not result in the need for new or physically altered police protection facilities in order to maintain acceptable service ratios, response times, or other performance objectives. No impact would occur.

Schools. As described above, CD-IV Project construction would not result in a significant increase of local population or housing that would increase demand for school-related services. The operation and maintenance phase would result in only six full-time employees, and the decommissioning phase would result in a similar number of temporary employees as CD-IV Project construction; therefore, demand for school-related services during operation or

decommissioning would similar to or less than demand during construction. Thus, construction, operation and maintenance, and decommissioning would not result in the need for new or physically altered school facilities in order to serve school-aged children. No impact would occur.

Other Public Facilities. The CD-IV Project would not result in substantial adverse impacts related to other types of public facilities (e.g., public libraries, hospitals, or other civic uses) because, as discussed above, it would not result in a significant increase of local population or housing, which is typically associated with increased demand for public facilities. Therefore, the CD-IV Project would not have an effect on the service goals of other public services and would have a no impact associated with the provision of new or physically altered facilities for libraries, hospitals, or other civic uses. No impact would occur.

b) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.

Construction, Operation and Maintenance, and Decommissioning

The CD-IV Project would neither be supported by, nor need to be supported by, a wastewater treatment provider. Portable restroom facilities used during Project construction would be maintained by a local contractor, and permanent employees would use existing facilities located in the existing Casa Diablo Geothermal Complex. No impact would occur.

c) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Construction, Operation and Maintenance, and Decommissioning

Implementation of the CD-IV Project would not result in the installation of new facilities for the treatment of water or wastewater. The CD-IV Project would not require any connections to local or regional water or wastewater treatment systems, and would not provide water or wastewater to any such systems. The geothermal fluids that would be extracted by the CD-IV Project are generally not potable and would be injected back into the ground as part of the closed loop system. The CD-IV Project would not require the construction or expansion of any off-site wastewater treatment facilities, and no impact would occur.

d) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.

Construction, Operation and Maintenance, and Decommissioning

The CD-IV Project would implement PDM HYD-5, as discussed in Section 4.19, *Water Resources*, which entails preparation of a site-specific drainage and runoff management plan. This plan would apply to all new roads and would ensure that off-site stormwater would be intercepted in ditches and channeled around well sites. Changes in drainage patterns and increased impervious surface areas at other CD-IV Project facilities would be mitigated through implementation of Mitigation Measure HYD-A. The preparation of a Comprehensive Drainage

Plan under this mitigation would ensure that construction of new stormwater drainage facilities would result in a less than significant impact.

e) Not have sufficient water supply available to serve the project from existing entitlements and resources, or require new or expanded water supply resources or entitlements.

Construction, Operation and Maintenance, and Decommissioning

Construction of the CD-IV Project may temporarily increase the demand for potable water at the project site for use by construction workers, but even the peak construction workforce of up to 120 workers would be negligible in relation to the population served by MCWD. With only six new workers required for operation and maintenance of the CD-IV Project, the increase in water demand would be inconsequential. Water use during decommissioning, for such uses as dust control, would be less than that required for construction activities. Consequently, construction, operation and maintenance, and decommissioning of the CD-IV Project would not require new or expanded water supply resources or entitlements and the impact would be less than significant.

f) Result in a determination by the wastewater treatment provider that would serve or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

Construction, Operation and Maintenance, and Decommissioning

As discussed above, the CD-IV Project would not require or result in a new connection to a wastewater treatment facility or provider, and no existing connection exists on site. Therefore, the Project would not contribute additional wastewater flows to any wastewater treatment provider or facility, and so would not require or utilize available or new capacity at any wastewater treatment plant. No impact would occur.

g) Be served by a landfill with insufficient permitted capacity to accommodate the project's solid waste disposal needs.

Construction, Operation and Maintenance, and Decommissioning

Operation and maintenance of the CD-IV Project would result in the generation of only minor amounts of solid waste. Construction and decommissioning could result in greater volumes of solid waste, much of which could be recycled, such as the pipeline material. Although a small portion of this material could be sent to local or regional landfills, this would represent a small fraction of the existing landfill waste stream being sent to the Benton Crossing Landfill. Based on the anticipated landfill capacity described in Section 3.17, sufficient capacity is anticipated to be available to handle disposal of non-recyclable waste in support of the Project, and this impact is considered to be less than significant.

h) Not comply with federal, state, and local statutes and regulations related to solid waste.

Construction, Operation and Maintenance, and Decommissioning

The disposal of spent oil, lubricants, wastewater treatment chemicals, other chemicals, and other solid waste could require special handling or disposal procedures. Disposal and waste handling for all waste flows generated on site during CD-IV Project construction, operation and maintenance, and decommissioning would be completed in accordance with applicable state and local laws and policies. Therefore, no impact would occur.

4.17.5 Alternative 2: Plant Site Alternative

4.17.5.1 Direct and Indirect Impacts

Capacity of Utilities and Public Services

Construction, Operation and Maintenance, and Decommissioning

Public Services. The construction, operation and maintenance, and decommissioning workforces are anticipated to be the same as for the Proposed Action; therefore, these phases would result in the same effects on the ability of public service providers to maintain acceptable service ratios, response times, and other performance measures.

Utilities. Construction, operation, and maintenance, and decommissioning of Alternative 2 would result in similar water, wastewater, stormwater drainage, and solid waste effects as would the Proposed Action.

4.17.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 2 would be less than significant.

4.17.6 Alternative 3: Modified Pipeline Alternative

4.17.6.1 Direct and Indirect Impacts

Capacity of Utilities and Public Services

Construction, Operation and Maintenance, and Decommissioning

Public Services. The construction, operation and maintenance, and decommissioning workforces are anticipated to be the same as for the Proposed Action; therefore, these phases would result in the same effects on the ability of public service providers to maintain acceptable service ratios, response times, and other performance measures.

Utilities. Construction, operation, and maintenance, and decommissioning of Alternative 3 would result in similar water, wastewater, stormwater drainage, and solid waste effects as would the Proposed Action.

4.17.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Action. Potential impacts of Alternative 3 would be less than significant.

4.17.7 Alternative 4: No Action

4.17.7.1 Direct and Indirect Impacts

Capacity of Utilities and Public Services

Public Services. Under this alternative, the BLM would not approve the CD-IV Project. Direct and indirect impacts related to the construction, operation and decommissioning of the proposed power plant or pipelines would not occur. However, in Basalt Canyon up to 11 additional exploration wells which were authorized in previous NEPA and CEQA documents may be drilled for exploratory purposes. Impacts on public services resulting from the construction of exploratory wells would be similar to constructing development wells have been analyzed previously.

If Alternative 4 were implemented, no changes would be implemented on the power plant site and the existing environmental setting described in Draft EIS/EIR Chapter 3 would be maintained except for potential exploratory well construction in Basalt Canyon. Therefore, the No Action Alternative would result in negligible changes to conditions related to public services.

Utilities. As described above, under this alternative, up to 11 additional wells may be drilled that have already undergone environmental review. If Alternative 4 were implemented, it would not result in increased water consumption, generate wastewater, or generate solid waste, it would have no impact on the capacity of utilities and service systems to serve demand.

4.17.7.2 CEQA Significance Determination

Because the No Action Alternative would not introduce any additions to the service populations of the public services in the project vicinity, it would have no impact on the provision of these services. No demand on utilities and service systems would be required; therefore, no impact would occur.

4.17.8 Cumulative Impacts

4.17.8.1 Geographic Extent/Context

The geographic scope of the cumulative effects analysis for utilities and public services includes the areas served by the local law enforcement agencies and fire protection districts, the MCWD, the Mammoth School District, and the Benton Crossing Landfill.

4.17.8.2 Existing Cumulative Conditions

The CD-IV Project area consists of relatively rural and forested land, administered primarily by the USFS as part of the Inyo National Forest in unincorporated Mono County. Existing geothermal power plants, pipelines, and ancillary facilities are located in the project area.

4.17.8.3 Reasonably Foreseeable Projects

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to the cumulative conditions in the cumulative analysis area. Table 4.1-1, in Section 4.1.5, *Cumulative Scenario Approach*, lists cumulative projects in the vicinity of the project site and surrounding area that were used to develop this analysis of cumulative effects. Applications for projects that could be developed in the vicinity of the CD-IV Project include the MP-I Replacement Project, which could be developed approximately 0.25 mile southeast of the proposed CD-IV power plant. The MP-I Replacement Project would continue to utilize the existing geothermal resource in Basalt Canyon and use the existing pipeline that connects to the current MP-I power plant.

4.17.8.4 Construction, Operation and Maintenance, and Decommissioning

The CD-IV Project would have no impact with respect to public services for fire and police protection, schools, other public services and facilities, wastewater treatment requirements/capacity, new water/wastewater treatment facilities, or solid waste regulations. Therefore, it would not contribute to cumulative impacts in these areas.

The CD-IV Project would result in less than significant impacts regarding stormwater drainage facilities. The MP-I Replacement Project would have similar drainage facilities as the Proposed Action and it is anticipated that mitigation applied to the MP-I Replacement Project would avoid significant deleterious effects, without contributing to a cumulatively considerable change. The CD-IV Project would also result in less than significant impacts regarding landfill capacity. It is anticipated that much of the solid waste generated from the CD-IV Project and MP-I would be recycled, including during decommissioning. The Benton Crossing Landfill is anticipated to have sufficient capacity available through 2023. If this landfill is not available beyond 2023, it is expected that other landfills in the area would have sufficient capacity. Therefore, in consideration of potential combined effects of the CD-IV Project plus other reasonably foreseeable projects, it is unlikely that Project-related impacts to public services and utilities would result in a combined impact that would cause an adverse cumulative effect.

4.17.8.5 CEQA Significance Determinations

The CD-IV Project would have no impact with respect to public services for fire and police protection, schools, other public services and facilities, wastewater treatment requirements/capacity, new water/wastewater treatment facilities, or solid waste regulations. The CD-IV Project would have less than significant impacts regarding stormwater drainage facilities

and landfill capacity. For the reasons described above, the CD-IV Project's contribution to cumulative impacts with respect to utilities or public services would not be cumulatively considerable.

4.17.9 Mitigation Measures

No mitigation measures are recommended.

4.17.10 Residual Impacts after Mitigation Incorporated

Because no mitigation measures are recommended, impacts to utilities and public services for the Proposed Action and alternatives would be the same as discussed above.

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4.18 Visual Resources

4.18.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the possible impacts to visual resources. Impacts are identified and evaluated based on relevant BLM stipulations, USFS standards, policies, and guidelines and recent studies for similar projects in the same area, including:

1. BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" Stipulation
2. National Forest Landscape Management: Volume 2, Chapter 2, The Visual Management System, Agriculture Handbook Number 462 (USFS, 1974)
3. USFS Inyo National Forest Land and Resource Management Plan (1988)
4. Mammoth Pacific I (MP-I) Replacement Project Revised Draft Environmental Impact Report, State Clearinghouse 2011022020 (Mono County, 2012)
5. Basalt Canyon Geothermal Pipeline Project Environmental Assessment/Draft Environmental Impact Report (EA/Draft EIR) (BLM and Mono County, 2005)

Recent studies prepared for both the MP-I Replacement Project and the Basalt Canyon Geothermal Pipeline Project are relevant because both include components similar to those under the Proposed Action and Alternatives and both overlap in area with the CD-IV Project. Specifically, the EA/Draft EIR prepared for the Basalt Canyon Geothermal Pipeline Project includes a visual resources analysis for the Basalt Canyon geothermal pipeline and the Draft EIR for the MP-I Replacement Project includes a visual resources analysis for replacement of the MP-I facility. The methodology used in this analysis is a three step process:

1. Identify where the Proposed Action and Alternatives intersect the USFS "retention" and "partial retention" Visual Quality Objective (VQO) areas, as well as BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" stipulation areas (indicated in Figures 3.18-1 and 4.18-1).
2. Evaluate the direct and indirect effects of the Proposed Action in the Project area and consider effectiveness of PDMs in relation to VQO requirements on USFS lands.
3. Evaluate response to VQOs in relation to LRMP compliance, CEQA significance criteria and the effectiveness of PDMs. Determine the need for implementing mitigation measures and the need for Forest Supervisor approval for deviations from the Land and Resource Management Plan on USFS lands in accordance with Forest wide standards.

4.18.1.1 USFS Visual Management System

The USFS Visual Management System was originally created to establish the "visual landscape" as a basic resource and to ensure that the visual environment is "treated as an essential part of and receive(s) equal consideration with the other basic resources of the land" (USFS, 1974). As the Proposed Action would occur mostly on USFS lands, the Proposed Action is evaluated against

the USFS Visual Management System's VQOs, which apply only to USFS lands, which have been mapped throughout the Project area. The "retention" designation only allows activities that are not visually evident, activities that would repeat form, line, color and texture of the surrounding characteristic landscape. The "partial retention" designation also requires that management activities (which includes activities under the Proposed Action) be subordinate to the characteristic landscape, but does allow the introduction of forms, lines, colors and textures found infrequently in the characteristic landscape as long as those elements, (pipelines, electrical transmission lines, and other aboveground structures), remain subordinate to the visual dominance of the characteristic landscape. Retention and Partial Retention VQO areas are mapped in **Figure 4.18-1**.

This analysis determines how the Proposed Action would meet the LRMP's visual resources standards and guidelines, including:

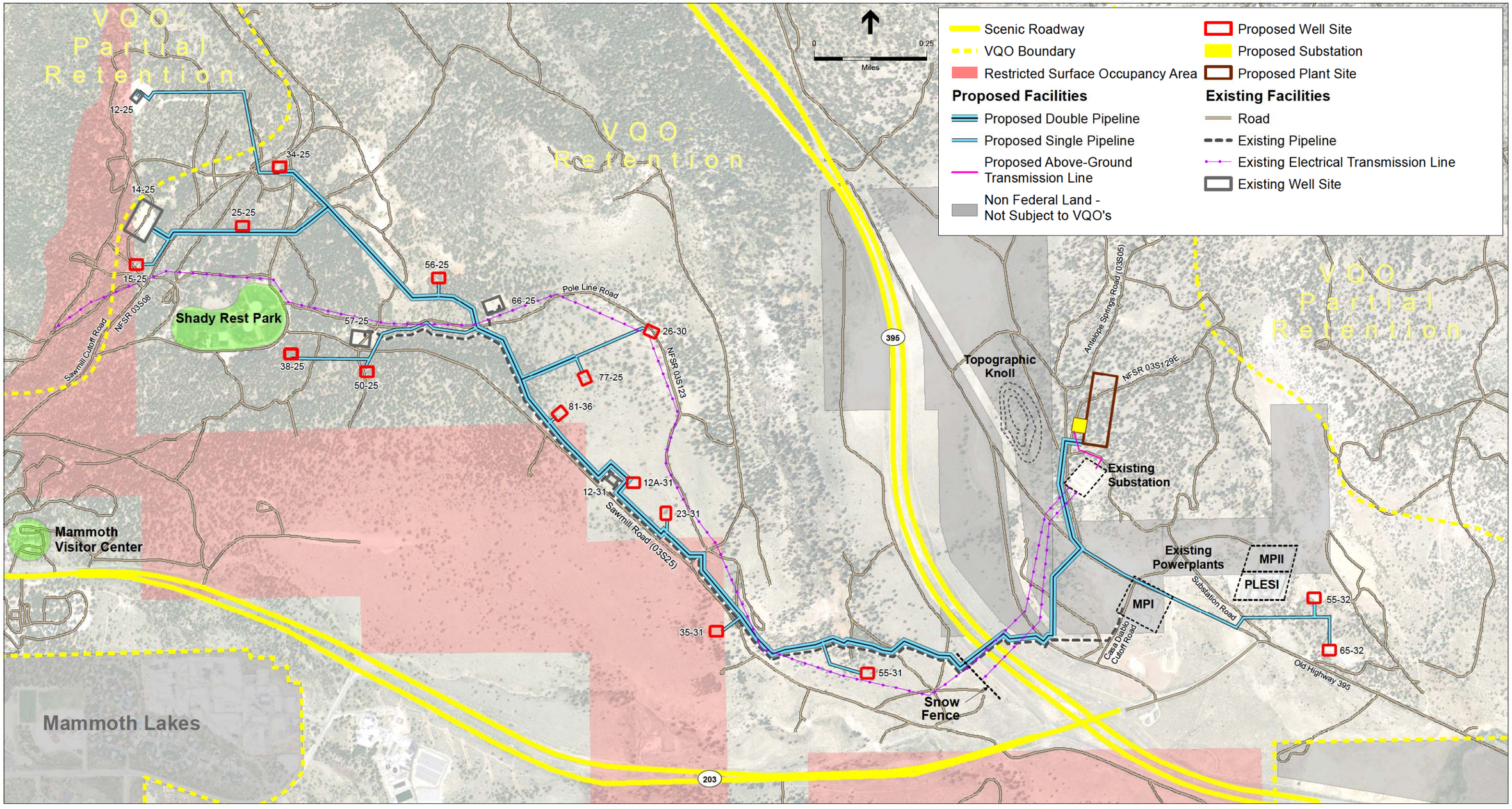
1. Maintain viewsheds near U.S. Highway 395 and SR 203 designated scenic corridors to meet Retention and/or Partial Retention VQOs requirements as inventoried.
2. Meet the Retention VQO in Sensitivity Level 1 roads and trails, recreation sites, and within concentrated recreation areas (USFS, 1988). This guideline is relevant in evaluating the visual effects of Project components in the immediate vicinity of Shady Rest Park and Sawmill Cutoff Road (NFSR 03S08).

4.18.1.2 BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" Stipulation

As described in Section 3.18, *Visual Resources*, portions of portions of Geothermal Leases CACA-14407 and CACA-14408 are covered by the special stipulation which states that "No surface disturbing activities will be permitted in the No Surface Occupancy areas …unless the lessee can demonstrate through an appropriate plan of operation or permit application that no unacceptable environmental impacts will occur from the proposed operations." As presented in Figure 4.18-1, western portions of the Project area are within the "No Surface Occupancy" areas. This analysis evaluates whether the Proposed Action would conflict with this stipulation.

