

# U.S. Department of the Interior Bureau of Land Management

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## Ormat Technologies, Inc.

### STEAMBOAT GEOTHERMAL WELL(S) 16-32 PROJECT

**Location:**  
Washoe County, Nevada

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### **BLM Mission Statement**

*It is the mission of the Bureau of Land Management to sustain the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.*

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## ACRONYMS AND ABBREVIATIONS

<b>Term</b>	<b>Definition</b>
BLM	Bureau of Land Management
BMPs	best management practices
CalPIF	California Partners in Flight
CDFW	California Department of Fish and Wildlife
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DOA	U.S. Department of Agriculture
DOI	U.S. Department of the Interior
EA	Environmental Assessment
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impact
Forest Service	U.S. Forest Service
GBBO	Great Basin Bird Observatory
mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NDA	Nevada Department of Agriculture
NDEP-BAPC	Nevada Division of Environmental Protection Bureau of Air Pollution Control
NDOW	Nevada Department of Wildlife
NEPA	National Environmental Policy Act
NRCS	Natural Resources Conservation Service
NRS	Nevada Revised Statutes
Ormat	Ormat Nevada Inc.
PL	Public Law
PM <sub>10</sub>	particulate matter less than 10 microns
project	Steamboat Geothermal Well 16-32 Project
ROD	Record of Decision
RPS	Renewable Portfolio Standard
SWCA	SWCA Environmental Consultants
USC	United States Code
USFWS	U.S. Fish and Wildlife Service

## 1.0 INTRODUCTION/PURPOSE AND NEED

### 1.1 Introduction

Ormat Nevada Inc. (Ormat) is proposing to construct, operate, and maintain the Steamboat Geothermal Well 16-32 Project within the existing Steamboat Geothermal Unit in Washoe County, Nevada (herein called the Proposed Action or the project). The Proposed Action would include the construction of one (1) geothermal well pad and the drilling and testing of up to three (3) geothermal wells all from the same pad, improvement of an existing access road, and installation of one additional geothermal fluid pipeline. The wells would include one or more of the following: temperature gradient well, observation/slim well, and full-size production/injection well, for a maximum of three wells drilled from one well pad.

The Proposed Action would be located within federal geothermal lease N-12085, administered by the Bureau of Land Management (BLM) in Section 32, Township 18 North, Range 20 East, Mount Diablo Baseline and Meridian (Figure 1). The surface management of the project area is provided by the Carson Ranger District of the U.S. Forest Service (Forest Service). Memorandum of Understanding WO300-2006-08 between the BLM and Forest Service defines the BLM as the lead agency for permit review and National Environmental Policy Act (NEPA) compliance, and the Forest Service as a cooperating agency.

### 1.2 Background

On January 7, 2013, Ormat submitted a Notice of Intent to conduct geothermal resource exploration operations in accordance with Title 36 of the Code of Federal Regulations (CFR) Part 228.4, along with a Geothermal Drilling Permit application in accordance with 43 CFR 3200, to both the Forest Service Carson Ranger District and the BLM Carson City District Office, Stillwater Field Office. The Forest Service submitted a letter of concurrence to the BLM for Ormat to commence operations as described in the Notice of Intent, and the BLM made the determination that an Environmental Assessment (EA) would be required. The Forest Service identified two resource issues: habitat potential for Threatened or Endangered or sensitive plant species, and consultation with the Washoe Tribe. Upon completion of cultural resources surveys, the Forest Service determined that cultural resources would not be affected. The Forest Service also determined that the project area contained suitable habitat for the Steamboat monkeyflower (*Mimulus ovatus*), which is considered a Nevada Natural Heritage Watchlist species, and for Steamboat buckwheat (*Eriogonum ovalifolium* var. *williamsiae*), which is listed as a federally endangered species. Because of the minimal scope of the project, a combined Operations/Utilization Plan incorporating both exploration and utilization scenarios was submitted to the BLM as discussed during a meeting between Ormat and the BLM in December 2013. The combined Operations/Utilization Plan meets the requirements as defined in both 43 CFR Subpart 3262 – Conducting Drilling Operations and in 43 CFR Subpart 3272 – Utilization Plans.

The BLM has prepared this EA to analyze and disclose the environmental, social, and economic impacts that could result from the implementation of the proposed project in the Steamboat Geothermal Lease Area. Should a determination be made that implementation of the Proposed Action would not result in significant environmental impacts, a Finding of No Significant Impact (FONSI) would be prepared to document that determination, and a Decision Record issued that provides a rationale for approving the action.