4.18.1.3 Overview of Key Observation Points

KOPs are specific points which represent important views of the Proposed Action and Project area. KOPs are selected to be close as possible to the Proposed Action to be representative of how the public perceives the affected landscape. The "public" may include highway travelers, travelers on local roads, and recreationists using nearby trails and USFS service roads. The sensitivity of these diverse user groups to changes in the landscape are influenced by a number of factors, including how prominent the view of the Proposed Action is (in terms of scale, distance and angle of observation), the frequency and duration that viewers are exposed to the view, and whether the viewer groups are aware of their surroundings or expectant of high-quality views. As described in Section 3.18, *Visual Resources*, the KOPs are selected to include project facilities visible within the USFS's "retention" VQO and the scenic highway corridors. Potential KOPs were identified along both SR 203 and U.S. Highway 395 to consider visual effects of the



SOURCE: Ormat, 2011; NAIP, 2010; USFS, 2011; USGS, 2011

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Figure 4.18-1

USFS Visual Quality Objectives for the Proposed Project

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geothermal pipeline alignment. In addition, due to proximity of the proposed well facility (38-25) to Shady Rest Park, the KOP from the Shady Rest parking lot is included in this analysis.

Based on the above factors, and as described in Section 3.18, three KOPs (Photos 1, 3, and 4 in Figures 3.18-2 and 3.18-3) were selected to evaluate the Project site's existing conditions and potential visual impacts. The location and characteristics of each KOP is summarized in Table 4.18-1, below.

TABLE 4.18-1
KOP LOCATION AND CHARACTERISTICS

ID	Viewpoint Location	Visual Quality Objective (VQO)	Distance to Facilities & direction	Typical Viewers	Relation to Visible Project Facilities
KOP 1	U.S. Highway 395 California Scenic Highway	Retention	500 feet southwest	Motorists	Pipeline crossing under highway.
KOP 2	SR 203 County Scenic Highway	Retention	0.25 mile northeast	Motorists and hikers	Pipeline runs within view of SR 203.
KOP 3	Shady Rest Park parking lot	Retention	20 feet southeast	Park visitors and recreationists	Well facility site adjacent to Shady Park and pipeline immediately adjacent to Sawmill Road (03S25).

4.18.2 Project Design Measures

The analysis assumes that the following PDMs related to visual resources are fully implemented:

1. *VIS-1*: Any pipeline route selected within the pipeline corridor will either be located at least 300 feet from the developed portions of Shady Rest Park or will be substantially screened from view from the developed portions of the park by topography or vegetation.

2. *VIS-2*: In sections of the Project area with a USFS VQO of "partial retention" and "retention," ORNI 50, LLC will, with the approval of the USFS, locate the pipeline so that it is not immediately adjacent to existing roads where possible, and takes advantage of existing vegetation or terrain screening opportunities to reduce the visibility of the pipeline from these roads.

3. *VIS-3*: The pipeline segments to be constructed (a) in areas with a VQO of "retention" in the vicinity of Sawmill Cutoff Road, and (b) in Inyo National Forest managed-land in areas with the VQO of "retention" and visible from SR 203 and/or U.S. Highway 395 will use texture and color or colors (approved by the authorized officer) selected to blend with the color and texture of the characteristic landscape.

4. *VIS-4*: All power plant and well pad facilities will be painted a neutral color to blend in with the environment, using a color that was approved and used for the existing Basalt Canyon facilities and/or another color scheme approved by the USFS.

5. *LU-1*: All geothermal pipelines potentially visible in scenic highway corridors or important visual areas will be obscured from view to the extent reasonably feasible by fences, natural terrain, vegetation, or constructed berms (consistent with Mono County Conservation/Open Space Element, Goal I, Objective D, Action 1.18).

6. *LU-2*: Geothermal exploration and development projects will be carried out with the fewest visual intrusions reasonably possible (consistent with Mono County Conservation/Open Space Element, Goal I, Objective F).

4.18.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to visual resources if it would:

a) Have a substantial adverse effect on a scenic vista;

b) Substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway;

c) Substantially degrade the existing visual character or quality of the site and its surroundings; or

d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

In addition to the CEQA significance criteria, consistency with the USFS Visual Management System for this area is an important evaluation criterion, since the project is within Inyo National Forest and has designated VQOs as discussed. Furthermore, consistency with the BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" stipulation is also evaluated since this aims to protect critical visual zones along U.S. Highway 395, SR 203, and Sawmill Cutoff Road (NFSR 03S08). While consistency with both VOQs and the BLM "No Surface Occupancy" stipulation is desirable, an adverse effect created by an inconsistency with USFS VQOs and/or the "No Surface Occupancy" stipulation, however, does not necessarily require mitigation under CEQA.

4.18.4 Alternative 1: Proposed Action

4.18.4.1 Direct and Indirect Impacts

Consistency with USFS Visual Management System and BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" Stipulation

The primary tools used to analyze visual impacts of the Proposed Action are the USFS' Visual Management System VQO's as assigned by the LRMP as well as the BLM Geothermal Leases CACA-14407 and CACA-14408 "Restricted Surface Occupancy" stipulation, which are presented in Figure 4.18-1. An evaluation of the Proposed Action's consistency and/or inconsistency with the USFS Visual Management System and the BLM "No Surface Occupancy" stipulation is described for each main Project component (including power plant, well site facilities, and geothermal pipelines). This tool was also used to analyze the visual impacts of the project from three KOPs.

Power Plant

The CD-IV power plant would be constructed in an area surrounded by Jeffrey Pine trees and would be sited north of the existing SCE substation and transmission lines. The power plant itself would look very much like the power plants already on site, as shown in Figure 4.18-2, Photo 1. The base elevation of the proposed power plant would be approximately 50 feet higher than the existing power plants, and the facility would be behind and below the forested knoll that screens views from U.S. Highway 395 and SR 203, as shown in Figure 4.18-2, Photo 2. The power plant may be partially visible to drivers along southbound U.S. Highway 395 but views of the facility would be fleeting due to the speed of travel. From more distant public viewing locations (i.e., from eastbound SR 203) the power plant would also be hidden behind the knoll, trees, and transmission lines.

Antelope Springs Road (03S05) passes directly by the proposed power plant site. This road is most commonly used by recreationists, USFS workers and SCE substation maintenance workers. Still, motorists travelling on Antelope Springs Road (03S05) would have direct and close-up views of the proposed power plant, an industrial facility which would look similar to the existing power plant shown in Figure 4.18-2. Implementation of PDM VIS-4 would require ORNI 50, LLC to paint the plant a neutral color to blend with the existing environment. However, even with implementation of PDM VIS-4, the power plant would still be clearly visible in the foreground (within 300 feet of Antelope Springs Road (03S05)); therefore, introducing the new power plant to the landscape would result in an inconsistency with the VQO of “retention” in this portion of the Project area. To screen views of the power plant site from Antelope Springs Road (03S05), ORNI 50, LLC should implement **Mitigation Measure VIS-3 (Power Plant Landscape Plan)**, which requires immediate and effective landscaping improvements along the northeastern corner of the plant to reduce this inconsistency by meeting the “partial retention” VQOs.

The power plant is not located within portions of Geothermal Leases CACA-14407 and CACA-14408 covered by the “Restricted Surface Occupancy” stipulations.

Well Site Facilities

Well site facilities (including the well head, pump motor, pump control building, well head fence and well site pipeline) would be hidden or fully obscured from view by vegetation and terrain from designated scenic highways. However, as described below, several well facilities would be visible from roads such as Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08). These facilities would appear similar to existing well facilities constructed on drill site 66-25, shown in Figure 4.18-3. Impacts on views of well facility site 38-25 from Shady Rest Park are described below under the subheading “Designated Scenic Highways and KOPs.”

Well Site Facilities Visible along Sawmill Road (03S25). Well sites 81-36, 12A-31, 23-31, 35-31, and 55-31would be readily visible in the immediate foreground (i.e., within 300 feet) to viewers traveling on Sawmill Road (03S25). ORNI 50, LLC would paint the well site facilities an appropriate color to blend with the existing environment, which would reduce the visual contrast of these well site facilities (see PDM VIS-4). The “rectilinear” form and straight lines of the well head fence, pump control building and wellhead are not commonly seen in these natural areas; therefore

Photo 1 Existing geothermal power plant near junction of Highway 395 and SR 203, looking west

Photo 2 View from Junction of Highway 395 and SR 203 Looking North. Arrow indicates new power plant location, to be constructed behind the forested knoll. Existing power plant is visible to the right.

SOURCE: ESA

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Figure 4.18-2

Photos of Existing Power Plant and Proposed Site

SOURCE: ESA

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Figure 4.18-3
Photo of Existing Well Facility 66-25

these features would not meet the VQO of "retention" for this portion of the valley floor landscape. Portions of Sawmill Road (03S25), the existing pipeline and well site 35-31 also touch on the perimeter edges of the Restricted Surface Occupancy zone. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate and effective landscaping in front of the pipeline in locations where the pipeline would be clearly visible from Sawmill Road (03S25), would help screen views of the well facilities, to meet "partial retention" VQO criteria.

Well sites 77-25, 50-25, and 56-25 may also be occasionally visible through the forest to recreationists on Sawmill Road (03S25), although distances would be beyond the immediate foreground (beyond 300 feet). Well site 26-30 would not be visible from Sawmill Road (03S25) but would be visible from Pole Line Road (NFSR 03S123), a National Forest System Road used by recreationists. Similar to the well sites described above, implementation of PDM VIS-4 would reduce the visual contrast of these well facilities but would change the characteristic landscape; therefore these facilities would not meet the VQO of "retention" for this portion of the landscape. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which requires immediate and effective landscaping in front of the pipeline in locations where the pipeline would be clearly visible from Sawmill Road (03S25), would help screen views of the well facilities in order to meet the "partial retention" VQO criteria.

Well Site Facilities Visible along Sawmill Cutoff Road (NFSR 03S08). Well site facilities constructed on drill sites 15-25 and 34-25 would be readily visible in the immediate foreground (or within 300 feet) above the sagebrush to viewers traveling on Sawmill Cutoff Road (NFSR 03S08). Well site facility 25-25 may also be occasionally visible through the forest to recreationists on Sawmill Cutoff Road (NFSR 03S08), although the viewing distance from this roadway is beyond the immediate foreground (beyond 300 feet). Similar to the well sites described above, implementation of PDM VIS-4 would reduce the visual contrast of these well site facilities. However, even with implementation of PDM VIS-4, well sites within 300 feet of Sawmill Road (03S25) (15-25 and 34-25) would still be readily visible, resulting in an inconsistency with the sites' VQO of "retention" for this portion of the landscape. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate and effective landscaping in front of the pipeline in locations where the pipeline would be clearly visible from Sawmill Cutoff Road (NFSR 03S08), would help screen views of the well facilities, however, would still not meet "retention" but does meet "partial retention" VQO.

As shown in Figure 4.18-1, the western edge of well facilities 14-25 and 15-25 are within those portions of Geothermal Leases CACA-14407 and CACA-14408 covered by the "Restricted Surface Occupancy" stipulations. However, well facility 14-25 is an existing well and although well facility 15-25 partially overlaps with the "Restricted Surface Occupancy" stipulation, implementation of **Mitigation Measure VIS-1** would help screen views of the facility from Sawmill Cutoff Road (NFSR 03S08).

Well Site Facilities near Old Highway 395. Well site facilities 55-32 and 65-32 would not be readily visible in the immediate foreground from Old Highway 395 as these sites would be located on a hillside and views would be screened by trees. Thus, these wells would meet the VQO of "retention" for this portion of the Project area.

Geothermal Pipeline within Retention VQO Designated Areas (Shady Rest Park, Sawmill Cutoff Road and Sawmill Road)

As described in Section 3.18, the Inyo National Forest VQO for the area around Shady Rest Park, Sawmill Cutoff Road (NFSR 03S08), Sawmill Road (03S25), U.S. Highway 395, and State Route 203 is "retention." Only those activities that would repeat form, line, color and texture of the surrounding landscape would meet this VQO.

Sawmill Cutoff Road and Shady Rest Park. The new pipelines would be eight to 24-inch diameter welded-steel pipe and the overall outside diameter would range from 12 to 28 inches with insulation included. The pipelines would be constructed near ground level on pipeline supports and would appear similar to the existing Basalt Canyon pipeline (as shown in Figure 3.18-4, Photos 5 and 6). Recreationists along Sawmill Cutoff Road (NFSR 03S08) may notice the "expansion loops" or square bends along the production pipeline route, where the pipeline lengthens and shortens. These bends would typically be horizontal (approximately 40 feet by 40 feet) but in some cases the loops would be vertical, ranging 15 to 20 feet high. To reduce the visual impact of the proposed geothermal pipeline in this area, ORNI 50, LLC would implement PDMs VIS-1 and VIS-3, described under Section 4.18.2, above. PDM VIS-1 would require that any pipeline route selected within the pipeline corridor either be 300 feet from the developed portions of Shady Rest Park or be substantially screened from view from the developed portions of the park by topography or vegetation. PDM VIS-3 would require that the selected pipeline use texture and color or colors (approved by the authorized officer) selected to blend with the color and texture of the characteristic landscape. However, as shown in Figure 4.18-2, a segment of the pipeline connecting to well facility 15-25 parallels Sawmill Road (03S25) within 300 feet of the road, which would result in an inconsistency with the VQO of "retention" for this portion of the Project area. Similarly, near well facilities 14-25 and 34-25, the proposed geothermal pipeline would cross Sawmill Cutoff Road (NFSR 03S08). Although the pipeline would be constructed beneath the road, recreationists would have immediate views of the pipeline on either side of Sawmill Cutoff Road (NFSR 03S08), which would also result in an inconsistency with the VQO of "retention" within this area of the Project area. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate and effective landscaping in front of the pipeline in locations where the pipeline would be clearly visible from Sawmill Cutoff Road (NFSR 03S08), would help screen views of the pipeline, however, would still not meet "retention" but does meet "partial retention" VQO.

In addition, from the Knolls Loop, recreationists would have immediate views of the production pipeline crossing over the injection pipeline (or vice versa) in the vicinity of well facility 34-25. The pipeline crossing over the other would be a square or angled bend and would be approximately 8 feet long. At this particular site, recreationists using the Knolls Loop could have immediate views of this pipeline crossing, which would range in height between 5 feet 3 inches and 8 feet 6 inches, depending upon whether angled or square bends are used for the crossover. Views of these crossovers would result in a substantial visual change. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which includes immediate and effective landscaping in front of the pipeline crossing where the pipeline would be clearly visible from Knolls Loop, would help screen views of the pipeline. Nonetheless, even with landscaping and

given the height of these crossovers, the pipeline crossovers would be clearly visible to recreationists. Implementation of **Mitigation Measure VIS-2 (Underground Pipeline Crossovers)**, which requires belowground installation of either the existing pipeline, new injection pipeline or production pipeline, and use of non-vertical expansion loops would minimize the visibility of such pipeline crossovers and would thereby reduce adverse visual effects on recreationists using the Knolls Loop, however, would still not meet "retention" but does meet "partial retention" VQO.

As shown in Figure 4.18-1, the geothermal pipelines adjacent to Sawmill Cutoff Road (NFSR 03S08) and within the "retention" area would not be located within portions of Geothermal Leases CACA-14407 and CACA-14408 covered by the "Restricted Surface Occupancy" stipulation.

Sawmill Road. A large segment of the proposed geothermal pipelines that would run adjacent to Sawmill Road (03S25) would be visible to various recreationists including hikers, dog-walkers, cross-country skiers, and snowmobilers. As shown in Figure 4.18-1, throughout the majority of the Project area, which is designated as "retention," both a production pipeline and an injection pipeline would be aligned with and parallel to the existing Basalt Canyon pipeline. The pipelines would be an addition and appear similar to the existing pipeline. At approximately nine points along Sawmill Road (03S25) and Pole Line Road (NFSR 03S123), the production pipeline would cross over the injection pipeline (or vice versa). At such locations, recreationists would have immediate views of these pipeline crossings, which could range between 7 feet 3 inches and 10 feet 6 inches, depending upon whether angled or square bends are used for each crossover. At two points along Sawmill Road (03S25) the pipeline would cross beneath the road (i.e., near well facility sites 50-25, and 35-31). At these particular sites, recreationists would have immediate views of the pipeline. Implementation of PDM VIS-2 would require ORNI 50, LLC to site the new pipeline in such a manner that it would not be immediately adjacent to existing roads where possible and would take advantage of existing vegetation or terrain screening opportunities to reduce the visibility of the pipeline from roads such as Sawmill Road (03S25).

The pipeline's straight lines would generally repeat the straight lines of the adjacent road and existing pipeline. Although the pipelines would be built low to the ground, the three parallel pipelines would be clearly visible (spanning approximately 12 feet wide), the top of the pipelines would often be visible above the vegetation from the roads it parallels in these areas, and the pipeline crossings and crossovers would be clearly visible from Sawmill Road (03S25) at several locations along the roadway. For these reasons, the pipelines would substantially alter the visual landscape since three pipelines on the same alignment would no longer be subordinate elements within the meadow or the surrounding mountainous landscape, resulting in an inconsistency with the "retention" VQO rating. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)** and **Mitigation Measure VIS-2 (Underground Pipeline Crossovers)**, which includes immediate landscaping, installation of pipelines belowground at crossing points and use of non-vertical expansion loops would keep the project elements subordinate to the landscape to meet "partial retention" VQO criteria, but would not meet "retention" level criteria.

As shown in Figure 4.18-1, two segments of the pipeline, one near well site 81-36 and the other between well sites 23-31 and 35-31, fall within a portion of Geothermal Lease CACA-14408 covered by the "Restricted Surface Occupancy" stipulation. Although these restrictions were originally adopted to protect visual zones along U.S. Highway 395, SR 203, and Sawmill Cutoff Road (NFSR 03S08), implementation of **Mitigation Measures VIS-1 and VIS-2** would help reduce visual effects in this area through implementation of immediate and effective landscaping, installing pipelines belowground at crossing points and requiring non-vertical expansion loops be used to minimize overall pipeline heights.

Access Roads

As shown in Figure 2-2 in Chapter 2, *Proposed Action and Alternatives*, Sawmill Cutoff Road (NFSR 03S08) would be widened and short segments of new permanent access roads that would connect existing roads to the actual well sites would be constructed in areas where proposed well pads are not immediately adjacent to existing roads. These access road segments would be constructed in the Project area with VQO designations of both "retention" and "partial retention." Clearing of brush for these new roads would change existing views by adding more human generated activity to the landscape surrounding Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08). Still, these new access road segments would appear similar to existing NFSRs and unauthorized roads in the Project vicinity and would repeat the form, line, color and texture of the surrounding landscape. Additions to the access roads would remain consistent with the surrounding characteristic landscape, would continue to be subordinate to the visual dominance of the surrounding landscape and would remain consistent with the "partial retention" VQO, though would not meet the higher "retention" criteria.

Designated Scenic Highways and KOPs

As shown in Figure 3.18-2 (Photo 2, KOP 1) and Figure 3.18-3 (Photo 3, KOP 2), short sections of the existing geothermal pipelines east of well site 55-31 are visible from U.S. Highway 395 and SR 203, respectively. Both of these highways are designated scenic highways. Since the geothermal pipelines would be constructed parallel to the existing pipeline, segments of the new pipelines would also be visible to motorists traveling on SR 203 and U.S. Highway 395. Also, as mentioned above, construction of well facility 38-25 would also be highly visible from the Shady Rest Park parking lot. Consistency with the VQOs at each of the three KOPs is described below. None of the project components within view from the below-described KOPs are within portions of Geothermal Leases CACA-14407 and CACA-14408 that are covered by the "Restricted Surface Occupancy" stipulation; thus consistency with this stipulation is not discussed further.

Views from U.S. Highway 395 – KOP 1. As described above, the power plant would not be visible from northbound U.S. Highway 395 due to the power plant's siting behind and below the top of a forested knoll that would screen it from view. The top portion of the plant may be partially visible from southbound U.S. Highway 395 but topography and vegetation would both provide screening of the power plant from the highway and SR 203.

Segments of the new geothermal pipelines located east of U.S. Highway 395 could be visible to motorists traveling north along U.S. Highway 395. However, since the existing pipeline is not

readily visible from the highway, any views of the new pipelines paralleling the existing pipeline are expected to be fleeting. Segments of the new geothermal pipelines located west of U.S. Highway 395, would be briefly visible to motorists traveling south along U.S. Highway 395 just before the SR 203 off-ramp. Figure 3.18-2, Photo 2 presents an existing view of the project area from the southbound side of U.S. Highway 395 just north of the SR 203 junction, an area with a "retention" VQO designation. As shown in Figure 3.18-2, Photo 2, the existing geothermal pipeline is partially visible from this vantage point but portions of the pipeline are hidden from view by trees, vegetation, and highway signs. The new pipeline segments and pipeline crossover (which would be between 5 feet 3 inches and 8 feet 6 inches high) would be highly visible from vehicles on an estimated 1,000-foot southbound section of the highway for about 11 seconds, at distances from about 1,100 feet to as little as 200 feet away (BLM and Mono County, 2005). To reduce the contrast of the pipeline in these areas, ORNI 50, LLC would paint the pipeline a neutral color to blend with the landscape in accordance with PDM VIS-3. However, because portions of the pipelines would be visually evident from U.S. Highway 395, the pipelines and crossover would still be noticeable and would introduce a smooth texture that is not apparent in the existing characteristic landscape. Thus, views of the pipeline segments from U.S. Highway 395 would be inconsistent with the VQO of "retention" prescribed for this portion of the Project area. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which requires planting of native trees and shrub vegetation in front of the proposed pipeline, and **Mitigation Measure VIS-2 (Underground Pipeline Crossovers)**, which requires installation of either the existing or new pipeline belowground, and the installation of non-vertical expansion loops would help obscure views of the pipeline from U.S. Highway 395 so that the pipelines would not be visually evident, however, would still not meet "retention" but does meet "partial retention" VQO.

Views from SR 203 – KOP 2. The same pipeline segments described above would be visible to motorists traveling either eastbound or westbound on portions of SR 203 near the intersection with U.S. Highway 395. In this area, which has a VQO of "retention", the pipeline would generally parallel SR 203 to the north at distances from about 1,000 to 1,500 feet. The geothermal pipelines could be visible from vehicles on an estimated 1,450-foot section of SR 203 while traveling eastbound, or for about 20 seconds (BLM and Mono County, 2005). The pipelines would also be visible from vehicles on an estimated 1,150-foot segment of the highway while traveling westbound, or for about 16 seconds. Since the new pipelines would be placed north of the existing Basalt Canyon pipeline, it is possible that views of the new geothermal pipelines would be obstructed by the existing pipeline, topography and shrubbery. To reduce the visibility of the pipeline in these areas, ORNI 50, LLC would paint the pipeline to blend with the landscape in accordance with PDM VIS-3. Implementation of PDMs LU-1 and LU-2 would also require ORNI 50, LLC to obscure the pipeline to the extent feasible through construction of fencing, use of the natural terrain, vegetation or constructed berms. No other sections of the Proposed Action pipeline would be visible from any other locations on SR 203. As described above, the physical features of the power plant would not be visible from SR 203 due to topography, distance, and the presence of trees and transmission lines.

Sections of the geothermal pipelines visible in the foreground from the scenic highways would repeat the color of the characteristic landscape and from KOP 2, the new pipeline segments would

also generally repeat the line of the roads, power lines, fences and low horizon. However, because portions of the pipelines would be visually evident from SR 203, the pipelines would still be noticeable and would introduce a smooth texture that is not apparent in the existing characteristic landscape; therefore, views of the pipeline segments from SR 203 would be inconsistent with the VQO of "retention" prescribed for this portion of the Project area. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which requires planting of native trees and shrub vegetation in front of the proposed pipeline, and **Mitigation Measure VIS-2 (Underground Pipeline Crossovers)**, which requires installation of either the existing or new pipeline belowground and the installation of non-vertical expansion loops would help obscure views of the pipeline from this scenic roadway, however, would still not meet "retention" but does meet "partial retention" VQO.

Views from Shady Rest Park - KOP 3. The well facility proposed at the eastern end of Shady Rest Park (38-25) would appear similar to existing well facility constructed on drill site 66-25, as shown in Figure 4.18-3. Construction of this new facility would substantially alter the visual character of this site as ORNI 50, LLC would clear approximately 2.5 acres of trees and other vegetation for the well site facilities. Fencing would be installed around the well site. Implementation of PDM VIS-4 would require the well site facility is painted a neutral color to blend in with the existing environment. Nonetheless, the 10-foot high motor control building would still be visible from the Shady Rest Park parking lot and Sawmill Road (03S25), which is occasionally used by hikers and other recreationists, who typically expect quality views. For this reason, construction of this well facility would result in an inconsistency with the site's "retention" VQO designation. Implementation of **Mitigation Measure VIS-1 (Landscape Plan)**, which requires planting of native trees and plants, would help screen views of well site 38-25, however, would still not meet "retention" but does meet "partial retention" VQO.

Construction

Construction activities and construction-related traffic would be visible from multiple vantage points in the Project area and vicinity throughout the construction period (up to approximately 16 months). Earthmoving activities and construction materials, equipment, trucks, and parked vehicles, could be visible throughout the construction duration, during which a number of activities would take place, including vegetation removal, earthwork, as well as foundation and equipment installation. Motorists traveling along U.S. Highway 395 and Old Highway 395, and Antelope Springs Road (03S05) would have temporary views of construction vehicles traveling to and from the power plant site.

Construction-Related Drilling Effects. During intermittent drilling activities, the periodic use of drill rigs in the wellfield would be visible from U.S. Highway 395, SR 203 and unpaved roads at foreground or middleground distances while drilling from any of the well sites in the Project area. Due to the large size of the approximately 175-foot high drill rigs, use of this particular piece of construction equipment would temporarily alter the existing quality and character of the Project area by introducing a tall structure to the area during drilling activities. Because this construction activity would be short-term (limited to a 30-day period per well) and temporary, the drill rig structure would not permanently alter the existing visual quality and character of the Project area. Furthermore, comparable drilling activities have historically occurred in the area, the most recent

being the drilling of wells 14-25 and 12-25 in the Upper Basalt Canyon area. Such activities at well 14-25 would have met "partial retention" VQO requirements, though nothing more stringent. During flow testing, geothermal steam and water vapor plumes could also be visible from adjacent roads and the nearby Mammoth Lakes community. Depending on the weather conditions during each flow test, these plumes could rise up to several hundred feet high. Since some of the access roads adjacent to well facility sites would require temporary closure during construction, recreationists would not have close-up views of well testing activities. For this reason, and since flow testing operations would be short-term (limited to a 30-day period at each well site), once these operations are completed, the construction-related effects on views would not be substantial. Similar to existing and past drilling activities that have occurred in the Project area, the effects of construction-related drilling on views would have met "partial retention" VQO requirements, though nothing more stringent.

Nighttime Construction Lighting Effects. Nighttime lighting would be necessary at each well site during drilling and flow-testing activities since these operations would take place 24 hours per day, 7 days per week over 30 days. The light from the drill site would be focused downwards and would unlikely be visible from the Mammoth Lakes community given the distance between the well sites and the community. The dense stands of trees surrounding the well field would also help shield any nighttime lighting effects on the community. For this reason, nighttime construction lighting would not substantially degrade the visual character of the Project area's landscape. Nonetheless, the introduction of lighting to the Project area would have met "partial retention" VQO requirements, though nothing more stringent.

Pipeline Construction-Related Effects. As described in Chapter 2, pipeline construction would be limited to one summer season and would likely be visible from multiple vantage points. Motorists traveling on SR 203, U.S. Highway 395, Old Highway 395, Antelope Springs Road (03S05), and Sawmill Road (03S25) would have fleeting views of pipeline construction activities, equipment, and vehicles. Although pipeline construction would be short-term and impacts on views would not be adversely affected in the long-term, such activities would result in a temporary inconsistency with the VQO rating, though would have met "partial retention" VQO requirements, but nothing more stringent.

In conclusion, although recreationists and motorists from multiple vantage points may have views of construction vehicles, equipment, and vapor plumes, given the overall short-term duration of construction, such activities would not be visually adverse in the long-term. Construction-related effects would meet the "partial retention" VQO requirements, however would result in a temporary inconsistency with the "retention" VQO rating.

Operation and Maintenance

Effects of the Power Plant Operations and Maintenance. Over the life of the Proposed Action, the new power plant would be operated collectively with the existing Casa Diablo Geothermal Complex and would be operated by six new employees. As described in Chapter 2, it may be necessary to re-drill or rework both production and injection wells periodically over the life of the project. Such activities would be the same as those described above for drilling operations.

Portions of the drilling rig mast would likely extend above the top of the forest and would be temporary visible from some locations along SR 203, the Town of Mammoth Lakes, and possibly from U.S. Highway 395. Given the short-term nature of any necessary drilling and fluid testing activities, impacts on these views would be temporary and would not result in long-term inconsistencies with USFS VQOs, local policy goals or objectives.

Effects of the Power Plant. Because the power plant would be an air-cooled closed-loop binary system, there would be no release of geothermal fluid and no cooling towers that could result in the formation of steam plumes during plant operations. Steam plumes visible in the vicinity of the existing power plants at Casa Diablo emanate from naturally occurring fumaroles in the area. Because the proposed CD-IV power plant would not create any new steam plumes, the Proposed Action would be consistent with the power plant site's VQO of "retention" in the eastern portion of the Project area.

Access Road Maintenance Effects. Access roads would also need to be maintained during the summer and winter time to ensure adequate access to the production wells year-round. Recreationists using these access roads would have intermittent views of snow plowing equipment and other access road maintenance equipment. Since these activities would be short-term, impacts on recreational views would be temporary and would not result in long-term inconsistencies with USFS VQOs, local policy goals or objectives.

Operational Lighting Effects. Each well site would have onsite lighting for safety purposes, consisting of one single light. The light would be directed downward and shaded to keep the light on the well site. Additional lighting may be required during any well site inspections and maintenance activities. Lighting at the well sites would not be visible from the Town of Mammoth Lakes given the small scale and distance between the well sites and the community. The dense stands of trees surrounding the well field would also shield any operational lighting effects on the community. For this reason, nighttime operational lighting would not substantially degrade the visual character of the Project area's landscape.

Decommissioning

The expected life of the power plant operation is 30 years. Decommissioning would entail dismantling the power plant and wellfield and abandoning wells. The decommissioning activities would not result in substantial surface disturbance beyond restoration of existing facility footprints, additional removal of vegetation, or involve any other activities which could lead to any substantial visual impacts.

4.18.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.2.2.

a) Have a substantial adverse effect on a scenic vista.

There are no designated scenic vistas in the vicinity of the Project area. The CD-IV Project facilities, construction, operation and maintenance, and decommissioning would remain subordinate to the existing visual setting and would not have a substantial adverse effect on a scenic vista.

b) Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.

Construction

As described in Section 3.18, *Visual Resources*, U.S. Highway 395 is a State-designated scenic highway and SR 203 is a Mono County-designated scenic route. As described above, motorists traveling on these routes would have temporary views of construction activities, equipment (including drill rigs), and construction-related traffic throughout the approximately 16-month construction duration of the Proposed Action. Refer to Section 4.18.4.1, above, for detailed discussion of construction-related impacts on views from these scenic highways.

Construction of the power plant, belowground transmission line, well pads, and geothermal pipelines would require tree removal. Up to 6.5 acres of trees would be removed for the new power plant but this site is not visible from any scenic routes due to topography and the thick stand of trees surrounding the site. Tree removal for the well pads and the pipeline would vary from site to site. At project sites adjacent to Shady Rest Park (including well facility 38-25), Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08), the clearance of trees and some road widening would be more noticeable to motorists and recreationists along these roads. Implementation of PDMs VIS-1 through VIS-4, LU-1 and LU-2 would help reduce the visibility of well facilities and the geothermal pipelines. Although these well sites would still be surrounded by a dense stand of trees, tree removal activities along these roadways could still be perceived as a negative visual impact. Construction of well facilities, widened roads and geothermal pipelines immediately adjacent to Sawmill Cutoff Road (NFSR 03S08), Sawmill Road (03S25), and Shady Rest Park would also be readily visible and could substantially alter views from these recreational areas. Implementation of the PDMs and **Mitigation Measure VIS-1 (Landscape Plan)** at select Project sites would require planting of native plants and trees to screen well site facilities and the geothermal pipelines from Sawmill Cutoff Road (NFSR 03S08), Sawmill Road (03S25), and Shady Rest Park. This measure would also require immediate and effective landscaping to occur prior to construction at specific project sites to help screen visual effects of pipeline crossovers and locations where the pipeline would cross beneath roads. Implementation of these mitigation measures would reduce impacts to scenic resources to a less-than–significant level.

Operation and Maintenance

As described earlier, operation activities may require re-drilling or reworking of both production and injection wells periodically as well as maintenance of new access roads. During such activities, recreationists and motorists using local trails and scenic routes would have intermittent views of construction equipment, construction activities, and vehicles. Steam plumes would not be generated by the power plant and thus there would not be any visual effect on scenic resources

related to the scenic highways of the area in that regard. Other operations and maintenance activities such as re-drilling and reworking of wells or periodic maintenance of the power plant would be short-term and the impact on scenic resources would be less than significant.

Decommissioning

As described under Section 4.18.4.1, decommissioning activities of the Proposed Action would not substantially degrade scenic resources in the Project area. Therefore, no impact would occur.

c) Substantially degrade the existing visual character or quality of the site and its surroundings.

As described under Section 4.18.4.1 and under the discussion for criterion b), the new power plant would be constructed adjacent to Antelope Springs Road (03S05), requiring removal of approximately 6.5 acres of trees. Views from this roadway would be substantially different from existing forested conditions and the plant would appear similar to the existing power plant shown in Figure 4.18-3. Implementation of PDM VIS-4 would require ORNI 50, LLC to paint the plant a neutral color to blend with the existing environment. However, even with implementation of PDM VIS-4, introducing an industrial element to the existing forested landscape would substantially degrade the visual character and quality of the site, resulting in a significant impact. Implementation of **Mitigation Measure VIS-3 (Power Plant Landscape Plan)**, which requires immediate and effective landscaping improvements in front of the plant, would help screen views of the plant from this roadway and would reduce this impact to a less-than-significant level.

As described under the discussion for criterion b), above, construction and operation and maintenance of all other elements of the Proposed Action (well facilities and pipelines) would be noticeable to motorists and recreationists from multiple vantage points. Views of construction equipment (including large drill rigs), construction vehicles, and tree removal activities would be noticeable throughout the 16-month construction period and could temporarily degrade the existing visual character or quality of the site and its surroundings. As described in Section 4.18.4.1, above, implementation of PDMs and **Mitigation Measures VIS-1 (Landscape Plan)**, and **VIS-2 (Underground Pipeline Crossovers)** including the installation of non-vertical expansion loops would help reduce visual impacts of the Proposed Action on the visual character and quality of the site and its surroundings. Nonetheless, even with implementation of these measures, collectively, the three parallel 24-inch pipelines (spanning over a 12 feet wide corridor), the installation of multiple crossovers and the new well facilities would be highly visible along the majority of Sawmill Road (03S25), SR 203 (county designated scenic route) and U.S. Highway 395 (State designated scenic highway). Given the high visual sensitivity of this area, the Proposed Action would still result in a substantial adverse effect on the visual character and quality of the site and its surroundings, resulting in a significant and unavoidable impact.

d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.

As described under Section 4.18.4.1, nighttime construction lighting would be required for site during drilling and flow-testing activities. Onsite lighting would also be required at the well site

facilities and power plant. Since both construction and operational lighting would be focused downwards and given the distance between the well sites and the community, the Proposed Action would not create a substantial light or glare effect.