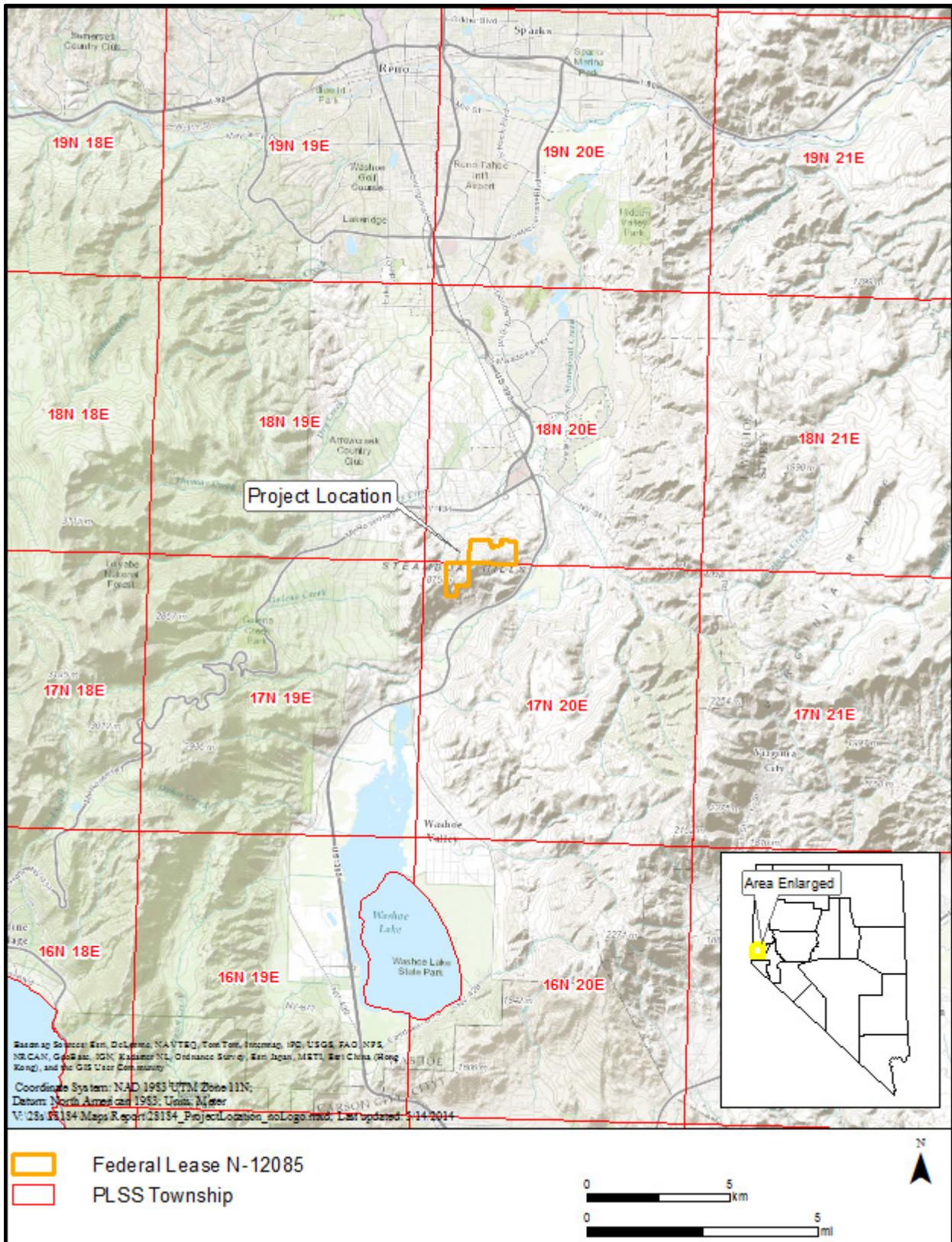


Figure 1. Project location map.

## 1.3 Purpose and Need

The purpose of the Proposed Action is to provide Ormat with the opportunity to explore for potential resources of geothermal fluids on federal lands managed by the Forest Service and the BLM that are leased to Ormat, within Washoe County, Nevada.

The need for the action is established by the BLM's responsibility under the Geothermal Steam Act, its revisions of 2007, and its implementing regulations under 43 CFR 3270; the Minerals Leasing Act of 1920, as amended; and Secretarial Order 3285 A1 of February 22, 2010 (which establishes the development of environmentally responsible renewable energy as a priority for the U.S. Department of the Interior (DOI)), to respond to the combined Operations/Utilization Plan submitted by Ormat for the exploration, construction, and operation of the Proposed Action.

## 1.4 Land Use Plan Conformance Statement

Mineral exploration in the proposed project area conforms to the Toiyabe National Forest Land and Resource Management Plan of 1986, particularly the following Standards and Guidelines for Minerals:

1: Encourage exploration and development of mineral resources and minimizing possible adverse impacts to surface resources.

4: Require operating plans which minimize impacts to surface and cultural resources and provide for reclamation of disturbed areas (page IV-57).

23: Reasonable access for mineral exploration, development, and production is guaranteed under the mining laws. The type of access approved will be consistent with the logical development of mineral properties (page IV-59).

In addition, the Proposed Action described below is in conformance with the BLM Carson City Field Office Consolidated Resource Management Plan, page MIN-1, National Policy #1 (Surface Management Policy), and page ROW-4, Administrative Action #3 (Application for Rights-of-way) (BLM 2001). The Proposed Action is consistent with the applicable land use plan because it is clearly consistent with the following land use plan decisions, objectives, terms, conditions:

RMP Desired Outcome 1: Encourage development of energy and mineral resources in a timely manner to meet national, regional and local needs consistent with the objectives for other public land uses (page MIN-1)

Administrative Action, Standard Operating Procedures for Leasable Minerals 5: Oil, gas, and geothermal exploration and production upon BLM land are conducted through leases with the Bureau and are subject to terms and stipulations to comply with all applicable federal and state laws pertaining to various considerations for sanitation, water quality, wildlife, safety, and reclamation. Stipulations may be site-specific and are derived from the environmental analysis process (page MIN-5).

## 1.5 Relationship to Laws, Regulations, or Other Plans

The EA has been prepared in accordance with the following statutes and implementing regulations, policies, and procedures:

- The National Environmental Policy Act of 1969, as amended (NEPA; Public Law [PL] 91-190, 42 United States Code [USC] 4321 (*et seq.*))
- 40 CFR 1500 (*et seq.*)—Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act
- Considering Cumulative Effects under the National Environmental Policy Act (Council on Environmental Quality [CEQ] 1997)
- DOI requirements (Departmental Manual 516, Environmental Quality [DOI 2007])
- BLM NEPA Handbook (H-1790-1) (BLM 2008a)
- Federal Land Policy and Management Act of 1976 (PL 94-579, 43 USC 1761 (*et seq.*))
- 43 CFR 2800, Rights-of-way, Principles and Procedures; Rights-of-way under the Federal Land Policy and Management Act and the Mineral Leasing Act; Final Rule, April 22, 2005
- Geothermal Steam Act of 1970 (30 USC 1001-1025)
- 43 CFR 3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007
- The 2005 Energy Policy Act; The National Energy Policy, Executive Order 13212
- Best Management Practices as defined in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, Fourth Edition (Gold Book) (DOI and U.S. Department of Agriculture [DOA] 2007)
- Washoe County Development Code, Chapter 110 of the *Washoe County Master Plan* (Washoe County Community Services Department 2013)

The Record of Decision (ROD) for the Programmatic Environmental Impact Statement for Geothermal Leasing in the Western United States was signed on December 17, 2008, by the DOI Assistant Secretary for Land and Minerals Management (BLM 2008b). The ROD approves the BLM's decision to facilitate geothermal leasing of the federal mineral estate in 12 western states, which includes Nevada. This decision 1) identifies public lands that are legally and administratively open or closed for geothermal leasing; 2) develops a reasonably foreseeable development scenario, and 3) adopts stipulations, best management practices (BMPs), and procedures for geothermal leasing and development.

These actions have been implemented as BLM resource management plan amendments for 114 land use plans, which includes the Carson City Field Office Consolidated Resource Management Plan (BLM 2001). Special stipulations developed in the ROD were applied to geothermal resource leases subsequently issued by the BLM.

The Proposed Action would be subject to other applicable state and local permits prior to beginning construction. Table 1 lists federal and state permits, policies, and actions that may be required in support of the Proposed Action.