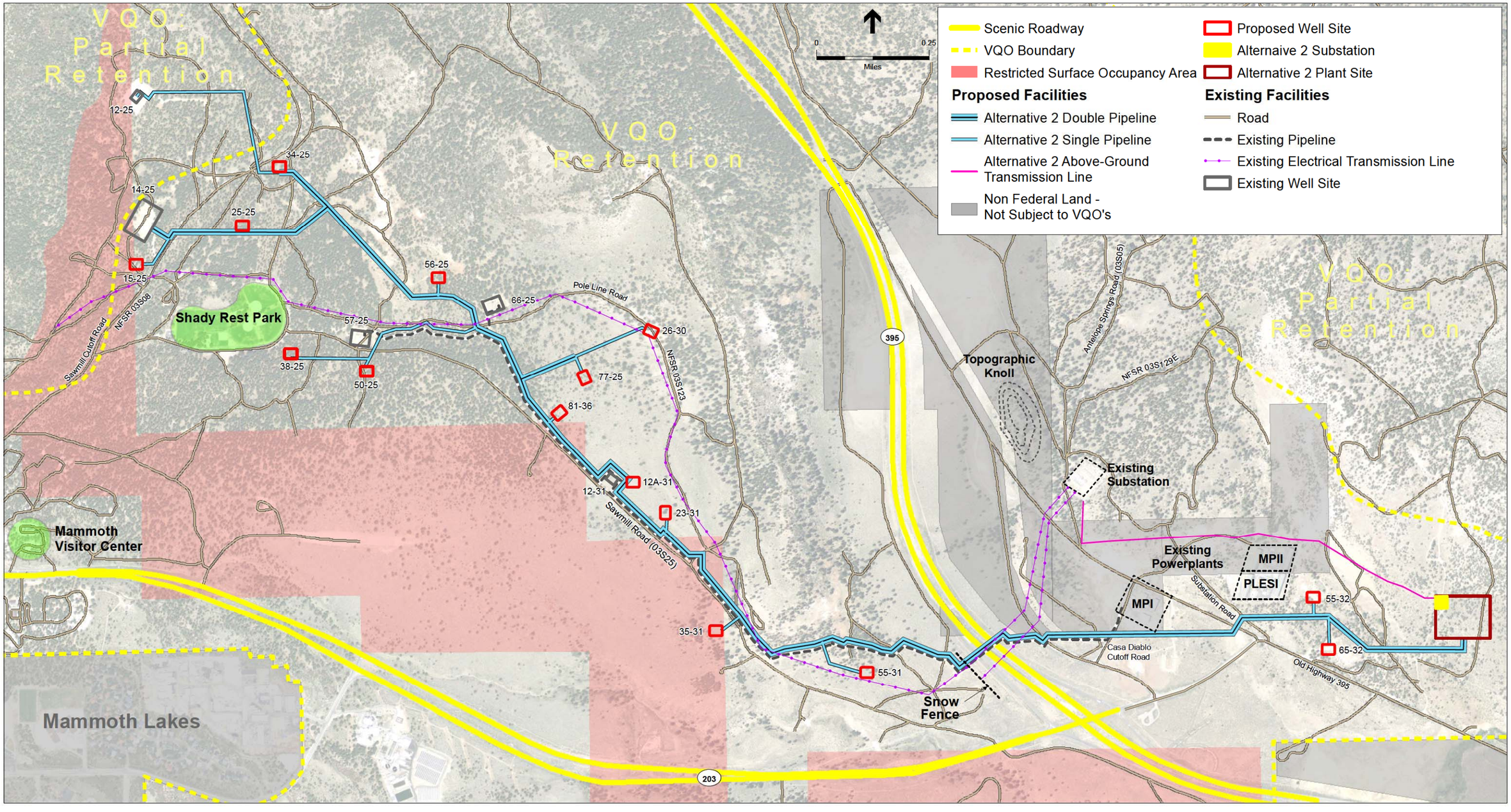
4.18.5 Alternative 2: Plant Site Alternative

4.18.5.1 Direct and Indirect Impacts

Consistency with USFS Visual Management System and BLM Geothermal Leases CACA-14407 and CACA-14408 "Restricted Surface Occupancy" Stipulation

Under Alternative 2 (presented in Figure 4.18-4), the well site facilities would be the same as those under the Proposed Action. The geothermal pipeline and access road alignments to the west of U.S. Highway 395 would also be the same as those under the Proposed Action. However, unlike the Proposed Action, at locations where a pipeline must cross either the existing pipeline, a production, injection pipeline, or both, the pipeline crossings would be underground. In comparison to the CD-IV Project, installation of the pipeline belowground at crossing points would reduce visual impacts in comparison to the Proposed Action. As determined under Section 4.18.4.1, implementation of PDMs VIS-1, VIS-2, VIS-3, and VIS-4 as well as **Mitigation Measure VIS-1 (Landscape Plan)** would help screen visual effects of new well facilities and pipeline at sites where these facilities would be clearly visible from trails, NFSRs, SR 203 and U.S. Highway 395. Similar to Alternative 1, these measures would help reduce the visual effects of these facilities but would not ensure consistency with the VQOs of "retention" and "partial retention" throughout the portion of the Project area west of U.S. Highway 395. East of U.S. Highway 395, the pipelines would parallel the existing Basalt Canyon pipeline, pass the existing power plants, and connect the easternmost well facilities to the Alternative 2 plant site. The Alternative 2 pipeline alignment east of U.S. Highway 395 would be visible within Forest Service lands, from old Highway 395 and would be unable to meet the VQO requirements for "retention" in this area.

Under Alternative 2, the power plant and substation would be located approximately 0.4 mile east of the existing Casa Diablo power plant facilities (MP-II and PLES I), and east of proposed injection wells 55-32 and 65-32. Figure 3.18-2, Photo 2, shows a representative view of the power plant site under Alternative 2. Similar to that proposed under Alternative 1, the Alternative 2 power plant would also be screened by stands of Jeffrey Pine trees. However, unlike the power plant site proposed under Alternative 1, the Alternative 2 power plant site would be constructed at a similar elevation as the existing power plant facilities (MP-II and PLES I) and could be partially visible as shown in Figure 4.18-2, Photo 2. Implementation of PDM VIS-4 would ensure that the power plant is painted a neutral color (similar to the other CD-IV facilities) to blend in with the environment. Similar to the Proposed Action, introducing the new power plant at this alternative site would result in an inconsistency with the VQO of "retention" in this portion of the Project area. Similar to the Proposed Action and as shown in Figure 4.18-4, the western edge of well facilities 14-25 and 15-25 are within those portions of Geothermal Leases CACA-14407 and CACA-14408 covered by the "Restricted Surface Occupancy" stipulations. In addition, two segments of the pipeline, one near well site 81-36 and the other between well sites 23-31 and 35-31, fall within a portion of



SOURCE: Ormat, 2011; NAIP, 2010; USFS, 2011; USGS, 2011

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Figure 4.18-4

USFS Visual Quality Objectives for Alternative 2

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Geothermal Lease CACA-14408 covered by the "no surface occupancy" stipulation. Implementation of **Mitigation Measure VIS-1** would help screen views of the wells and pipelines from Sawmill Cutoff Road (NFSR 03S08) and Sawmill Road. Implementation of **Mitigation Measure VIS 1** would reduce the impact to a less than significant level.

Construction, Operations and Maintenance, and Decommissioning

Potential visual resources impacts during construction, operation and decommissioning of Alternative 2 would be similar to those described for the Proposed Action. Under this alternative, motorists traveling along Old Highway 395 would have fleeting views of both construction- and operation-related vehicles traveling to and from the alternative plant site. Given the overall short-term duration of construction, operation, and decommissioning activities, Alternative 2 would not substantially degrade the visual character of the Project area's landscape. With the exception of well facilities 15-25, 34-25, and 38-25, the site would maintain VQO ratings of "partial retention." Similar to Alternative 1, there would be no steam plumes generated by the Alternative 2 Plant so there would be no degradation in the overall visual quality of the site and it would retain a minimum VQO of "partial retention," but not "retention" within the eastern portion of the Project area.

4.18.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the CD-IV Project. Implementation of PDMs VIS-1 through VIS-4, LU-1 and LU-2 and **Mitigation Measure VIS-1 (Landscape Plan)** would help reduce the visibility of well site facilities, geothermal pipelines, and the power plant. Although the installation of pipeline crossings belowground would reduce adverse visual effect, the three parallel 24-inch pipelines (spanning approximately 12 feet wide) and the new well facilities would be highly visible along the majority of Sawmill Road (03S25), SR 203 (county designated scenic route) and U.S Highway 395 (State designated scenic highway). Given the high visual sensitivity of this area, Alternative 2 would still result in a substantial adverse effect on the visual character and quality of the site and its surroundings, resulting in a significant and unavoidable impact.

4.18.6 Alternative 3: Modified Pipeline Alternative

4.18.6.1 Direct and Indirect Impacts

Consistency with USFS Visual Management System and BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" Stipulation

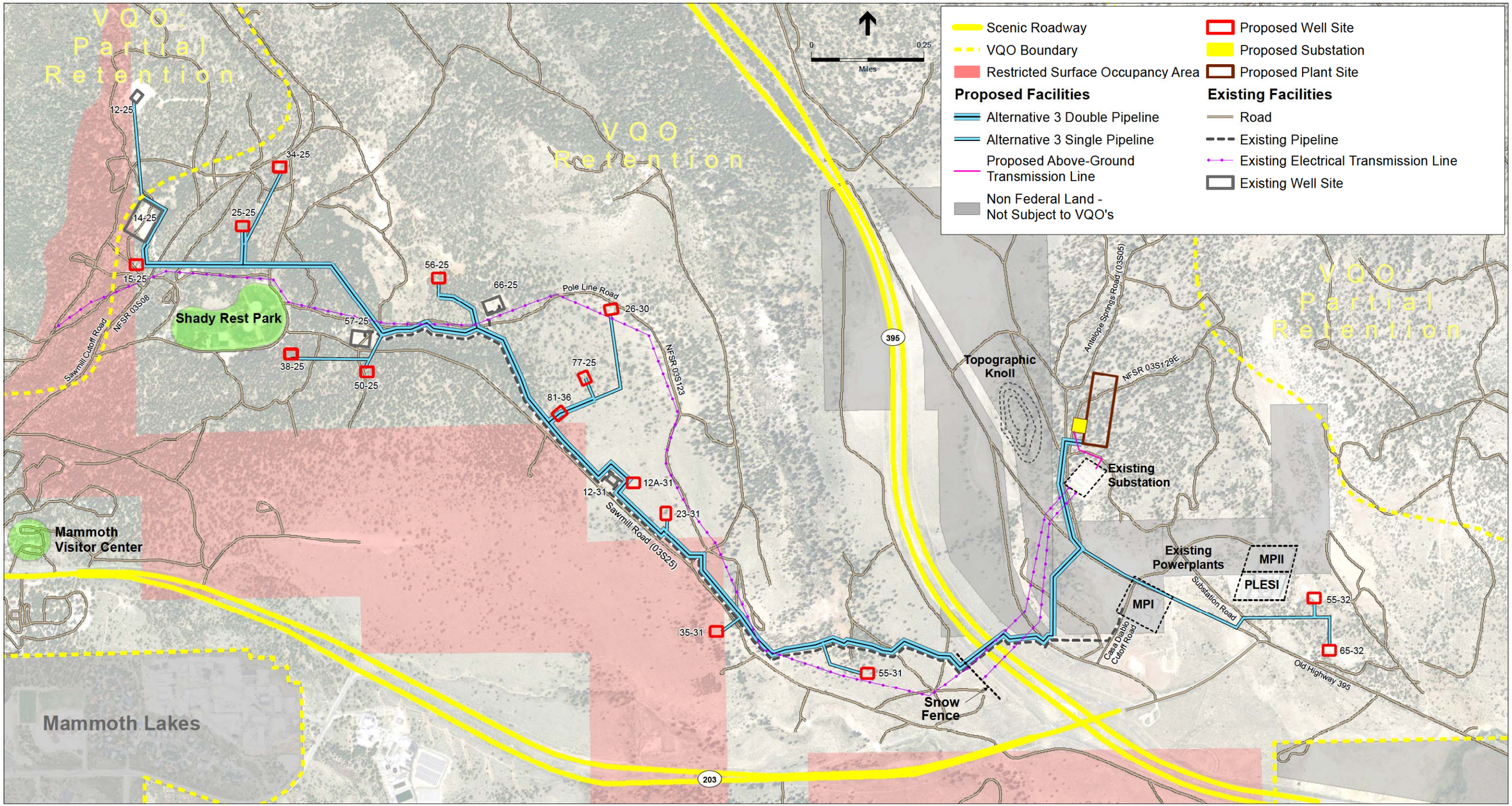
Under Alternative 3 (presented in Figure 4.18-5), the power plant and well facilities would be the same as those under the Proposed Action. As described in Section 2.4.2 of Chapter 2, *Proposed Action and Alternatives*, well construction would be phased to proceed east to west and not all wells may be needed. Wells in the western portion of Basalt Canyon and closest to Shady Rest Park would be the last wells to be developed. As determined under Section 4.18.4.1, implementation of PDMs VIS-1through VIS-4, LU-1 and LU-2, and **Mitigation Measure VIS-1 (Landscape Plan)** would help screen visual effects of the well facilities where these facilities would be clearly visible

from trails, Sawmill Road (03S25), Sawmill Cutoff Road (NFSR 03S08), and scenic roadways. Mitigation Measure VIS-1 would ensure that the landscape plan gets implemented prior to construction to ensure that newly vegetated areas have a chance to mature prior to construction of applicable well facilities. Similar to Alternative 1, these measures help reduce the visual effects of these facilities but would not ensure consistency with the VQOs of "retention" and "partial retention" throughout the portion of the Project area west of U.S. Highway 395.

Under Alternative 3, the geothermal production and injection pipelines would be constructed in conjunction with the well drilling and would be phased. Unlike Alternative 1, the production pipeline from well facility 26-30 and well 77-25 would be moved to the south, connecting near well facility site 81-36. In Upper Basalt Canyon, the production pipeline from well facility site 12-25 would proceed south towards well facility 14-25 and 15-25, rather than east and south to well site 34-25. Furthermore, the production and injection pipeline corridor would be narrowed to the east of Sawmill Road (03S25) and well facility site 81-36. As described in Section 2.4.3.2, if the two injection wells 55-32 and 65-32 are sufficient for reinjection of spent geothermal brine, the injection pipeline to Basalt Canyon would not be constructed. Consequently, wells and reinjection pipeline in the western portion of the Project area may not be needed. Under this scenario, construction of geothermal piping would be less and impacts on visual resources associated with the pipeline development would be substantially lower. Specifically, under Alternative 3, less geothermal piping would be constructed parallel to Sawmill Cutoff Road (NFSR 03S08) in comparison to the Proposed Action. In addition, at locations where a new pipeline must cross the existing pipeline, a production pipeline, or both, the pipeline crossings would be underground. In comparison to the Proposed Action, installation of new pipeline belowground at specific pipeline crossings would reduce visual impacts. Implementation of PDMs VIS-1 through VIS-4, LU-1 and LU-2 as well as **Mitigation Measure VIS-1 (Landscape Plan)** would help screen visual effects of the pipelines at sites where these facilities would be clearly visible from trails, NFSRs, SR 203 and U.S. Highway 395.

This measure would also help screen visual effects of pipeline crossovers and locations where the pipeline would cross beneath roads. Implementation of these measures would reduce visual effects of visible portions of the geothermal pipeline but would still result in an inconsistency with the VQO of "retention" along Sawmill Road (03S25) and Sawmill Cutoff Road (NFSR 03S08).

Similar to the Proposed Action and as shown in Figure 4.18-5, the western edge of well facilities 14-25 and 15-25 are within those portions of Geothermal Leases CACA-14407 and CACA-14408 covered by the "no surface occupancy" stipulations. In addition, two segments of the pipeline, one near well site 81-36 and the other between well sites 23-31 and 35-31, fall within a portion of Geothermal Lease CACA-14408 covered by the "No Surface Occupancy" stipulation. Implementation of **Mitigation Measure VIS-1** would help screen views of the wells and pipelines from Sawmill Cutoff Road and Sawmill Road.



SOURCE: Ormat, 2011; NAIP, 2010; USFS, 2011; USGS, 2011

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Figure 4.18-5

USFS Visual Quality Objectives for Alternative 3

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Construction, Operation and Maintenance, and Decommissioning

Potential visual resources impacts during construction, operation and maintenance, and decommissioning of Alternative 3 would be similar to those described for the Proposed Action. Given the overall short-term duration of construction, operation and maintenance, and decommissioning activities, Alternative 3 would not substantially degrade the visual character of the Project area's landscape and the site would retain consistency with VQO requirements of "partial retention," though nothing more stringent.

4.18.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for Alternative 1 (the Proposed Action). Implementation of PDMs VIS-1 through VIS-4, LU-1 and LU-2 would reduce the visibility of well site facilities, geothermal pipelines, and the power plant. Similar to Alternative 1, implementation of **Mitigation Measure VIS-3 (Power Plant Landscape Plan)** would help screen views of the power plant from Antelope Springs Road (03S05). **Mitigation Measure VIS-1 (Landscape Plan)** would also be required to help screen visual effects of the pipelines and well facilities but, in comparison to Alternative 1, would be needed at fewer locations where these facilities would be clearly visible from trails, NFSRs, SR 203 and U.S. Highway 395. Although the installation of pipeline crossings belowground would reduce adverse visual effects, the three parallel 24-inch pipelines (spanning approximately 12 feet wide) and the new well facilities would be highly visible along the majority of Sawmill Road (03S25), SR 203 (county designated scenic route) and U.S. Highway 395 (State designated scenic highway). Given the high visual sensitivity of this area, Alternative 3 would still result in a substantial adverse effect on the visual character and quality of the site and its surroundings, resulting in a significant and unavoidable impact.

4.18.7 Alternative 4: No Action

4.18.7.1 Direct and Indirect Impacts

Consistency with USFS Visual Management System and BLM Geothermal Leases CACA-14407 and CACA-14408 "No Surface Occupancy" Stipulation

Under this alternative, the BLM would not approve the CD-IV Project. Direct and indirect impacts related to the construction, operation and maintenance, and decommissioning of the Project would not occur.

If the No Action Alternative were implemented, few changes would be implemented on the site and the existing environmental setting described in Draft EIS/EIR Chapter 3 would generally be maintained.

However, 11 exploratory wells already permitted which could still be drilled, not part of the CD-IV project. These exploratory wells have already been evaluated in other environmental documents including the EA for the *Basalt Canyon Slim Hole and Geothermal Well Exploration Projects* (BLM, 2001) and the EA for the *Upper Basalt Geothermal Exploration Project* (BLM, 2005). Temporary drill rigs would be evident and some vegetation removal and well spoils would

also be evident. The wells with the most visual exposure, wells 15-25, 34-25 and 38-25 (next to Shady Rest Park), were evaluated in the Upper Basalt Geothermal Exploration and with implementation of appropriate mitigation measures, visual impacts would be reduced, however, would still not meet “retention” but does meet “partial retention” VQO.

4.18.7.2 CEQA Significance Determination

Under the No Action Alternative no facilities associated with the CD-IV project would be constructed and therefore, the project would not result in changes to existing visual resource conditions.

However, exploration well drilling at 11 sites which have already been permitted at the same locations but are not part of this CD-IV project could occur. Three of the sites are visually exposed and drilling would result in minor impacts to visual resources that would be less than significant.

4.18.8 Cumulative Impacts

4.18.8.1 Geographic Extent/Context

The geographic scope of the cumulative effects analysis for recreation includes the northeastern portion of the Mammoth Lakes region of Inyo National Forest. This geographic scope was established based on the boundaries of the affected recreation resources, which includes NFSRs that serve and/or connect to other portions of the Mammoth Lakes region of Inyo National Park.

4.18.8.2 Existing Cumulative Conditions

Existing conditions within the cumulative impacts area reflect a combination of the natural condition and the effects of past actions and are described in Chapter 3. Direct and indirect visual effects of the construction, operation and maintenance, and closure and decommissioning of the CD-IV Project are analyzed above. The Project area consists of relatively rural and forested land, administered primarily by the USFS as part of the Inyo National Forest in unincorporated Mono County. Existing geothermal power plants, pipelines, and ancillary facilities are located in the project area and are visible from multiple vantage points including SR 203, U.S. Highway 395, and Sawmill Cutoff Road (NFSR 03S08) and Sawmill Road (03S25).

4.18.8.3 Reasonably Foreseeable Projects

Projects identified on the cumulative projects list on Table 4.1-1, presented in Section 4.1.5, *Cumulative Scenario Approach*, that could result in cumulative visual resources impacts include the Digital 395 Middle Mile Project and various Town of Mammoth Lakes capital improvement projects including airport security upgrades, sidewalk improvement projects, road and storm drainage improvements, and various bike path improvement projects as part of the Town’s Trail System Master Plan. Construction of the MP-I Replacement project is expected to be complete by the end of 2012 but due to delays, could overlap with construction of the Proposed Action.

4.18.8.4 Construction

The construction schedule for the Proposed Action would begin in the spring of 2013 and continue until December 2013. Construction would also occur during the non-winter months of 2014, and potentially 2015. Past, current, and future projects could require construction activities that use the same access routes as the Proposed Action. As shown in Table 4.1-1, future projects that could overlap in schedule with the Proposed Action include the Digital 395 Middle Mile Project, various roadway rehabilitation projects in Mammoth Lakes, and parks and recreation projects in Mammoth Lakes. Although the volume of construction vehicles traveling on the same access could be noticeable, most of these projects would be short-term and would occur at least one mile away from the Proposed Action. Therefore, the projects listed in Table 4.1-1 are not expected to result in substantial adverse effects on scenic resources, visual character, or quality of the Project site and surrounding area. However, as noted in the paragraph above, the MP-I Replacement project could potentially overlap in construction of the Proposed Action. In the event that construction of the proposed power plant overlaps in construction with the MP-1 Replacement project, the volume of construction vehicles and construction equipment would be noticeable from U.S. Highway 395 and SR 203 but the effects would be short-term and limited to the period of schedule overlap. Implementation of **Mitigation Measures VIS-1** (Landscape Plan), **and VIS-4** (Power Plant Landscape Plan) would adequately reduce Proposed Action-related construction effects on scenic resources, the visual character, and/or quality of the Project. The construction effects of the Proposed Action, when combined with the other cumulative projects identified above, would not be visually adverse and would be consistent with the VQOs of “partial retention” but would not meet the criteria set for “retention” in the Project area.

4.18.8.5 Operation, Maintenance, and Decommissioning

The increase in development associated with cumulative projects would be expected to result in an increase in residents and workers – as well as visitors, shoppers, and tourists – to the Town of Mammoth, who would collectively be expected to increase the use of trails and scenic roads in the region and would expect quality views from these vantage points. However, the Town of Mammoth and Inyo National Forest includes extensive outdoor opportunities for scenic viewing. The majority of the cumulative projects listed in Table 4.1-1 would occur within the limits of the Town of Mammoth Lakes and would not overlap in area with the Proposed Action. Similar to the Proposed Action, operation of the replaced MP-I would not generate steam plumes. Consequently, the effects of the Proposed Action during operation, maintenance, and decommissioning, when combined with the other cumulative projects identified above, would not be visually adverse and would be consistent with the VQOs of “partial retention” but would not meet the criteria set for “retention” in the Project area. CEQA Significance Determinations

CEQA cumulative impacts would be the same as described above and would not have a cumulatively considerable contribution to impacts on visual resources and therefore the impact would be less than significant.

4.18.9 Mitigation Measures

The following measures would be required to avoid or reduce impacts on the quality of the human environment. The following mitigation measures would avoid or minimize impacts on visual resources:

Mitigation Measure VIS-1: *Landscape Plan*. Prior to construction, ORNI 50, LLC shall prepare, submit for approval by the USFS, and implement a landscape plan that includes planting of native trees and shrub vegetation at select locations to further screen well site facilities and the geothermal pipeline from view from Sawmill Cutoff Road (NFSR 03S08), Sawmill Road (03S25), Shady Rest Park, U.S. Highway 395, SR 203, and Knolls Loop. To minimize adverse visual effects from the abovementioned roads and park, ORNI 50, LLC shall landscape the following areas at least one year prior to construction and surround landscaped sites during construction with dark colored protective fencing:

a. The northern side of well facility site 38-25 (near Shady Rest Park)

b. Along Sawmill Cutoff Road (NFSR 03S08) (between well facility sites 15-25 and 14-25, and at the pipeline crossing near well facility site 34-25)

c. Along Sawmill Road (03S25) (between well facility sites 81-36, 12A-31, 23-31, 35-31, and 55-31)

d. At pipeline crossover near Knolls Loop (approximately 700 feet southeast of well facility site 34-25)

e. At pipeline crossovers adjacent to Sawmill Road (03S25) and Pole Line Road (NFSR 03S123) (near well facility sites 56-25,66-25, 77-25, 81-36, 12A-31, 23-31, 35-31, and 55-31)

Mitigation Measure VIS-2: *Underground Pipeline Crossovers*. At locations where one pipeline crosses over another, ORNI 50, LLC shall reduce the height of crossovers by implementing either of the following methods:

a. Install either the existing pipeline or new pipeline underground. To prevent snowmelt, the underground pipeline shall be insulated and a 2- to 4- inch air gap shall be maintained between the insulation and the casing pipe. The top of the casing pipe would be at least 3 to 6 feet below grade.

b. Lower the existing pipeline or new pipeline (whichever is easiest) belowground or within a 3-foot deep trench and design the pipeline crossover with an angled bend to ensure that the overall height of the crossover is at or below 4 feet aboveground.

c. All expansion loops shall be non-vertical to minimize overall height of installed pipelines to less than 4 feet aboveground.

Mitigation Measure VIS-3: *Power Plant Landscape Plan*. Prior to construction, ORNI 50, LLC shall prepare, submit for approval by the USFS, and implement a landscape plan that includes planting of native trees, shrubs, and perennial vegetation to screen views from Antelope Springs Road (03S05). ORNI50, LLC shall landscape the area immediately adjacent to Antelope Springs Road at least one year prior to construction to reduce adverse visual effects of the facility.

4.18.10 Residual Impacts after Mitigation Incorporated

Following implementation of mitigation measures provided in Section 4.18.9, many adverse effects on visual resources resulting from construction, operation and maintenance, of the Proposed Action and alternatives would be avoided or substantially reduced. However, there would continue to be a residual substantial and significant unavoidable visual impact related to construction, operation and maintenance of wells and pipelines in areas designated by the USFS with a VQO of “retention” and/or where facilities are within the BLM Restricted Surface Occupancy zone after mitigation has been incorporated. Following decommissioning, these significant and unavoidable residual impacts on visual resources would be eliminated.

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4.19 Surface Water Hydrology

4.19.1 Methodology for Analysis

This analysis of potential environmental consequences of the Proposed Action and Alternatives focuses on the following indicators: surface water quality related to accidental releases, changes in drainage patterns and associated hydrology, potential for flooding, and use of shallow groundwater for project construction and operation. The impact analysis provided here evaluates potential impacts based on these indicators, considers applicant-proposed project design measures and compliance with applicable regulations, and applies mitigation measures to minimize remaining potential impacts that could occur as a result of implementation of the Proposed Action.

Potential for groundwater effects related to geothermal reservoir development is addressed separately in Section 4.7, Geothermal and Groundwater Resources. Water supply availability with respect to the Proposed Action is evaluated in Section 4.17, Utilities and Public Services. For a discussion of potential effects on riparian habitat, including applicability of USFS Riparian Conservation Objectives, please refer to Section 4.3, Biological Resources – Vegetation.

4.19.2 Applicant Proposed Project Design Measures

The analysis assumes that the following Project Design Measures (PDMs) related to hydrologic resources would be fully implemented:

Protection of Erosion and Surface Waters

1. *HYD-1*: Appropriate erosion control measures will be used to control any offsite discharges, and the Project will adopt any relevant Lahontan Regional Water Quality Control Board (LRWQCB) and USFS best management practices to prevent soil erosion, including the preparation of a Storm Water Pollution Prevention Plan.

2. *HYD-2*: The pipeline route and any access roadways shall be located outside of any riparian conservation areas delineated by the USFS.

3. *HYD-3*: Existing roads will be evaluated and properly graded and repaired in areas that show evidence of enhanced erosion.

4. *HYD-4*: Exposed, disturbed soils in construction areas will be watered to minimize wind erosion and dust. Topsoil piles will be covered to minimize erosion during wind storms. See also AQ-1.

5. *HYD-5*: A site drainage and runoff management plan will be prepared. All new access roads will comply with the plan to minimize erosion and off-site sedimentation. Off-site stormwater will be intercepted in ditches and channeled around the well sites to energy dissipaters as necessary to minimize erosion.

6. *HYD-6*: The pipeline route will not be cleared or graded to minimize soil disturbance.

7. *HYD-7*: The Project will obtain coverage under, and comply with, the California Construction General Storm Water Permit.

Containment of Geothermal Fluids

8. *HYD-8*: The well bores will be cased with steel casing to prevent interzonal migration of the fluids, protect groundwater, and reduce the possibility of uncontrolled well flow ("blowouts").

9. *HYD-9*: Containment basins/sumps constructed at each drill site for the containment and temporary storage of all drilling fluid, drilling mud and cuttings and stormwater runoff shall be constructed to meet RWQCB requirements. Upon completion of drilling activities, the solids remaining in the pit will be dried and tested in accordance with the requirements of the SWRCB Water Quality Order No. 2003-0003 – Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality or the project-specific requirements of the LRWQCB and, if authorized by the Regional Water Quality Control Board, USFS and BLM, buried in the pit.

10. *HYD-10*: The power plant site will be constructed to prevent offsite discharge from accidental spills of geothermal fluid, binary working fluid, or other materials stored or used on the site. The plant and well pads will be designed so that spills will be contained on-site.

11. *HYD-11*: Isolation valves will be located within the pipeline to prevent any backflow of geothermal fluid, should a pipeline rupture or major leak occur.

12. *HYD-12*: In-line sensing equipment and automatic shutdown controls will be installed to detect pipeline leaks or ruptures and shut-in the wells in the event of an electric failure or detected sudden drop in pipeline pressure.

13. *HYD-13*: Ormat shall prepare and implement a "Spill or Discharge Contingency Plan" and "Well Blowout Contingency Plan" to prevent, control, contain, clean up and mitigate the impacts of any large spills of geothermal fluid.

4.19.3 CEQA Significance Criteria

Based on CEQA Guidelines Appendix G, a project would cause adverse impacts to hydrology and water quality if it would:

a) Violate any water quality standards or waste discharge requirements?

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

f) Otherwise substantially degrade water quality?

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

j) Inundation by seiche, tsunami, or mudflow?

4.19.4 Alternative 1: Proposed Action

4.19.4.1 Direct and Indirect Impacts

This analysis of direct and indirect impacts for the Proposed Action is organized according to the following project phases: construction; operation and maintenance; and decommissioning.

Surface Water Quality

Construction

Select elements of the Proposed Action would be located in areas that are tributary to Hot Creek. As shown in Figure 3.19-1 (in Chapter 3.19, Water Resources), these include the two well sites located east of U.S. Highway 395, the proposed plant site, and associated pipelines located east of U.S. Highway 395. Wells 55-32 and 65-32, as well as a proposed access road associated with Well 55-32, would be located at least 1,100 feet east of the nearest tributary waterway. The proposed plant site would be located approximately 1,200 feet northeast of the nearest tributary waterway. Generally, these facilities would be located at a sufficient distance from existing waterways that leaks would be contained or shut off prior to leaked fluids reaching surface waters. The pipelines connecting wells 55-32 and 65-32 to the remainder of the pipeline network would span the tributary waterway in the vicinity of the existing plant site, as shown in Figure 3.19-1. All other proposed facilities are located in areas that drain into swales, located to the west of U.S. Highway 395, including all proposed wells, pipelines, and access roads within that area (Figure 3.19-1).

Implementation of the Proposed Action would include various construction activities that would include trenching, grading, installation of pipelines, installation of buildings and other facilities, construction of roads, modification or closure of existing roads, and installation of various appurtenances. Construction of these facilities would require the use of a variety of different types of heavy machinery such as scrapers, bulldozers, graders, earth movers, heavy trucks, transport vehicles, trenchers, excavators, drilling rigs, and a variety of other equipment on-site. Construction activities would include removal of existing vegetation and disturbance of surface

sediments, as well as grading, trenching, and various other activities. These activities, as well as additional wear on existing unpaved access roads, could contribute to increased erosion and downstream sedimentation potential. Increased loads of sediment and construction-related water quality pollutants including oils, greases, fuels, hydraulic fluid, paints, cement washout, and various other constituents could be released into the environment during construction. During a storm event, these pollutants could become entrained in stormwater and flow offsite, resulting in degradation of water quality downstream.

The Applicant has proposed several measures that, when combined with required water quality permitting for the construction period, would help to minimize potential impacts associated with grading, the use of heavy machinery, and other construction related sources of water quality emissions. PDMs HYD-1, HYD-3, HYD-5, HYD-6, and HYD-7 would ensure that grading is minimized along the proposed pipeline route, that new roads are maintained to minimize erosion, that stormwater generated offsite would be intercepted and channeled around well sites to minimize erosion, and that the Proposed Action would acquire coverage under the Statewide General Construction Permit for Stormwater Discharges. The latter would include implementation of construction period best management practices (BMPs) and other measures designed to minimize potential for release of water quality pollutants from the Project Area during construction, to the extent needed to protect downstream beneficial uses. BMPs to be implemented would be determined prior to the initiation of construction activities on site, based on LRWQCB requirements. Additionally, for areas located on USFS lands, implementation of applicable BMPs included in the USFS Water Quality Management Handbook would be required. In order to ensure that existing and modified roads would also be adequately maintained to prevent erosion and sedimentation, implementation of **Mitigation Measure SW-1** would be required. This measure provides specific requirements for the implementation of a Comprehensive Site Drainage and Runoff Management Plan, and ensures that existing and modified roads, including roads plowed during the winter for project operations, would be managed for erosion and sedimentation potential. No further mitigation is warranted. For a discussion of potential water quality impacts specific to well drilling, please refer to the discussion of geothermal well construction and testing, below.

Well construction (production and injection wells) would involve drilling and installation of geothermal wells, as discussed in Chapter 2, Proposed Action and Alternatives. Well drilling activities would result in the surfacing of drilling mud, drill cuttings, and water/geothermal fluid. In the event that drill cuttings, drilling mud, water/geothermal fluid, and/or additives are accidentally released from the drilling site, water quality of natural waters could be affected. The Proposed Action would include several measures and activities designed to minimize potential for release of these potential water quality pollutants from the well construction sites. Drilling mud and associated liquids would be contained on-site, and would be reinjected by the drilling rig in support of the ongoing drilling process. As discussed in Chapter 2, drill cuttings would be separated from the drilling mud and contained on-site. In accordance with PDM HYD-9, containment basins/sumps would be constructed at each drill site. These facilities would be used for the containment and temporary storage of all drilling fluid, drilling mud, and drill cuttings, as stipulated in PDM HYD-9. Stormwater at the drilling site would also be routed into these

containment basins/sumps. Accidental release of water from the containment basins/sumps during a storm event, such as due to overflowing of a containment basin/sump, could result in an increase in sediment loading and other pollutants downstream. In order to protect downstream waters from increased pollutant loads, implementation of **Mitigation Measure SW-1** would be required. This measure would minimize potential impacts by providing specific requirements for completion and implementation of a comprehensive Site Drainage and Runoff Management Plan, including measures to manage stormwater runoff, minimize erosion and sedimentation potential, and ensure proper sizing of stormwater management facilities.