**Table 1.** List of Federal and State Permits

<b>Regulatory Agency</b>	<b>Authorizing Action</b>
BLM	Geothermal Drilling Permit
Department of Conservation and Natural Resources, Nevada Division of Water Resources	Water Use Permitting
State of Nevada, Commission on Mineral Resources, Division of Minerals	Geothermal Exploration and Production Well Permit

**Table 1.** List of Federal and State Permits (Continued)

<b>Regulatory Agency</b>	<b>Authorizing Action</b>
Nevada Division of Environmental Protection, Underground Injection Control	Injection Well Permit
Nevada Division of Environmental Protection, Bureau of Air Quality	Surface Air Disturbance Permit

## 1.6 Decision to Be Made

Applications for geothermal drilling upon and rights-of-way across public land submitted to BLM may be approved only after an environmental analysis is completed. BLM decision options include approving the Proposed Action as defined in the Operations/Utilization Plan and rights-of-way applications as submitted by Ormat; approving the Proposed Action with stipulations to mitigate environmental impacts; or denying the Proposed Action.

## 2.0 PROPOSED ACTION AND ALTERNATIVES

The previous section presents the purpose and need for the Proposed Action, as well as the preliminary issues and concerns identified as needing additional review. To meet the purpose and need for action and resolve the issues identified, the BLM has determined that the Proposed Action and No Action alternatives are necessary for detailed analysis. There were no unresolved conflicts or concerns identified that would necessitate the consideration of any additional alternatives.

### 2.1 Proposed Action

Ormat is proposing to construct, operate, and maintain the Steamboat Geothermal Well 16-32 Project in Washoe County, Nevada, on public land managed by the Forest Service within the Steamboat Geothermal Lease Area administered by the BLM (refer to Figure 1). Specifically, the Proposed Action includes:

- improving and maintaining an existing access road (on lease);
- constructing one exploration well drill pad;
- drilling and completing up to three exploration wells to a depth of up to 3,500 feet from the constructed drill pad;
- flow-testing each exploration well to obtain samples of geothermal fluids and to collect aquifer information from the geothermal reservoir; and
- if necessary, installing aboveground pipeline to connect to an existing pipeline and power plant.

These activities are further described below.

#### 2.1.1 *Site Access and Road Improvement*

Principal access to the project area is from the Mount Rose Highway to Wedge Parkway where County Road 52 provides direct access through the Steamboat geothermal field. There are a number of existing dirt roads within the Steamboat geothermal field that provide additional access; one of these existing dirt roads within federal lease N-12085 would be used to access the proposed well site (Figure 2).

An approximately 2,000-foot-long segment of the existing access road would require grading to accommodate the drill rig, prevent erosion, and ensure safety of personnel.

The total estimated area of surface disturbance required for improving the existing access road, assuming a 15-foot-wide drivable road bed (20-foot total width of surface disturbance), would be less than 1 acre.

#### 2.1.2 *Well Pad Location*

Ormat proposes to drill up to three geothermal exploration wells from one well pad for the purpose of assessing and defining the underlying geothermal resource (Table 2). If drilling and testing results are successful, one or more of these wells may be used for production by constructing a pipeline to connect them to existing pipelines and power plants.

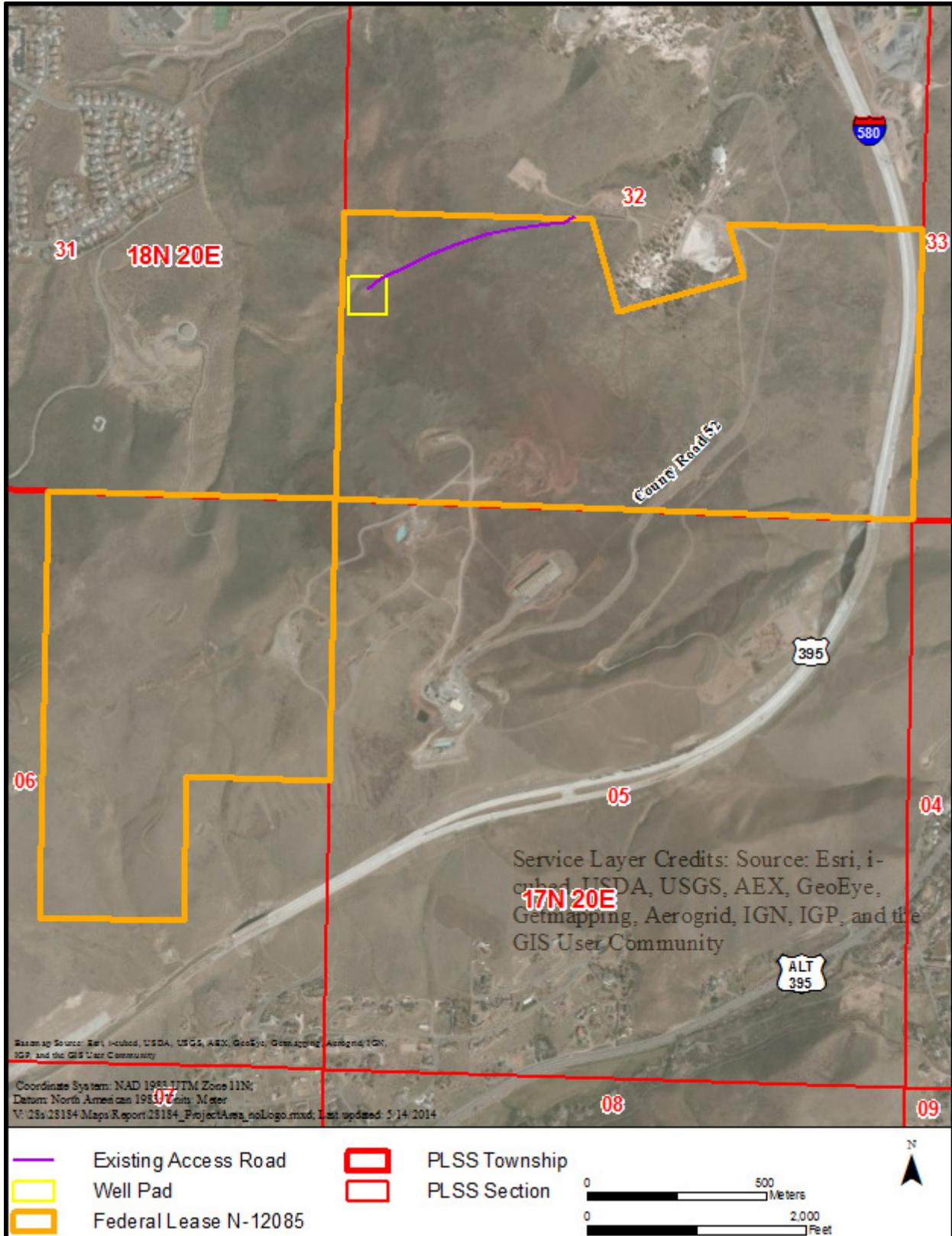


Figure 2. Project area.