The Applicant has proposed to apply for coverage under the Statewide General Waste Discharge Requirements (WDRs) for Discharges to Land with a Low Threat to Water Quality (Low Threat WDRs), in order to dispose of drill cuttings on-site. Adherence to the conditions of this permit would be required by law, and would involve testing of the drill cuttings for potential water quality contaminants and other measures required by the LRWQCB designed to minimize potential effects on water quality and ensure that beneficial use of natural waters is not affected. In the event that the remaining drill cuttings are found to contain potential water quality pollutants or other hazardous materials, such that acquisition of coverage under the Low Threat WDRs is not attainable, implementation of **Mitigation Measure SW-2** would be required in order to ensure that surface and groundwater quality would be protected from degradation. This measure would minimize potential effects on water quality by ensuring that all containment facilities for drilling spoils would be protected from flows anticipated from a 100-year flood event with sufficient freeboard to prevent overtopping.

As discussed in Chapter 2, well construction would also involve a series of well flow tests and data collection. Geothermal fluid would be extracted from the wells during the tests and stored in on-site, temporary steel tanks. Following the testing period, the geothermal fluid would be re-injected into the formation, either at the site of the well being tested, or at a separate geothermal well to be determined by the Applicant. Geothermal fluid is generally expected to contain relatively high levels of dissolved solids and minerals, such that accidental release of the fluid to surface waters could result in degradation of water quality. Release of geothermal fluid to the surface or to surface waters is not anticipated. However, accidental release could occur, including potential well blowout during construction, which could result in degradation of water quality downstream. In order to ensure that accidental releases of geothermal fluids would not result in a reduction in downstream water quality, implementation of **Mitigation Measures SW-3** and **PHS-1** (refer to Section 4.13, Public Health and Safety, Hazardous Materials, and Fire) would be required. These measures would provide for the proper removal of drilling spoils from each well site in accordance with applicable laws, if coverage under a General Permit could not be acquired, and also requires the preparation of emergency and contingency plans for management of hazardous materials.

Operation and Maintenance

During operation of the Proposed Action, all geothermal fluid would be contained within the proposed infrastructure, and would circulate through production wells/wellheads, pipelines, the power plant facility, and injection pipelines/wells under pressure. Release of geothermal fluid

would not occur during normal operations and maintenance. However, accidental release of geothermal fluid could occur in the event of equipment failure. Equipment failure could potentially occur at production and injection well sites, along geothermal pipelines, or at the proposed power plant. Geothermal fluid is generally expected to contain relatively high levels of dissolved solids and minerals, such that accidental release of the fluid to surface waters could result in degradation of water quality. In the event that equipment failure resulted in the discharge of geothermal fluid into the environment, a loss of water quality in receiving waters could occur.

As noted previously, Wells 55-32 and 65-32 would be located at least 1,100 feet from the nearest waterway, while the proposed plant site would be located at least 1,200 feet from the nearest waterway. It is unlikely that leaks at Wells 55-32 or 65-32, or at the plant site, would reach the tributary to Hot Creek. However, in the event of a major leak (such that leaked fluid would flow offsite), potential surface water quality degradation could occur. Additionally, a pipeline leak in the vicinity of the proposed stream crossing could result in potential water quality degradation downstream, including along Hot Creek. Other facilities would be located in areas that drain to internally-drained basins.[1]

Power plant operation would involve geothermal power generation based on binary technology. A binary geothermal plant functions by transferring heat contained in geothermal fluid to an organically-based working fluid, which is used to drive a turbine for power production. The Applicant would use n-pentane, a hydrocarbon, as a working fluid within the proposed power plant. Under atmospheric pressures, N-pentane exists as a liquid up to a temperature of about 95 degrees F. As a result, accidental releases of n-pentane from the power plant could, if sufficient in volume and left uncontained, become entrained in natural waters downstream of the plant, causing water quality pollution. Infiltration of n-pentane into the subsurface could result in groundwater pollution, which could affect shallow groundwater. Additionally, accidental release of transformer oil, fuels, lubricants, and other chemicals into the environment, from the proposed substation, power plant, and other relevant facilities, could become entrained in stormwater and result in degradation of natural waters. Compliance with hazardous materials storage regulations and PDMs (discussed further in Section 4.13, Public Health and Safety, Hazardous Materials and Fire) would reduce the potential for accidental releases of hazardous materials and provide measures for the containment and prompt cleanup should they occur.

As discussed in Chapter 2, the Applicant has proposed several measures designed to minimize potential for the accidental release of geothermal fluid. Pressure sensors would be installed along the geothermal fluid pipelines, in order to detect a possible line rupture, with flow control valves that could be used to isolate a rupture once detected. Additionally, PDMs HYD-10, HYD-11, HYD-12, and HYD-13 would address potential geothermal fluid spills by requiring isolation valves to prevent backflow along the geothermal pipelines, requiring containment of spills at the power plant site, installing in-line sensing equipment and automatic shutdown controls in the event of sudden pressure drops or electric failures, and implementation of a Spill or Discharge

[1] Internally drained waterways are not connected to downstream waterways, and therefore do not affect or contribute to downstream water quality. Instead, water within these areas drains into nearby basins, where it evaporates or infiltrates.

Contingency Plan and a Well Blowout Contingency Plan. In addition to these measures, implementation of **Mitigation Measures SW-4** and **SW-5** would be required. Adherence to these measures would minimize accidental release of geothermal fluid by containing all well testing related storage tanks and piping within sufficiently sized containment structure, and would ensure that spill containment facilities are designed to prevent infiltration of spilled fluids to underlying groundwater. These measures would ensure that potential for water quality degradation would be minimized.

During project operations, unless carefully maintained, equipment used on site, including stationary and non-stationary equipment, trucks, and machinery, could generate fuel, oil, or other fluid leaks. Fluids leaked from equipment could become entrained in stormwater during runoff events, resulting in elevated levels of water quality pollution downstream. In order to minimize this potential impact, implementation of **Mitigation Measure SW-6** would be required. This measure would provide for the routine inspection of equipment and vehicles for fluid leaks, would provide for the routine maintenance of equipment and vehicles to prevent leaks, and would provide for removal and proper disposal of soil contaminated with leaked fluids.

Decommissioning

Potential water quality impacts associated with decommissioning are anticipated to be similar in nature to those discussed for construction activities, although considerably reduced in intensity. Geothermal wells would be required to be abandoned and plugged in accordance with state requirements for the protection of groundwater resources from water quality contamination. Fluid would be removed from pipelines and they would be removed and recycled, as discussed in Chapter 2, Proposed Action and Alternatives. Removal of other facilities would require the use of heavy machinery, which could alter localized drainage patterns, resulting in increases in erosion and sedimentation. However, completion of a reclamation plan would be required prior to initiation of the decommissioning process, and decommissioning activities would be required to adhere to the requirements of the reclamation plan. The reclamation plan would require implementation of grading practices and water quality best management practices designed to minimize potential effects on surface water hydrology and water quality associated with the decommissioning process. Therefore, potential water quality impacts associated with decommissioning would be minimized via adherence to the requirements of the decommissioning plan. No further mitigation is warranted.

Surface Water Hydrology

Construction and Operation

Installation of the proposed facilities, including the construction activities required for their installation, would involve grading, trenching, and/or other earthwork for the proposed power plant, well pads, roads, substation, transmission line, access roads, and the proposed pipeline alignments. These activities could result in changes to on-site topography, which could result in altered drainage patterns on site. For instance, unless carefully managed, proposed on-site grading and trenching activities could result in localized changes in runoff flow direction, flow concentration, or other changes, that could potentially result in increased ponding or flooding on-site or downstream, and/or contributing to increased erosion or sediment loading on-site or downstream.

Installation of the proposed facilities would also involve the construction of new impervious surfaces. Impervious surfaces prevent the infiltration of stormwater into the subsurface, resulting in increased runoff rates during storm events. The Proposed Action would result in the construction of new impervious surfaces associated with the proposed power plant, substation, and, potentially, production well access roads. Increased runoff from proposed impervious surfaces in these areas could cause or contribute to on-site or downstream flooding or other changes in surface hydrology during storm events.

PDM HYD-5 would result in the preparation of a site-specific Drainage and Runoff Management Plan that would apply to all new roads, and would ensure that off-site stormwater would be intercepted in ditches and channeled around well sites so as to minimize on-site increases in ponding, flooding, or erosion. However, changes in drainage patterns and increased impervious surface area would also be expected at the site of other proposed facilities. Additionally, PDM HYD-5 does not apply to existing roads and modified roads. Therefore, in order to minimize potential impacts to existing drainage patterns and stormwater runoff, implementation of **Mitigation Measure SW-1** would be required. This mitigation measure provides additional guidance and requirements for implementation of the Site Drainage and Runoff Management Plan including management of stormwater as affected by impervious surfaces, and requires that the plan be applied to existing as well as new roads and modified roads within the Project Area.

Decommissioning

Removal of facilities during decommissioning could result in unanticipated ponding of stormwater or other on-site drainage and erosion/sedimentation issues. In order to minimize such effects and to prevent effects on downstream hydrology, implementation of **Mitigation Measure SW-1**, which provides additional details regarding implementation of a Site Drainage and Runoff Management Plan, would be required. Additional measures may be required through the decommissioning reclamation plan process. With respect to impervious surfaces, decommissioning would remove all impervious surfaces installed under the Proposed Action.

Flooding

Construction, Operation and Maintenance, and Decommissioning

As shown on Figure 3.19-1, the Project Area is located entirely outside of the FEMA-defined 100-year flood zone. Therefore the Proposed Action would not result in construction within a floodplain, nor would it otherwise interfere with flooding processes located within a 100-year floodplain during construction, operation and maintenance, or decommissioning. Please refer to prior discussions of on-site hydrology and drainage for a discussion of potential changes in stormwater flows emanating from the Project Area.

Groundwater Supply and Groundwater Levels

Construction and Operation

As discussed in Chapter 2, during well construction, up to 25,000 gallons per day of water would be required for construction and well drilling. If all wells were installed, this would represent

approximately 21 million gallons (64 acre-feet) over the entire construction period. Water would be optionally sourced from shallow groundwater wells at the existing Casa Diablo geothermal plants, from deep geothermal water (obtained by diverting a small stream of geothermal injection fluid), from reclaimed water available from the MCWD treatment plant, from local MCWD municipal supplies if available, or some combination of these sources. Reducing injection rates of geothermal fluid for existing geothermal plant operation by up to 25,000 gallons per day would represent a relatively small reduction in the total volume of water returned to the geothermal system via injection under existing conditions. The existing Casa Diablo power plants have an average flow rate of 12,000 gallons per minute (17.3 million gallons per day) (EGS, 2012). Similarly, withdrawal of this volume of water the shallow (cold) aquifers would represent a small fraction of the total volume of water available in the affected aquifer, which stores an estimated 180,000 to 300,000 acre-feet of water (see additional discussion in Chapter 3.19, Water Resources). Thus, potential construction withdrawals would be equivalent to 0.02 percent or less of total groundwater storage. Withdrawal of water at these rates is not expected to noticeably affect or alter cold groundwater levels (shallow aquifers). No mitigation is warranted for construction period groundwater withdrawal.

The Proposed Action would not require any groundwater withdrawals from the cold, shallow aquifer during operations, for potable or other uses. Therefore, cold groundwater resources would not be affected by groundwater withdrawals during operation of the Proposed Action. If needed, potable water would be delivered from an alternate source by truck. With respect to cooling, the proposed cooling system would be dry cooled and would not require additional water for cooling.

For a discussion of groundwater resources with respect to operation period utilization of geothermal fluid from deep geothermal aquifers, and associated effects on groundwater, please refer to Chapter 4.7, Geothermal and Groundwater Resources.

Decommissioning

Decommissioning could require groundwater use in support of on-site construction activities, in particular for dust control during decommissioning activities. The groundwater requirements for decommissioning would be substantially lower than those discussed for construction, due to a lower construction work intensity construction and the absence of well drilling. Therefore, decommissioning of the Proposed Action is not expected to noticeably affect groundwater resources within the vicinity of the Project Area. No mitigation is warranted for decommissioning period groundwater use.

Groundwater Quality

Construction, Operation and Maintenance, and Decommissioning

Potential effects of accidental release of pollutants, including geothermal fluid, power plant working fluid, and other water potential quality pollutants on groundwater are addressed previously under the discussion of operation period accidental releases to natural waters. Potential groundwater quality effects of geothermal well drilling, and the withdrawal/injection of

geothermal fluid into deep aquifers, are discussed separately in Chapter 4.7**,** Geothermal and Groundwater Resources. No further discussion is warranted.

4.19.4.2 CEQA Significance Determination

Significance conclusions for the impacts identified for each phase of the project (Construction, Operation and Maintenance, Decommissioning) are presented below based on the CEQA Significance Criteria presented in Section 4.19.3.

a) Violate any water quality standards or waste discharge requirements?

Construction

Potential for construction related reductions in water quality are discussed previously, under Surface Water Quality. As discussed therein, adherence to PDMs, conditions of required permits, and **Mitigation Measures SW-1**, **SW-2**, **and SW-3**, would minimize potential construction period effects on water quality. These measures are also anticipated to prevent or avoid potential violation of applicable water quality standards and discharge requirements. Therefore, with implementation of **Mitigation Measures SW-1**, **SW-2**, **and SW-3**, this impact is considered less than significant.

Operation, and Maintenance

Potential for operation period effects on water quality are discussed previously, under Surface Water Quality. Potential groundwater effects of geothermal well drilling, and the withdrawal/ injection of geothermal fluid into deep aquifers, is discussed separately in Section 4.7, Geothermal Resources. As discussed therein, implementation of **Mitigation Measures SW-4, SW-5,** and **SW-6** would ensure that potential operation period impacts are reduced to less than significant levels.

Decommissioning

Potential for decommissioning related effects on water quality are anticipated to be minimal, as discussed previously. No additional mitigation is warranted.

Impact Significance after Mitigation: Less than Significant.

b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?

Construction, Operation and Maintenance

Construction and operation period groundwater use is addressed previously, under Groundwater Supply and Groundwater Levels. As discussed therein, potential for groundwater depletion is considered minimal, and this impact is considered less than significant.

Decommissioning

Decommissioning could result in additional use of groundwater for dust control. However, the amount of water required for decommissioning is expected to be only a fraction of that required for construction. Therefore, this impact is considered less than significant.

c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?

Construction, Operation and Maintenance, and Decommissioning

Potential for the Proposed Action to alter existing drainage patterns on-site, which could result in increased erosion or sedimentation, is addressed previously under Changes in Drainage Patterns and Stormwater Runoff and Decommissioning. As discussed therein, implementation of mitigation would be required, and adherence to **Mitigation Measure SW-1** would ensure that potential impacts would be less than significant.

Impact Significance after Mitigation: Less than Significant.

d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

Construction, Operation and Maintenance, and Decommissioning

Potential for the Proposed Action to alter existing drainage patterns on-site, which could result in increased or altered surface water runoff, is addressed previously under Changes in Drainage Patterns and Stormwater Runoff and Decommissioning. As discussed therein, implementation of mitigation would be required, and adherence to **Mitigation Measure SW-1** would ensure that potential impacts would be less than significant.

Impact Significance after Mitigation: Less than Significant.

e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

Construction, Operation and Maintenance, and Decommissioning

Potential for the Proposed Action to result in increased impervious surfaces is addressed previously under Changes in Drainage Patterns and Stormwater Runoff and Decommissioning. As discussed therein, implementation of mitigation would be required, and adherence to **Mitigation Measure SW-1** would ensure that potential impacts would be less than significant.

Impact Significance after Mitigation: Less than Significant.

f) Otherwise substantially degrade water quality?

Construction, Operation and Maintenance, and Decommissioning

Potential degradation of water quality is discussed under CEQA criterion a), above. Additional discussion is not warranted.

g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?

Construction, Operation and Maintenance, and Decommissioning

The Proposed Action would not result in the construction of any structures within a 100-year flood zone. Therefore, no impact would occur.

h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

Construction, Operation and Maintenance, and Decommissioning

The Proposed Action would not result in the construction of any structures within a 100-year flood zone. Therefore, no impact would occur.

i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?

Construction, Operation and Maintenance, and Decommissioning

The Project Area is not protected from flooding by a levee, and would not cause or result in disturbance to any levee or dam. Additionally, the Proposed Action would not result in the construction of housing or other facilities that would support increased population densities, in an area where flooding could occur. Therefore, no impact would occur.

j) Inundation by seiche, tsunami, or mudflow?

Construction, Operation and Maintenance, and Decommissioning

The Proposed Action is not located in proximity to any large lake or other water body that is susceptible to seiche, nor is it located near the ocean where tsunami could occur. Mudflows are anticipated to occur in some areas in the general region around the Project Area, in particular within the Tri-Valley Area, which is located approximately 25 miles east of the Project Area and in a separate basin. However, mudflows are not expected to occur on-site. Mudflows may be anticipated in areas with loose, highly erosive surface sediment that is or could be denuded of vegetation. Such conditions do not exist on-site. Therefore, potential for mudflows is considered minimal, and this impact is considered less than significant.

4.19.5 Alternative 2: Plant Site Alternative

4.19.5.1 Direct and Indirect Impacts

Potential impacts to all water resources impact topics discussed in this section, for Alternative 2, would be the same as those discussed for the Proposed Action, except that the location of those impacts would be slightly altered according to the Alternative 2 plant site location. Specifically, the proposed plant site would be located approximately 900 feet north of Hot Creek, which is approximately 300 feet closer to a waterway than the plant site in the Proposed Action. Wells 55-32 and 65-32 would be located in the same place as the Proposed Action, but one of the proposed access roads for Well 65-32 would be located approximately 1,000 feet from the Hot Creek tributary (approximately 100 feet closer than the Proposed Action). Other facilities would be located in areas that are internally drained. All mitigation discussed for the Proposed Action would apply to Alternative 2. Please refer to impact discussions for the Proposed Action.

4.19.5.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Project. Impacts would be less than significant with incorporation of mitigation measures.