**Table 2.** Geothermal Well Site Locations

Well Name (Kettleman No.)	Lease Number	Legal Description* (Section Number and Aliquot Part)	Approximate UTM Coordinates (NAD 83)	
			Easting (meters)	Northing (meters)
16-32	N-12085	Section 32, NW ¼, SW 1/4	261385.33	4362631.72
16A-32	N-12085	Section 32, NW ¼, SW 1/4	261385.33	4362631.72
16B-32	N-12085	Section 32, NW ¼, SW 1/4	261385.33	4362631.72

\* All wells are located in Township 18 North, Range 20 East, Mount Diablo Baseline and Meridian.

UTM = Universal Transverse Mercator; NAD = North American Datum.

### 2.1.3 Construction Procedures and Surface Disturbance

The proposed well pad would be approximately 350 × 350 feet (2.8 acres). The actual dimensions of the well pad may be modified to best match the specific physical and environmental characteristics of the site and to minimize grading (cut and fill), but the total surface disturbance associated with the new well pad construction would not exceed 2.8 acres. Within the 2.8-acre well pad, the disturbance area would have drainage ditches and a reserve pit.

The well pad would provide a level and graded surface to support equipment. Well pad preparation activities would include clearing vegetation, earthwork, drainage, and other improvements necessary for efficient and safe operation and for fire prevention. Clearing would include the removal all organic material, stumps, brush, and slash. Topsoil would be stripped (typically to rooting depth) and salvaged as feasible. Salvaged topsoil (and other organic materials) would be stockpiled on the pad for use during subsequent reclamation of the disturbed area. Stormwater runoff would be directed into ditches surrounding the well pad and back on to undisturbed ground, consistent with BMPs for stormwater. The well pad would be graded to the reserve pit to prevent the movement of stormwater from off the constructed pad, and would be designed for a 100-year storm event.

The reserve pit would be constructed in accordance with BMPs identified in *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development*, a.k.a. The Gold Book (DOI and DOA 2007). The pad would have BMPs for the containment and temporary storage of water, drill cutting, and circulation of drilling mud during drilling operations. The reserve pit would measure 75 × 200 × 10 feet deep and would be located within the 2.8-acre disturbance area of the well pad. Geothermal fluid produced from the well during flow testing would also drain to the reserve pit. To prevent access by people and wildlife, the reserve pit would be fenced. It would be fenced on three sides during drilling and on the fourth side once drilling is complete to close it off entirely. The fence would remain in place until reclamation of the pit begins.

If the drilling results are successful, the shoulders of the well pad could be reclaimed, but the majority of the pad would be kept clear for ongoing operations and the potential need to work on or redrill the well. For a detailed description of surface reclamation activities see Section 2.1.10.

### 2.1.4 Well Drilling, Testing, and Operation

The well bore would be drilled using non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or polymer-water mix. Variable concentrations of additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Some of the mud additives may be hazardous substances, but would be used in low concentrations that would not render the drilling

mud toxic. Caustic soda is sometimes added to the drilling mud to keep the pH at 9.5 to 10 for hydrogen sulfide abatement. Hydrated lime may be added to the drilling mud to substitute for caustic soda as a nonhazardous alternative. Additional drilling mud would be mixed and added to the mud system as needed to maintain the required quantities. “Blow-out” prevention equipment would be used while drilling below the surface casing. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic, non-hazardous barite (barium sulfate) would likely be stored at the well site for use in preventing uncontrolled well flow, as necessary. Specific drilling information is presented in Table 3.

**Table 3.** Well Drilling Specifications

Rig Type	Rig Height (feet)	Trucks Needed (on average)	Drilling Time (days)*	Workers on Site	Depth Drilled (feet)
Large rotary drilling rig	160–170	4–6 small trucks/ service vehicles	45 <sup>†</sup>	Average: 9–10 Max: 18	3,500
Small track-mounted drilling rig	30–50	2 small trucks/ service vehicles	25 <sup>†</sup>	6–10	3,000

\* Difficulties encountered during the drilling process, including the need to redrill the well, could add as much as double the time required to successfully complete each well.

<sup>†</sup> Drilling would be conducted 24 hours a day, 7 days a week.

Wells may need to be worked over or redrilled. Depending on the circumstances encountered, working over a well may consist of lifting the fluid in the well column with air or gas or stimulation of the formation using a dilute acid. Well redrilling may consist of:

- reentering and redrilling the existing well bore;
- reentering the existing well bore and drilling and casing a new well bore; or
- plugging and abandoning the well bore and sliding the rig over a few feet on the same well pad and drilling new well bore through a new conductor casing.

While the drill rig is still over the well, the residual drilling mud and cuttings would be flowed from the well bore and discharged to the reserve pit.

Staff needed to conduct the drilling would include a drilling supervisor, mud logger, and crew. The drilling supervisor and mud logger would typically stay on-site in a trailer while the well is being drilled. The drilling crew may also stay on-site during operations in portable trailers that would be placed on an existing well pad in the Steamboat facility.

## 2.1.5 Flow Testing

### 2.1.5.1 SHORT-TERM WELL TESTING

Short-term well testing would last approximately 3 to 5 days on average. Each test would consist of flowing the well into the reserve pit or portable steel tanks brought onto the well site while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry, and other parameters. An “injectivity” test may also be conducted by injecting the produced geothermal fluid from the reserve pit or steel tanks back into the well and the geothermal reservoir. Up to two short-term well tests would be performed on the observation/slim well and/or full-size production/injection well. The drill rig would be moved from the well site following completion of these short-term test(s). The short-term well test is expected to flow approximately 1.5 million gallons.

### **2.1.5.2 LONG-TERM WELL TESTING**

One or more long-term flow tests of the wells are expected to be conducted following the short-term flow tests to more accurately determine long-term well and geothermal reservoir productivity. The long-term flow tests would last between 7 and 30 days, and would be conducted by pumping the geothermal fluids from the well through on-site test equipment closed to the atmosphere (using a line shaft turbine pump or electric submersible pump) to the reserve pit. A surface booster pump would then pump the residual produced geothermal water/fluid through a temporary 8- to 10-inch-diameter pipeline to inject the fluid into a nearby existing well, or into the reserve pit on a nearby existing well pad. The temporary pipeline would be carried by workers and hand laid on the surface of the disturbed shoulder of the access road connecting to the geothermal full-size well. On-site testing equipment would include standard flow metering, recording, and sampling apparatus. The long-term well test is expected to flow approximately 15 million gallons.