4.19.6 Alternative 3: Modified Pipeline Alternative

4.19.6.1 Direct and Indirect Impacts

Potential impacts on all water resources discussed in this section, for Alternative 3, would be the same as those discussed for the Proposed Action. Facilities that would be tributary to Hot Creek and its tributaries would be placed in the same locations as compared to the Proposed Action. Other facilities would be placed in areas that are internally drained. As a result, potential impacts and proposed mitigation associated with installation of those facilities would be similar to the Proposed Action.

4.19.6.2 CEQA Significance Determination

CEQA significance determinations would be the same as described above for the Proposed Project. Impacts would be less than significant with incorporation of mitigation measures.

4.19.7 Alternative 4: No Action

4.19.7.1 Direct and Indirect Impacts

Under implementation of the No Action Alternative, installation of the proposed power plant, substation, and pipeline facilities would not occur and therefore there would be no impacts on water resources associated with the CD-IV project.

However, installation of some geothermal exploration wells (11 total) in Basalt Canyon could still occur, in accordance with already approved exploration permits. However, these well installations

would be reduced (five fewer wells) in comparison to the Proposed Action. Under the No Action Alternative, a total of 16 wells have been previously approved. Of these 16 wells, five wells have already been completed. The remaining 11 wells that could be installed include 9 slim hole and 2 large diameter geothermal-size exploration (Refer to Chapter 2 for a description of well types) wells. In comparison, the Proposed Action would result in installation of up to 16 new production and injection wells, which are generally the same size as large diameter geothermal exploration wells. Potential impacts associated with implementation of the No Action Alternative would be similar to the Proposed Action for well construction, albeit reduced in intensity. No other impacts would occur.

4.19.7.2 CEQA Significance Determination

Because the No Project Alternative would not include construction and operation of a geothermal power plant and pipelines, the impacts on surface water resources would be less than the proposed project. The exploratory well drilling approved previously would have impacts on water quality related to well drilling and construction similar to the CD-IV Project. Impacts would be reduced to a less-than-significant level with implementation of mitigation measures identified in previous NEPA and CEQA documents.

4.19.8 Cumulative Impacts

4.19.8.1 Geographic Extent/Context

The geographic scope for cumulative impacts from hydrologic resources generally encompasses the project area, the Town of Mammoth Lakes, and other nearby areas that are located within the same groundwater subbasin and watershed (Hot Creek and its tributaries) as compared to the Proposed Action. Various types of projects could contribute to the cumulative impact of the Proposed Action and alternatives, including existing and proposed geothermal developments, housing development projects, public infrastructure, and recreational trail system projects. These types of past, current and future projects could combine with potential impacts of the Proposed Action or an alternative to affect public health and safety within the geographic extent of this cumulative analysis.

Most of these projects have either undergone independent environmental review pursuant to NEPA and/or CEQA or would do so prior to approval. Even if environmental review has not been completed for the cumulative projects described in Table 4.1-1, presented in Section 4.1.5, Cumulative Scenario Approach, their effects were considered in the cumulative impacts analyses in this EIS/EIR.

4.19.8.2 Existing Cumulative Conditions

Existing cumulative conditions with respect to water quality include 303(d) listings along Mammoth Creek for manganese and mercury from natural sources, total dissolved solids from unknown sources, and within Crowley Lake for ammonia and dissolved oxygen. With respect to water supplies and groundwater, available surface water supplies and the underlying groundwater

basin are not considered to be overdrafted. The vicinity of the Project Area is, outside of Mammoth Creek, sparsely populated and consists largely of open space land within the Inyo National Forest, where development-related impacts on hydrologic resources are generally minimal.

A wide variety of past, present, and reasonably foreseeable future development projects could contribute to cumulative conditions for surface water resources in the cumulative analysis area. Table 4.1-1, presented in Section 4.1.5, Cumulative Scenario Approach, lists cumulative projects in the vicinity of the project site and surrounding area that were used to develop this analysis of cumulative effects for surface water resources.

4.19.8.3 Construction

Proposed Action

Cumulative impacts associated with construction of the Proposed Action would be limited to those projects under construction at the same time and general location as the Proposed Action. Potential construction-related water resources impacts that could contribute to cumulative impacts include accidental releases of pollutants due to construction activities such as grading, trenching, and other construction activities, and also including oils, greases, paints, cement washout, and various other potential pollutants. Acquisition of coverage under the construction stormwater general permit would ensure that no cumulatively considerable impact would occur – other projects disturbing over one acre of land area would also be require to acquire coverage under the permit, and required permitting conditions are sufficient to prevent cumulative degradation of water quality, in order to protect beneficial use.

With respect to releases of water quality pollutants from well drilling and testing, it is assumed for the purposes of this analysis that other potential projects that could involve well drilling and testing would utilize similar methods for containing water quality pollutants. As discussed for direct impacts, this would likely include containment of drilling mud, drill cuttings, and water/geothermal fluid at the drilling site. Accidental release could occur, either on site or from other proposed facilities. Accidental release of geothermal fluid could result in contribution of total dissolved solids (TDS) to the lower portions of Mammoth Creek, where Mammoth Creek is impaired for TDS. Such releases could potentially lead to a cumulatively considerable increase in TDS loading in Mammoth Creek. However, even without mitigation, accidental releases are anticipated to be minimal. With implementation of mitigation designed to contain accidental releases, and assuming that similar mitigation would be applied to other project sites, potential for release of elevated dissolved solids levels would be minimal. Therefore, it is unlikely that the Proposed Action would result in a combined impact that would cause an adverse cumulative effect with respect to water quality.

With respect to impervious surfaces, implementation of the Proposed Action would include disturbance associated with the installation of the proposed power plant, substation, transmission line, well pads, new roads, modification of existing roads, and installation of pipelines. Following completion of construction, new impervious surfaces would remain associated with these structures. However, only a portion of the total area disturbed during construction would remain

impervious during operations. Based on USFS requirements, all roadways and other compacted surfaces, even if unpaved, are considered to be impervious. Thus, implementation of the Proposed Action would result in the construction period disturbance of approximately 78.3 acres and in the installation of approximately 17.3 acres of new permanent impervious surfaces, as shown in Table 4.19-1.

TABLE 4.19-1
TEMPORARY CONSTRUCTION DISTURBANCE AND PERMANENT NEW IMPERVIOUS SURFACES UNDER THE PROPOSED ACTION

Facility	Temporary Construction Disturbance	Permanent New Impervious Surfaces
Power Plant	6.5	6.5
Substation	0.25	0.25
Transmission Line	0.75	0.0003
Well Pads	40	6.4
New Roads	1.4	1.4
Existing Roads	1.8	1.8
Pipelines	27.6	0.97
Total	**78.3**	**17.3**

SOURCE: ESA 2012 (Appendix F)

During construction, the total impervious surface area associated with the Proposed Action (78.3 acres) would represent about 0.23 percent of the total watershed size (33,914 acres). During operations, total impervious surface area associated with the Proposed Action (17.3 acres) would represent about 0.051 percent of the total watershed size (33,914 acres). Other existing plus cumulative scenario impervious surfaces within the watershed account for 441 acres of impervious surface area. Thus, the total affected surface area within the watershed with implementation of the Proposed Action would increase to 519 acres during construction, or 458 acres during operations, equivalent to approximately 1.51 percent or 1.35 percent, respectively. For this watershed, USFS considers the Threshold of Concern for the cumulative watershed impacts of impervious surfaces to be 10 to 12 percent. Therefore, it is unlikely that the Proposed Action would result in a combined impact that would cause an adverse cumulative effect with respect to impervious surfaces.

With respect to groundwater supply and groundwater levels, the groundwater basin is not currently overdrafted, nor is overdrafting anticipated within the foreseeable future (DWR, 2004). Additionally, based on the cumulative scenario projects considered in this analysis, major new potable groundwater uses are not anticipated. For the purpose of comparison, existing groundwater pumping by the MCWD (the primary groundwater user within the basin) is approximately 1,600 acre-feet per year, whereas the Proposed Action would result in the withdrawal of approximately 64 acre-feet during construction and no groundwater withdrawal during operation. Therefore, it is unlikely that the Proposed Action would result in a combined impact that would cause an adverse cumulative effect with respect to groundwater.

Alternative 2

Implementation of Alternative 2 would result in the installation of similar facilities as compared to the Proposed Action, but with a different location for the plant site. Cumulative scenario projects for Alternative 2 would be the same as those discussed for the Proposed Action. Therefore, similar potential for cumulative impacts would occur for Alternative 2, as compared to the Proposed Action, and it is unlikely that Alternative 2 would result in a combined impact that would cause an adverse cumulative effect on construction period water quality or groundwater.

With respect to impervious surfaces, implementation of Alternative 2 would include disturbance associated with the installation of the same facilities as discussed for the Proposed Action, but some facilities would be sized slightly differently than for the Proposed Action. Table 4.19-2 provides a summary of total construction disturbance and permanent new impervious surfaces that would occur under Alternative 2.

TABLE 4.19-2
TEMPORARY CONSTRUCTION DISTURBANCE AND PERMANENT NEW IMPERVIOUS SURFACES UNDER ALTERNATIVE 2

Facility	Temporary Construction Disturbance	Permanent New Impervious Surfaces
Power Plant	7.3	7.3
Substation	0.25	0.25
Transmission Line	5.6	0.0007
Well Pads	40	6.4
New Roads	1.4	1.4
Existing Roads	1.8	1.8
Pipelines	26.8	0.94
Total	**83.2**	**18.1**

SOURCE: ESA 2012

During construction, the total impervious surface area associated with the Alternative 2 (83.2 acres) would represent about 0.25 percent of the total watershed size (33,914 acres). During operations, total impervious surface area associated with the Proposed Action (18.1 acres) would represent about 0.053 percent of the total watershed size (33,914 acres). Other existing plus cumulative scenario impervious surfaces within the watershed account for 441 acres of impervious surface area. Thus, the total affected surface area within the watershed with implementation of the Project would increase to 524 acres during construction, or 459 acres during operations, equivalent to approximately 1.55 percent or 1.35 percent, respectively. For this watershed, USFS considers the Threshold of Concern for the cumulative watershed impacts of impervious surfaces to be 10 to 12 percent. Therefore, it is unlikely that Alternative 2 would result in a combined impact that would cause an adverse cumulative effect with respect to impervious surfaces.

Alternative 3

Implementation of Alternative 3 would result in the installation of similar facilities as compared to the Proposed Action. Cumulative scenario projects for Alternative 3 would be the same as those discussed for the Proposed Action. Therefore, it is unlikely that Alternative 3 would result in a combined impact that would cause an adverse cumulative effect.

With respect to impervious surfaces, implementation of Alternative 3 would include disturbance associated with the installation of the same facilities as discussed for the Proposed Action, but some facilities would be sized slightly differently than for the Proposed Action. Table 4.19-3 provides a summary of total construction disturbance and permanent new impervious surfaces that would occur under Alternative 3.

TABLE 4.19-3
TEMPORARY CONSTRUCTION DISTURBANCE AND PERMANENT NEW IMPERVIOUS SURFACES UNDER ALTERNATIVE 3

Facility	Temporary Construction Disturbance	Permanent New Impervious Surfaces
Power Plant	7.3	7.3
Substation	0.25	0.25
Transmission Line	5.6	0.0007
Well Pads	40	6.4
New Roads	1.4	1.4
Existing Roads	1.8	1.8
Pipelines	26.8	0.94
Total	**83.2**	**18.1**

SOURCE: ESA 2012

During construction, the total impervious surface area associated with the Alternative 3 (83.2 acres) would represent about 0.25 percent of the total watershed size (33,914 acres). During operations, total impervious surface area associated with the Proposed Action (18.1 acres) would represent about 0.053 percent of the total watershed size (33,914 acres). Other existing plus cumulative scenario impervious surfaces within the watershed account for 441 acres of impervious surface area. Thus, the total affected surface area within the watershed with implementation of the Project would increase to 524 acres during construction, or 459 acres during operations, equivalent to approximately 1.55 percent or 1.35 percent, respectively. For this watershed, USFS considers the Threshold of Concern for the cumulative watershed impacts of impervious surfaces to be 10 to 12 percent. Therefore, it is unlikely that Alternative 3 would result in a combined impact that would cause an adverse cumulative effect with respect to impervious surfaces.

No Action

Under the No Action Alternative, the power plant, substation, and other facilities associated with the Proposed Project would not be installed, except for some exploratory geothermal wells

(11 total), which could still be installed. As a result, potential for the No Action Alternative to result in a cumulatively considerable impact on water quality or groundwater would be less than that indicated for the Proposed Action. Therefore, it is unlikely that the No Action Alternative would result in a combined impact that would cause an adverse cumulative effect on construction period water quality or groundwater.

4.19.8.4 Operation and Maintenance

Proposed Action

Operation and maintenance of the Proposed Action would occur over approximately the next 30 years. During that time, as discussed for direct impacts, accidental releases of potential water quality pollutants to natural waters could occur. Potential sources of water quality pollutants that could be released include geothermal fluid that would be circulated through proposed facilities, as well as accidental releases from routine storage and use of various water polluting chemicals, including fuels, oils, and other chemicals that would be used during maintenance and operations. However, as discussed for direct impacts, potential for release of these constituents would be minimized via adherence to materials handling requirements and proposed mitigation.

In consideration of other potential cumulative projects that are relevant to this analysis, there exists a potential for accidental release of similar water quality pollutants from select projects. However, similar to the Proposed Action, release of potential water quality pollutants from other projects would be expected to occur only on an intermittent basis, and in the event of an accidental spill. Cumulative projects would be required to adhere to similar legal requirements for the handling of potentially hazardous water quality pollutants. Additionally, because other cumulative projects would be required to comply with CEQA and potentially NEPA, it is reasonable to assume that similar mitigation measures as those applied here would be implemented for cumulative projects, in order to ensure that water quality releases would be minimized.

As discussed for direct impacts, the Proposed Action would result in the installation of new impervious surfaces. Other cumulative projects would also be expected to result in the installation of new impervious surfaces. During operation of the Proposed Action and cumulative projects, increased impervious surface coverage could result in increased runoff on site, which could contribute to hydrologic changes downstream. Potential increases in stormwater generated by impervious surfaces for the Proposed Action would be minimized via adherence to applicable mitigation, which would require no net increase in stormwater discharge from the Project Area. Additionally, it is anticipated that other cumulative scenario projects would be required to implement similar mitigation measures in order to comply with CEQA and/or NEPA. Therefore, cumulative scenario impacts are anticipated to be minimal.

With respect to groundwater supplies, as discussed for direct impacts, the Proposed Action would result only in minimal water use during operation and maintenance. Other cumulative scenario projects could result in a net increase in water use within the groundwater basin. However, as discussed for cumulative construction impacts, the groundwater basin is not in a state of

overdraft. Therefore, operation and maintenance of the Proposed Action would not contribute to a cumulative scenario impact with respect to groundwater supplies. In consideration of the potential combined impacts associated with concurrent implementation of all cumulative scenario projects plus the Proposed Action, it is therefore unlikely that the Proposed Action would result in a combined impact that would cause an adverse cumulative effect on operation and maintenance period water quality, surface hydrology, or groundwater.

Alternative 2

Implementation of Alternative 2 would result in operation and maintenance for similar facilities as compared to the Proposed Action, but in slightly difference locations. Cumulative scenario projects for Alternative 2 would be the same as those discussed for the Proposed Action. As a result, similar potential for cumulative impacts would occur for Alternative 2, as compared to the Proposed Action. Therefore, it is unlikely that Alternative 2 would result in a combined impact that would cause an adverse cumulative effect on operation and maintenance period water quality, surface hydrology, or groundwater.

Alternative 3

Implementation of Alternative 3 would result in operation and maintenance for similar facilities as compared to the Proposed Action. Cumulative scenario projects for Alternative 3 would be the same as those discussed for the Proposed Action. As a result, similar potential for cumulative impacts would occur for Alternative 3, as compared to the Proposed Action. Therefore, it is unlikely that Alternative 3 would result in a combined impact that would cause an adverse cumulative effect on operation and maintenance period water quality, surface hydrology, or groundwater.

No Action Alternative

Under the No Action Alternative, the power plant, substation, and other facilities associated with the Proposed Action would not be installed, except for 11 new geothermal exploration wells, which could still be installed. Operation and maintenance of these wells would differ because road hardening and year-round access would not be required. Operation and maintenance of these wells would not meaningfully contribute to new impervious surfaces, as relevant to cumulative scenario projects. Therefore, it is unlikely that the No Action Alternative would result in a combined impact that would cause an adverse cumulative effect on operation and maintenance period water quality or groundwater.

4.19.8.5 Decommissioning

Proposed Action

Impacts of project decommissioning would be similar to construction impacts, albeit with a reduced intensity. Decommissioning impacts would be primarily related to an inadvertent release of potential water quality pollutants from the facilities being decommissioned and construction equipment during the decommissioning process. Decommissioning would be expected to comply

with relevant stormwater permitting requirements which, similar to Project construction, would require adherence to conditions designed to minimize water quality pollution. Well decommissioning would not involve testing. Finally, water use during decommissioning would be minimal. Therefore, it is unlikely that the Proposed Action would result in a combined impact that would cause an adverse cumulative effect on hydrologic resources during decommissioning.

Alternative 2

Decommissioning of Alternative 2 would result in similar activities as compared to the Proposed Action, except that proposed facilities would be installed in a slightly different location under Alternative 2. Therefore, it is unlikely that Alternative 2 would result in a combined impact that would cause an adverse cumulative effect on hydrologic resources during decommissioning.

Alternative 3

Decommissioning of Alternative 3 would result in similar activities as compared to the Proposed Action. Therefore, it is unlikely that Alternative 3 would result in a combined impact that would cause an adverse cumulative effect on hydrologic resources during decommissioning.