A long-term injection test may also be conducted following the short-term injection test, to more accurately determine long-term reservoir injectivity. The long-term injection test, lasting up to 30 days, would be conducted by injecting the produced geothermal fluid from the reserve pit back into the well and the geothermal reservoir.

### **2.1.6 Water Requirements and Source**

Water required for well drilling would be as much as 30,000 gallons per day. Water requirements for dust control and construction would be substantially less. One or more portable water tank(s) holding a combined total of at least 10,000 gallons would be maintained on the well site during drilling operations. Water would be purchased from the City of Reno and would be trucked to the site daily.

### **2.1.7 Aggregate Requirements and Source**

The drill site and access road were selected to minimize the need for aggregate application. The aggregate material from the excavation of the reserve pit would be used to build the well pad, cover the access road as necessary to create an all-weather surface, and prevent the formation of ruts.

### **2.1.8 Well Operation**

If drilling results are successful and a full-sized well is drilled, it would be used to either support future injection from the existing geothermal power plants or for additional production, depending on the resource. A successful observation/slim well could be used for injection.

### **2.1.9 Aboveground Pipelines**

Whether the well is used for production or injection, an aboveground pipeline would be constructed along the access road and connected to either the existing injection pipelines or the existing production pipelines located to the northeast of the well pad at the existing well sites. If the well is used for production, the pipeline would carry geothermal fluids from the production well to the power plant; if the well is used for injection, the pipeline would be used to return the cooled geothermal fluids (brine) from the existing facilities to the subsurface through the injection well.

The pipeline would be constructed of welded carbon steel pipe that would be covered with 2 to 3 inches of insulation and painted metal sheathing. The pipeline would range from 16 to 48 inches in diameter and would be constructed 2 to 3 feet aboveground, with structural supports located every 30 feet. Sliding pipe supports and expansion loops would allow for thermal expansion. Horizontal expansion loops would be

constructed outside the plant area (between the plant and the wells); vertical expansion loops may be required within the plant area. The injection well piping would use the same pipe supports as the production well piping wherever possible. The new aboveground pipeline would be constructed adjacent to the existing access road. Figure 2 shows the location of the access road where the proposed new pipeline would be located. Surface and subsurface disturbance associated with the piping construction would occur only at pipe footing locations.

### **2.1.10 Surface Reclamation**

After the well drilling and testing operations are completed, the liquids from the reserve pit would be allowed to naturally evaporate or would be removed if necessary for reclamation.

If Ormat judges the well to have no commercial potential, it may continue to be monitored but would eventually be plugged and abandoned in conformance with the well abandonment requirements of the BLM and Nevada Division of Minerals. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement until the top of the cement is at ground level; this is designed to ensure that fluids will not move across these barriers into different aquifers. The well head (and any other equipment) would then be removed, the casing cut off below ground surface, and the hole backfilled to the surface.

The portion of the cleared well pad not needed for operational and safety purposes (the “shoulders” of the pad) would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. The areas to be reclaimed would be ripped, tilled, or disked as necessary, and then reseeded with native grasses and forbs seed mix approved by the BLM and the Forest Service prior to application. The stockpiled topsoil and organic material would also be spread on the area to aid in revegetation success.

Once the resource is no longer needed, and the project is complete, Ormat would remove all improvements. Reclamation of the road would include recontouring back to the original contour, seeding, and controlling noxious weeds, and may include other techniques to improve reclamation success, such as ripping, scarifying, replacing topsoil, pitting, and mulching.

Reclamation of the pipeline would include regarding slopes to the original contour, replacing topsoil, and revegetating in accordance with an approved reclamation plan. All aboveground facilities would be disassembled and removed and either reused or recycled. Any materials that cannot be reused or recycled would be hauled away to the nearest approved landfill.

Ultimately, Ormat would prepare a site reclamation plan for approval by the BLM and Forest Service, and then implement that plan. The plan would address restoring the surface grades and revegetation of cleared areas as described above. Stormwater diversion would remain in place until successful revegetation is achieved.

### **2.1.11 Summary of Surface Disturbance**

The surface disturbance for the project would total approximately 3.72 acres (Table 4).

**Table 4.** Maximum Project Surface Disturbance

<b>Activity</b>	<b>Maximum Surface Disturbance (acres)</b>
Well pad construction	2.8
Existing road improvements	0.92

**Table 4.** Maximum Project Surface Disturbance (Continued)

<b>Activity</b>	<b>Maximum Surface Disturbance (acres)</b>
Pipeline structural supports	0.0 (within existing road improvements)
<b>Total</b>	<b>3.72</b>

### **2.1.12 Adopted Environmental Protection Measures/Best Management Practices**

Ormat would comply with all special lease stipulations attached to lease N-12085 which is applicable to project operations. In addition Ormat will also institute the following BMPs as part of the Proposed Action to reduce or eliminate impacts to resources:

- Water would be applied to the ground during the construction and utilization of the drill pad and access road as necessary to control dust.
- Portable chemical sanitary facilities would be available and used by all personnel during periods of well drilling and/or flow testing, and construction. These facilities would be maintained by a local contractor.
- To prevent the spread of invasive, nonnative species, all vehicles, heavy earthmoving construction equipment, mobile trailers, and RV campers brought to and used on the project site would go through high-pressure washing of the entire vehicle/unit at a commercial wash station prior to arriving and/or being used on the project site.
- Certified noxious weed-free hay and straw bales would be purchased and used at all times on the project site.
- Seed mixes for the rehabilitation and/or revegetation of all disturbed areas related to this project would be certified as weed-free, per BLM standards. Seed mixes would be approved by Forest Service personnel.
- All construction and operating equipment would be equipped with applicable exhaust spark arresters. Fire extinguishers would be available on the active sites. Water that is used for construction and dust control would be available for firefighting. Personnel would be allowed to smoke only in designated areas.
- Following project construction, areas of disturbed land no longer required for operations would be reclaimed to promote the reestablishment of native plant and wildlife habitat.
- The wellheads would each be painted a color to blend with the area and minimize visibility.

#### **2.1.12.1 FIRE PREVENTION AND CONTROL**

- Any small fires which occur around the well pad during drilling and/or testing operations should be able to be controlled by rig personnel utilizing on-site firefighting equipment.
- The BLM Carson City District Office (775.885.6000) would be notified of any wildland fire, even if the available personnel can handle the situation or the fire poses no threat to the surrounding area. Additionally, the Sierra Front Interagency Dispatch would be notified (775.883.5995).
- A roster of emergency telephone numbers would be available on-site so that the appropriate firefighting agency can be contacted in case of a fire.

- All vehicles shall carry at a minimum a shovel and 5 gallons of water (preferably in a backpack pump), in addition to a conventional fire extinguisher.
- Adequate firefighting equipment (a shovel, a pulaski, standard fire extinguisher(s), and at least a 100-gallon water tank with pump) shall be kept readily available at each active drill site.
- Vehicle catalytic converters (on vehicles that would enter and leave the drill site on a regular basis) shall be inspected often and cleaned of all flammable debris.
- All cutting/welding torch use, electric-arc welding, and grinding operations shall be conducted in an area free, or mostly free, from vegetation. At least a 100-gallon water tank with pump, and shovel shall be on hand to extinguish any fires created from sparks. A welding tent would be used, as appropriate. At least one person in addition to the cutter/welder/grinder shall be at the work site to promptly detect fires created by sparks.
- Personnel would be responsible for being aware of and complying with the requirements of any fire restrictions or closures issued by the BLM Carson City District Office, as publicized in the local media or posted at various sites throughout the field office district.

#### **2.1.12.2 SURFACE WATER AND GROUNDWATER PROTECTION**

- Exclusive of short- and long-term flow testing wherein fluids would be discharged to the reserve pit, geothermal fluids would not be discharged to the ground under normal operating conditions. Further, geothermal wells are cased to prevent co-mingling of the geothermal fluids with underground aquifers.

#### **2.1.12.3 WILDLIFE PROTECTION**

- Erosion-control measures after construction would include revegetation and periodic maintenance. Disturbed areas that will not be used after construction would be revegetated with the proper seed mixture and planting procedures prescribed by the BLM. Any topsoil enriched in organic material may be stockpiled on previously disturbed areas and applied to enhance areas to be reclaimed by revegetation.
- To prevent undue degradation and removal of habitat, cover, and food, only existing roads within the Steamboat geothermal complex would be used. The posted speed limits of 15 miles per hour (mph) would be observed on all roads in the project area in order to minimize dust and avoid collision and incidental death of local wildlife.
- The majority of activities would occur during the later summer and fall months to avoid impacts to nesting migratory birds and avoid disturbing deer during winter months.

#### **2.1.12.4 CULTURAL RESOURCES PROTECTION**

- Ormat employees, contractors, and suppliers would be reminded that all cultural resources are protected and if any unidentified resources were to be uncovered, the resource shall be left in place, work would cease, and notification would be made to the Ormat representative and the appropriate BLM authorized office, by telephone, with written confirmation to follow, immediately upon such discovery.
- Pursuant to 43 CFR 10.4(G), the proponent must notify the authorized officer, by telephone, with written confirmation, immediately upon discovery of human remains, funerary items, sacred objects, or objects of cultural patrimony. Pursuant to 43 CFR 10.4 (C) and (D), the proponent must stop activities in the immediate vicinity of the discovery and protect it from the proponent's activities for 30 days or until notified to proceed by the authorized officer. The BLM Carson City

District Office Archaeologist can be reached at 775.885.6000. The Forest Service Carson Ranger District Archaeologist can be reached at 775.882.2766.

### **2.1.12.5 MINIMIZATION OF AIR POLLUTION**

- Ormat would comply with any air quality requirements prescribed by the Nevada Division of Environmental Protection, Bureau of Air Pollution Control (NDEP-BAPC). Water would be applied to the ground during the construction and utilization of the drill pad and access road as necessary to control fugitive dust.
- Ormat would obtain a Surface Area Disturbance permit with the NDEP-BAPC, and implement the required actions to minimize fugitive dust emissions, during the well drilling and construction phase of the Proposed Action.

### **2.1.12.6 MINIMIZATION OF NOISE POLLUTION**

- To abate noise pollution, mufflers would be used on the drilling rig engine. The well pad may have one rock muffler. Rock mufflers are approximately 30 feet tall with a diameter of about 10 feet and are used to attenuate steam venting noise during well testing. Noise suppression devices would be utilized on all compressors as well. Construction and drilling noise would be minimized through operational practices (best available control technology), which would avoid or minimize practices that typically generate high noise levels or distinctive noise impacts.

### **2.1.12.7 MINIMIZATION OF HAZARDS TO PUBLIC HEALTH AND SAFETY**

- Construction and operation activities would be conducted in a manner to avoid creating any hazards to public health and safety. The project is remotely located and would not likely cause hazards to public health and safety. Injury contingency, spill or discharge contingency, and hydrogen sulfide contingency plans have been prepared as part of the Steamboat Geothermal Well(s) 16-32 Project Operations/Utilization Plan (Ormat 2013).
- Drilling operators are required by law to safety-train workers and to have first aid equipment on site. Ormat supervises the drilling operations to ensure that all safety procedures and best safety practices are in place and adhered to throughout the drilling program. Ormat's contract with the drilling company specifies that safety regulations are implemented and adhered to by the drilling contractor, and that the operation is in compliance with all existing laws pertaining to safety and environmental protection. Safety meetings are held prior to any major operation, such as running casing, cementing, or unloading the well. Drilling contractors would typically have daily safety meeting with crews and review any issues that could come up during the 12 hours that each crew is at work.
- In the event injuries occur in connection with an Ormat operation, specific and immediate attention would be given to proper transportation to a medical facility.
- Although there is very little chance that drilling in these moderate-temperature geothermal reservoirs would encounter substantial hydrogen sulfide, continuous hydrogen sulfide monitors would be on the rig floor and at the mud tanks and shaker to alert workers should elevated hydrogen sulfide levels be detected. Self-contained air packs would be on site for use by workers in an emergency. Signs would be posted to inform workers and visitors of any potential issues.
- Drilling parameters would be continuously monitored, and any changes in gas concentrations, formation pressures, or potential for flow are provided to the driller and supervisor. Blowout Prevention Equipment would be in place to shut off any unexpected gas flows. In the event that any evidence of high gas concentrations is detected in the drilling fluids, the drilling fluids consultant would obtain materials and design a program to safely circulate out the gas bubble and

to treat and remove any hydrogen sulfide using caustic soda, caustic soda and peroxide, or other technology as appropriate.

## **2.2 No Action**

Under the No Action alternative, the BLM would not issue geothermal drilling permit and access road right-of-way for the Proposed Action. As a consequence, Ormat would not perform exploratory well drilling and testing at this location in support of developing existing geothermal resources in conformance with existing lease conditions.

### **3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES**

This section presents the potentially affected environment (i.e., the physical, biological, social, and economic values and resources) of the impact area. While many issues may arise during scoping, not all of the issues raised warrant detailed analysis. Issues raised through scoping are analyzed if:

- analysis of the issue is necessary in order to make a reasoned choice between alternatives;
- the issue is potentially significant (an issue associated with a significant direct, indirect, or cumulative impact, or where necessary to determine the significance of impacts); or
- there is a disagreement about the best way to use a resource or resolve an unwanted resource condition or potentially significant effects of a Proposed Action or alternative.