No Action

The No Action Alternative would involve the installation of some of the proposed geothermal exploration wells (11 total) identified for the Proposed Action. Decommissioning of these wells would be required at the end of their usable lifetime. However, no other facilities would be installed that would require decommissioning. Therefore, potential for cumulatively considerable effects on water resources would be reduced in extent as compared to the Proposed Action. Therefore, it is unlikely that the No Action Alternative would result in a combined impact that would cause an adverse cumulative effect on hydrologic resources during decommissioning.

4.19.8.6 CEQA Significance Determinations

For construction related water quality emissions, as discussed for the cumulative discussion provided above, potential releases of construction period water quality pollutants during construction, including release of pollutants during well construction and testing, would be limited by adherence to permitting requirements and mitigation as warranted, for the Proposed Action and for cumulative scenario projects. During operations, accidental releases of potential water quality pollutants would be minimized via adherence to hazardous materials storage and handling regulations that would be applicable to the Proposed Action and to all cumulative scenario projects. Similarly, potential operation period releases of geothermal fluid would be minimized by adherence to applicable mitigation for the Proposed Action, while similar mitigation measures would presumably be employed for relevant cumulative scenario projects, in accordance with CEQA and NEPA requirements for minimization of potential impacts. Potential changes to stormwater hydrology as a result of the installation of new impervious surfaces would similarly be minimized for the Proposed Action and cumulative scenario projects, as discussed previously, and a cumulatively considerable scenario would be avoided. Finally, as discussed previously, neither the Proposed Action nor potential cumulative scenario projects would draw

groundwater from an overdrafted aquifer. Consequently, the Proposed Action's incremental contribution with respect to hydrologic resources would not be cumulatively considerable and the cumulative impact would be less than significant.

4.19.9 Mitigation Measures

Mitigation Measure SW-1: Comprehensive Site Drainage and Runoff Management Plan (Drainage Plan). According to PDM HYD-5, the Applicant would prepare a Drainage Plan. Additionally, the Applicant shall ensure that the Drainage Plan adheres to the following:

The Applicant shall prepare and submit to the LRWQCB, BLM and USFS for review the Drainage Plan that shall encompass all proposed facilities. The Drainage Plan shall evaluate potential changes in stormwater flow that would result from implementation of the Proposed Action, to the extent required to determine implementation of appropriate measures to minimize, avoid, retain, or otherwise prevent increases in stormwater runoff from leaving the site and minimize potential for associated erosion or sedimentation. The Drainage Plan shall also delineate location and sizing for proposed stormwater retention facilities, on-site drainages, and other required facilities as warranted to ensure that proposed stormwater facilities are sized appropriately. All stormwater and drainage facilities shall be sized to ensure that the implementation of the Proposed Action would result in no net increase in stormwater discharge from the site during at least a 20-year, 24-hour storm event. With respect to decommissioning, a drainage plan will be included in the reclamation plan, which will be submitted to relevant agencies for approval prior to the initiation of the decommissioning process. This will ensure that final post-decommissioning grading reflects natural site contours and minimizes potential for concentration of stormwater flows, erosion, and sedimentation. All proposed facilities shall comply with the all aspects of the Drainage Plan as indicated here and in PDM HYD-5, including existing and new/proposed access roads and roads that would be plowed during the winter due to proposed operations.

Mitigation Measure SW-2: To ensure that sediment and other pollutants contained in the proposed well construction period containment basins/sumps would not be released into downstream waters, the Applicant shall ensure that all containment basins/sumps are constructed so as to be able to contain anticipated drill cuttings, drilling mud, other drilling liquids, and on-site flows anticipated from a 100-year event with sufficient freeboard to prevent overtopping. Upon completion of drilling activities and disposal of drill cuttings, all containment basins/sumps shall be backfilled and graded to match natural topography.

Mitigation Measure SW-3: Following well completion, in the event that coverage under the Statewide General Waste Discharge Requirements for Discharges to Land with a Low Threat to Water Quality cannot be acquired in support of disposal of drill cuttings, the Applicant shall remove all drill cuttings from each well site where on-site disposal is not available. Removed drill cuttings shall be disposed of in a landfill or other facility approved to accept hazardous wastes (or in accordance with classification of drill cutting waste from the site), in accordance with local and state law. Remaining pits on-site shall be filled and graded to match natural conditions.

Mitigation Measure SW-4: During well testing, the Applicant shall ensure that all storage tanks and piping for geothermal fluid storage and conveyance at the well pad site would be contained within a temporary facility that would contain spilled fluid on-site. Containment structures may include berms, containment basins, sumps, or other structures with sufficient capacity to contain the maximum volume of geothermal fluid stored on-site, with sufficient freeboard to prevent accidental release.

Mitigation Measure SW-5: Prior to the initiation of operations, the Applicant shall ensure that the proposed spill containment facilities at the power plant site incorporate measures to prevent the infiltration to groundwater of spilled fluids at the plant site, including geothermal fluid and n-pentane. The capacity of the proposed containment facilities shall be equal to at least twice the volume of the entire fluid contents of the power plant facility, including pipeline capacity and the amount that would flow onto the site until automatic shutdown devices would stop the flow. Spill containment facility design shall be reviewed by the USFS and BLM prior to the initiation of construction activities for the power plant.

Mitigation Measure SW-6: During Project operation, the applicant shall ensure that equipment and vehicles are routinely inspected for fluid leaks. Equipment and vehicles shall be maintained so as to prevent equipment leaks from infiltrating into soils or being washed off-site during storm events. When discovered, the applicant will repair fluid leaks prior to use on the project site. If fluids do leak onto the project site, contaminated soil will be removed immediately and disposed of at an approved facility, in accordance with federal, state, and local requirements.

4.19.10 Residual Impacts after Mitigation Incorporated

Residual impacts after the incorporation of mitigation include the following: (1) Potential residual degradation of water quality associated with construction activities. Although potential construction-related water quality degradation would be minimized, some minor degree of water quality loss could still occur; however, it would not be sufficient to affect beneficial uses.
(2) Potential residual degradation of water quality associated with operations could occur. In the event of an accidental spill of geothermal fluid or other pollutants, even with implementation of proposed containment and cleanup procedures, some degree of residual contamination of surface water or groundwater quality could occur. (3) Potential residual minor changes in drainage and runoff could occur. Even with the implementation of the proposed grading and drainage plan, the Proposed Action would still result in changes to on-site hydrology. These changes would primarily be contained to the site and its immediate surroundings, and are not anticipated to result in noticeable change downstream.

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CHAPTER 5
Other Required CEQA/NEPA Considerations

5.1 Unavoidable Adverse Effects

Section 15126.2(b) of the CEQA Guidelines requires that an EIR identify the significant environmental effects which cannot be avoided if the proposed project is implemented. The analysis contained in Sections 4.2 through 4.19 indicates that the potential environmental effects from implementation of the CD-IV Project would cause significant impacts, although most of those can be reduced to a level that is below significant with mitigation measures. Significant unavoidable impacts on air quality were identified resulting from construction equipment emissions and power plant operation. Also, given the high visibility and visual sensitivity of the Project area, collectively, operation of the new pipelines and well facilities would result in a significant and unavoidable impact. Under Alternative 2, Alternative Plant Site, the long-term operation and maintenance of the power plant would exceed the Mono County nighttime exterior noise standard at the nearby Chance Ranch residence. Because mitigation to reduce power plant operation noise would not be practicable or feasible, Alternative 2 would result in a significant unavoidable impact with respect to the generation of noise levels in excess of local standards. Under Alternative 2, the power plant would be at a similar elevation as the existing power plant facilities (MP-II and PLES I) and could be partially visible from local highways and roads. Furthermore, the new pipelines (spanning approximately 12 feet wide) and well facilities would be highly visible from scenic roads and resources. Even with implementation of PDMs and the landscaping mitigation measure, impacts on the visual character of the Project Area would be significant and unavoidable.

Under Alternative 3, Modified Pipeline Alternative, less geothermal piping would be constructed parallel to Sawmill Cutoff Road (NFSR 03S08) and at locations where a new pipeline must cross another pipeline (either existing or new), the pipeline crossings would be underground. Although these pipeline modifications would reduce adverse visual effects, the new pipelines (spanning approximately 12 feet wide) and the new well facilities would still be highly visible in some visually sensitive areas. Therefore, even with implementation of PDMs and the landscaping mitigation measures, Alternative 3 would result in a substantial adverse effect on the visual character and quality of the site, resulting in a significant and unavoidable impact.

5.2 Significant Irreversible Environmental Changes

Section 15126.2(c) of the CEQA Guidelines requires that an EIR identify significant irreversible environmental changes that would be caused by a proposed project. These changes may include, for example, uses of nonrenewable resources, or provision of access to previously inaccessible

areas, as well as project accidents that could change the environment in the long term. Development of the CD-IV Project would require a permanent commitment of natural resources resulting from the direct consumption of fossil fuels, construction materials, the manufacture of new equipment, some of which would not be recyclable at the end of the CD-IV Project's useful lifetime, and energy required for the production of materials. A number of new access routes to various well pads from existing roads would be constructed for the CD-IV Project. These access routes would be short, and would only provide access to proposed well sites; proposed access routes would not provide public access to previously undeveloped forest areas. Access routes would be reclaimed during project decommissioning.

Accidents, such as the release of hazardous materials or fires, could trigger irreversible environmental damage depending upon the severity of the incident. As discussed in Section 4.13, *Public Health and Safety, Hazardous Materials and Fire*, project construction, operation and decommissioning would involve the use of hazardous materials, such as n-pentane, diesel fuel, lubricants, drilling muds and additives, and paints. An accidental spill of any of these substances could affect soils, water and/or groundwater quality. However, implementation of emergency contingency plan measures would minimize the extent of releases and cleanup actions would be required by the regulatory agencies, therefore, it is unlikely that such a release would cause irreversible environmental damage. Similarly, the potential exists for fires resulting from construction and maintenance activities in the wellfield or from the use of flammable materials at the power plant. Project design measures, fire safety regulations and implementation of fire prevention plans would ensure that safety risks are reduced to the extent practicable. Therefore, significant irreversible changes from accidents are not anticipated.

5.3 Growth-Inducing Impacts

The Bureau of Land Management (BLM National Environmental Policy Act (NEPA Handbook (H-1790-1 Sec. 9.2.9), the NEPA Guidelines (40 CFR 1502.16), and CEQA Guidelines Section 15126.2 require a discussion of any growth-inducing impacts caused by implementation of the proposed CD-IV geothermal project or one of the action alternatives.

Section 15126.2 (d) of the CEQA Guidelines requires the evaluation of economic, population, or housing growth in the surrounding environment with implementation of the Project. Induced growth is growth that exceeds planned growth in the surrounding area and that results from new development that would not have taken place if the Project had not been implemented. CEQA requires a discussion of the ways in which a proposed project may foster economic or population growth, or the construction of additional housing (directly or indirectly) in the surrounding environment. The discussion must also address how a proposed project may remove obstacles to growth, or encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. Typically, the growth-inducing potential of a project would be considered significant if it fosters population growth above what is assumed in local and regional land use plans, or in projections made by regional planning authorities. Significant growth impacts could also occur if a project provides infrastructure or service capacity to accommodate growth levels beyond those permitted by local or regional plans and policies.

As discussed in Section 4.15, the Project construction workforce could peak at a maximum of 120 workers during each phase of construction. While some of these workers would be recruited locally, most would be specialized craft workers from outside the Mono County area. Typically, non-local skilled craft workers do not bring families with them for short-term construction assignments, but rather rent temporary space in the local rental housing market, stay in local hotels, or bring RV and trailer home units to local RV parks and campgrounds. Because Mono County has a relatively high vacancy rate in its rental housing market, available rental housing could readily absorb the entire 120 peak workers envisioned without requiring construction of any new housing. Due to the short-term nature of construction activities, it is not anticipated that workers would permanently relocate locally for temporary construction employment. Therefore, notable impacts would not occur to existing population levels or employment distribution within the study area from the Project. Employment of construction personnel would be beneficial to local businesses and the regional economy through increased expenditure of wages for goods and services. Construction personnel would purchase food, beverages, and other commodities, which would provide economic benefit to the local economy.

Operation and maintenance of the CD-IV Project would employ approximately 6 full-time employees. Assuming a worst-case scenario of all 6 full-time workers relocating locally (including an average family size of three persons per household), these relocations would a negligible effect on population growth in Mono County and are anticipated to be within forecasted growth projections of the area. Potential employment relocations would not be beyond the capacity of available housing or public services and facilities. Therefore, employment associated with the CD-IV Project is not considered to generate an adverse direct growth-inducing impact.

With respect to inducing growth through providing access to previously undeveloped areas, the proposed CD-IV Project would involve construction of temporary and permanent roads. However, as discussed in Section 4.16 (Transportation), these roads would provide limited access to the proposed well pads and power plant. Project roadways would not provide access into other adjacent areas whereupon new access may create the generation of residential or commercial development. Therefore, roadway facilities associated with the proposed CD-IV Project would not induce growth.

As described in Chapter 1, the fundamental objective of the CD-IV Project is to construct, operate, maintain, and eventually decommission a 33 MW geothermal electricity generating facility and associated interconnection transmission infrastructure to provide renewable electric power to California's existing transmission grid to help meet federal and state renewable energy supply and GHG emissions reduction requirements. The Project is not intended to supply power-related to growth for any particular development and would not result in direct growth-inducing impacts. However, the Project could facilitate growth indirectly through the additional generation of electric power in the eastern California region. By increasing power generation in eastern California, the CD-IV Project could be considered growth-inducing. Power generated by the CD-IV Project would be transmitted to the SCE electricity distribution system. SCE provides power to 180 cities in 50,000 square miles of service area encompassing 11 counties in central,

coastal and southern California (SCE, 2012). These areas have experienced rapid population growth over the last 20 years. Growth is expected to continue with or without implementation of the CD-IV Project. Therefore, implementation of the CD-IV Project would be in response to anticipated future load growth and would be consistent with current regional planning projections.

5.4 Irreversible and Irretrievable Commitments of Resources

The BLM NEPA Handbook (H-1790-1 Sec. 9.2.9), the NEPA Guidelines (40 CFR 1502.16) require an analysis of the significant irreversible effects of a proposed action. Resources irreversibly or irretrievably committed to a proposed action are those used on a long-term or permanent basis. This includes the use of nonrenewable resources such as metal, wood, fuel, paper, and other natural or cultural resources. These resources are considered non-retrievable in that they would be used for a proposed action when they could have been conserved or used for other purposes. Another impact that falls under the category of irreversible and irretrievable commitment of resources is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

The Proposed Action and Alternatives 2 and 3 would irretrievably commit resources over the 30-year life of the geothermal plant. Construction of the proposed CD-IV Project would commit nonrenewable resources. During project operation, n-pentane, fuels and lubricants, and other nonrenewable resources also would be consumed, although on a limited basis. After approximately 30 years, the CD-IV Project would be decommissioned and the land returned to its pre-Project state. It is anticipated that, with revegetation, full recovery of surface resources on the project site would be achieved, although the possibility exists that currently unknown factors could affect site conditions during that time. Currently, the CD-IV Project site is not entirely undisturbed due to existing roads and OHV-related recreational use.

The analysis of whether the CD-IV Project would irretrievably consume geothermal resources over its 30-year life is more difficult to predict, as numerous variables affect geothermal reservoir conditions, such as climatic conditions and rainfall. To date, geothermal power production has occurred for more than 25 years in the Casa Diablo area. The CD-IV Project would return 100 percent[1] of the extracted geothermal fluid to the reservoir and would be managed to maintain reservoir production. Current forecasts indicate that, over the 30-year life of the CD-IV Project with continued production from the existing Casa Diablo facilities, declines in reservoir pressure would range from 1.45 to 10.2 psi (0.1 to 0.7 bar) and the produced temperature of geothermal wells would decline about 18° F (10°C). This forecast pressure and temperature would be similar to that observed in the geothermal reservoir around 2005, before some production shifted to Basalt Canyon. Decommissioning of the CD-IV and the other existing Casa Diablo geothermal developments could result in a recovery of some of the pressure and temperature declines over time.

[1] A negligible amount of geothermal fluid may be used during construction or for fire protection purposes.

The CD-IV Project is a renewable energy project intended to generate geothermal energy to reduce reliance on fossil fuels. Over its projected 30-year life, it would contribute incrementally to the reduction in demand for fossil fuel use for electricity-generating purposes. Therefore, this incremental reduction in expending fossil fuels would be a positive effect of the CD-IV Project's commitment of nonrenewable resources.

5.5 Short-Term Uses and Long-Term Productivity

The BLM NEPA Handbook (H-1790-1 Sec. 9.2.9) and the NEPA Guidelines (40 CFR 1502.16) require a discussion of the relationship between short-term uses and long-term productivity of the environment from implementation of the proposed action or one of the action alternatives. In this context, "short term" refers to the duration of project construction and "long term" refers to an indefinite period beyond construction during which Project impacts may still affect the environment. The specific impacts of a project vary in kind, intensity, and duration according to the activities occurring at any given time. The proposed project involves tradeoffs between long-term productivity and short-term uses of the environment.

Short-term uses of the environment as a result of the CD-IV Project and its build alternatives include those typically associated with geothermal energy development. Short-term impacts described in Chapter 4, *Environmental Consequences*, include effects on the natural environment, cultural resources, and recreation resources. These can be compared to the long-term benefits of the Proposed Action and its build alternatives, all of which would provide for the production of clean, renewable energy consistent with Federal and State goals to increase production of renewable energy to help reduce dependence on fossil fuels.

As discussed above in Section 5.4, *Irreversible and Irretrievable Commitment of Resources*, the Proposed Action and build alternatives are not anticipated to permanently damage forest habitats and hydrologic features and, therefore, would not adversely affect the long-term productivity of surface resources. The CD-IV Project, in combination with the existing Casa Diablo geothermal facilities, is forecast to somewhat reduce the pressure and temperatures in the geothermal reservoir, although some recovery may occur after decommissioning of the projects. However, these build alternatives also would provide a long-term benefit by generating electric power with minimal increase in the use of non-renewable resources such as fossil fuels, which would result in a benefit to air quality and a reduction in carbon-based emissions.

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