#### **3.1 Scoping and Issue Identification**

The BLM Stillwater Field Office and Forest Service Carson Ranger District held an interdisciplinary team meeting on March 13, 2014, and the following resources were identified as being present and potentially impacted by the Proposed Action:

- Air Quality
- Vegetation
- U.S. Forest Service Sensitive Plant Species
- Threatened or Endangered Plant Species
- Invasive, Nonnative Species
- General Wildlife
- Migratory Birds
- Water Quality
- Land Use Authorizations
- Minerals
- Socioeconomics
- Soils
- Visual Resources

#### **3.2 Supplemental Authorities and Other Resources**

Pursuant to BLM NEPA Handbook H-1790-1, Appendix 5, this EA must consider supplemental authorities as required by statute, Executive Order, or State guidelines (BLM 2008a). Table 5 presents a list of those supplemental authorities, considered for analysis by BLM and Forest Service resource specialists. Additional resources are listed in Table 6.

**Table 5.** Supplemental Authorities

Supplemental Authority*	Present Yes/No	Affected Yes/No	Rationale
Air Quality	Yes	Yes	To be analyzed in the EA
Areas of Critical Environmental Concern	No	No	The Steamboat Hot Springs Area of Critical Environmental Concern (ACEC) is located in the vicinity; however it does not overlap with the project area.
Cultural Resources	Yes	No	A cultural resources inventory and report was prepared for the project and is maintained at the Carson Ranger District (Forest Service Report: R201304102286). No sites eligible for listing in the National Register of Historic Places are present, as determined during that inventory. Concurrence from the State Historic Preservation Office (SHPO) was received on June 7, 2013. No further evaluation is required.
Environmental Justice	No	No	No low-income or minority populations would be impacted by the Proposed Action.
Farm Lands (prime or unique)	No	No	Not present in the project area. No further evaluation is required.
Floodplains	No	No	Not present in the project area. No further evaluation is required.
Invasive, Nonnative Species	Yes	Yes	To be analyzed in the EA.
Migratory Birds	Yes	Yes	To be analyzed in the EA.
Native American Religious Concerns	Yes	No	No known prehistoric or historical sites would be affected. No issues or concerns about Native American religious sites were raised
Threatened or Endangered Wildlife Species	No	No	Not present in the project area. No further evaluation is required.
Threatened or Endangered Plant Species	No	No	Further review of threatened and endangered plant species, combined with field surveys conducted on April 30, 2014 (SWCA Environmental Consultants [SWCA] 2014), indicates that no threatened and endangered plant species occur in the project area, evidenced by a lack of individual plants and suitable habitat.
U.S. Forest Service Sensitive Plant Species	No	No	Portions of the Steamboat Hills area support sensitive plants such as Steamboat monkeyflower ( <i>Mimulus ovatus</i> ). However, the appropriate soils for this species are not present within the project area. Further review of U.S. Forest Service Sensitive plant species, combined with field surveys conducted on April 30, 2014 (SWCA 2014), indicates that no Forest Service sensitive plant species occur in the project area, evidenced by a lack of individual plants and suitable habitat.
Watchlist Plant Species	No	No	Further review of watchlist plant species, including Slide Mountain buckwheat ( <i>Eriogonum ovalifolium</i> var. <i>eximium</i> ), Carson Valley monkeyflower ( <i>Erythranthe carsonensis</i> ), and Steamboat monkeyflower ( <i>Mimulus ovatus</i> ), combined with field surveys conducted on April 30, 2014 (SWCA 2014), indicates that these species do not occur in the project area, evidenced by a lack of individual plants and suitable habitat.
Wastes, Hazardous or Solid	Yes	No	Adherence to BMPs and permit stipulations would result in no impacts from hazardous or solid wastes.

**Table 5.** Supplemental Authorities (Continued)

Supplemental Authority*	Present Yes/No	Affected Yes/No	Rationale
Water Quality (Surface/Ground)	Yes	Yes	To be analyzed in the EA.
Wetlands/Riparian Zones	No	No	Not present in the project area. No further evaluation is required.
Wild and Scenic Rivers	No	No	Not present in the project area. No further evaluation is required.
Wilderness/Wilderness Study Areas	No	No	Not present in the project area. No further evaluation is required.

March 2012

\*See H-1790-1 (January 2008) Appendix 1 *Supplemental Authorities to be Considered*.

Supplemental Authorities determined to be Not Present or Present/Not Affected need not be carried forward or discussed further in the document.

Supplemental Authorities determined to be Present/May Be Affected may be carried forward in the document.

**Table 6.** Other Resources

Other Resources*	Present Yes/No	Affected Yes/No	Rationale
U.S. Forest Service Sensitive Wildlife Species	No	No	Not present in project area. No further evaluation is required.
U.S. Forest Service Sensitive Plant Species	Yes	Yes	To be analyzed in the EA.
Fire Management/Vegetation	No	No	Not present in project area. No further evaluation is required.
Forest Resources	No	No	Not present in project area. No further evaluation is required.
General Wildlife	Yes	Yes	To be analyzed in the EA.
Land Use Authorization	Yes	No	The Proposed Action would not interfere with existing land uses or leases, and would not further restrict access to public lands or Forest Service–managed lands
Lands With Wilderness Characteristics	No	No	Not present in project area. No further evaluation is required.
Livestock Grazing	No	No	Not present in project area. No further evaluation is required.
Minerals	Yes	No	This area is withdrawn from mineral entry.
Paleontological Resources	No	No	Not present in project area. No further evaluation is required.
Recreation	Yes	No	Recreation in the project area and the adjacent lands is dispersed and therefore should not be impacted.
Socioeconomics	Yes	Yes	To be analyzed in the EA.
Soils	Yes	Yes	To be analyzed in the EA.
Travel Management	No	No	Not present in project area. No further evaluation is required.
Vegetation	Yes	Yes	To be analyzed in the EA.
Visual Resources	Yes	Yes	To be analyzed in the EA
Wild Horses and Burros	No	No	Not present in project area. No further evaluation is required.

March 2012

\*Resources or uses determined to be Not Present or Present/Not Affected need not be carried forward or discussed further in the document.

Resources or uses determined to be Present/May Be Affected may be carried forward in the document.

## 3.3 Air Quality

### 3.3.1 Affected Environment

Air quality is determined by the type and amount of contaminants emitted into the atmosphere, size and topography of the air basin, and the meteorological conditions. The U.S. Environmental Protection Agency (EPA) has developed the National Ambient Air Quality Standards (NAAQS) for criteria pollutants, which include nitrogen dioxide (NO<sub>2</sub>), sulfur dioxide, carbon monoxide, ozone, and particulate matter less than 10 microns (PM<sub>10</sub>). The NAAQS specify the concentration and duration for which pollutants may cause adverse health effects. The EPA has delegated authority to enforce air quality standards to the NDEP-BAPC in Nevada (except for Washoe County, which has its own air quality jurisdiction, the Washoe County Health District Air Quality Management Division).

A designation of either “attainment” or “non-attainment” is provided for an area to describe whether the area violates the NAAQS or contributes to a near violation. Areas where ambient concentrations exceed the NAAQS are considered non-attainment, and are regulated more strictly. The project area is located in the Truckee Meadows Hydrographic Area 87 in Nevada. This hydrographic area is part of the Truckee River Basin hydrographic region and is 129,920 acres in size. Hydrographic Area 87 is currently considered in non-attainment for PM<sub>10</sub>, although recent monitoring has shown that the area has been in attainment for PM<sub>10</sub> between 2007 and 2012 (Washoe County Health District 2013). Hydrographic Area 87 is in attainment for the remaining criteria pollutants.

### 3.3.2 Environmental Consequences

#### 3.3.2.1 PROPOSED ACTION

The project area is within the designated non-attainment area for PM<sub>10</sub> in Hydrographic Area 87. Vehicle and equipment traffic, as well as construction and utilization of the drill pad and access road, would result in a short-term, temporary increases in dust levels. Increases in dust would be reduced through the dust control measures described in the BMPs in Section 2.1.12. Given the small size of the project, limited activity, and implementation of BMPs, the Proposed Action would contribute minimally to the non-attainment designation for PM<sub>10</sub> in Hydrographic Area 87.

#### 3.3.2.2 NO ACTION

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted and there would be no project-related impacts to air quality. Air quality in Hydrographic Area 87 would continue to be subject to local conditions and regional trends.

## 3.4 Vegetation

### 3.4.1 Affected Environment

Within the project area there are three land cover types: Inter-Mountain Basins Big Sagebrush Shrubland, Great Basin Xeric Mixed Sagebrush Shrubland, and Great Basin Pinyon-Juniper Woodland; however, no Great Basin Pinyon-Juniper Woodlands were observed during field surveys (SWCA Environmental Consultants [SWCA] 2014). A 2012 wildfire altered the plant species composition within the project area, which is currently represented by annual forbs, invasive cheatgrass (*Bromus tectorum*), and some recovering perennial plants. The remaining cover types are described below.

### 3.4.1.1 INTER-MOUNTAIN BASINS BIG SAGEBRUSH SHRUBLAND

This ecological system typically occurs in broad basins between mountain ranges, plains, and foothills between elevations of 4,900 and 7,550 feet throughout much of the western United States. Soils are typically deep, well-drained, and non-saline. The shrublands are dominated by basin big sagebrush (*Artemisia tridentate* ssp. *tridentate*) and/or Wyoming big sagebrush (*Artemisia tridentate* ssp. *wyomingensis*). Scattered juniper (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex* spp.) may be present in some areas. Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may codominate disturbed stands. Perennial herbaceous components typically contribute less than 25 percent of the total vegetative cover. Common graminoid species include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread grass (*Hesperostipa comata*), basin wildrye (*Leymus cinereus*), James' galleta (*Pleuraphis jamesii*), western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa secunda*), or bluebunch wheatgrass (*Pseudoroegneria spicata*) (NatureServe 2014).

### 3.4.1.2 GREAT BASIN XERIC MIXED SAGEBRUSH SHRUBLAND

This ecological system occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hill slopes, saddles, and ridges at elevations between 3,280 and 8,530 feet. Sites are dry, often exposed to desiccating winds, with typically shallow, rocky, non-saline soils. Shrublands are dominated by black sagebrush (*Artemisia nova*) (mid and low elevations), little sagebrush (*Artemisia arbuscula*) (higher elevation), and may be codominated by Wyoming big sagebrush or yellow rabbitbrush. Other shrubs that may be present include shadscale saltbush (*Atriplex confertifolia*), spiny hopsage (*Grayia spinosa*), Shockley's desert-thorn (*Lycium shockleyi*), bud sagebrush (*Picrothamnus desertorum*), greasewood, and horsebrush (*Tetradymia* sp.). The herbaceous layer is likely sparse and composed of perennial bunch grasses such as Indian ricegrass, desert needlegrass (*Achnatherum speciosum*), Thurber's needlegrass (*Achnatherum thurberianum*), squirreltail (*Elymus elymoides*), or Sandberg bluegrass (NatureServe 2014).

## 3.4.2 Environmental Consequences

### 3.4.2.1 PROPOSED ACTION

Under the Proposed Action, approximately 3.7 acres of vegetation would be cleared for the well pad and site access. The well pad and access road have been disturbed in the past by grading activities, and by wildfire. The plant species that have grown back within the project area are common throughout the lease area and surrounding lands. Therefore, the loss of individual plants within the project area would have a negligible effect on the remaining population. Impacts to vegetation would be minimized by implementation of reclamation and reseeding activities following project activities.

Increased levels of fugitive dust are anticipated to cause indirect short-term impacts to vegetation immediately adjacent to the project area through an unquantified loss of photosynthetic output. Impacts resulting from fugitive dust would be mitigated through dust control BMPs listed in Section 2.1.12, including surface application of water during the construction and utilization of the drill pad and access road as necessary.

### 3.4.2.2 NO ACTION

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to vegetation. Vegetation in the project area would continue to be subject to current local conditions.

## 3.5 Invasive, Nonnative Species

### 3.5.1 Affected Environment

The BLM defines invasive species as those that are introduced to an area in which they are not native, and which typically have the propensity to reproduce rapidly and cause widespread changes to an ecosystem. Noxious weeds are further defined as plants that interfere with management objectives for a given area of land at a given point in time, and are legally designated by a federal, state, or county government as injurious to public health, agriculture, recreation, wildlife, or property (BLM 2014a). Noxious weeds, invasive, and nonnative species are highly competitive, aggressive, and easily spread.

The State of Nevada maintains a list of noxious weeds under Nevada Administrative Code 555.010, and regulates the spread of noxious weeds under Nevada Revised Statutes (NRS) 555.150 (Nevada Department of Agriculture [NDA] 2014a). The BLM Carson City District recognizes and regulates the 47 noxious weeds currently listed under these statutes.

The NDA Noxious Weed Program has recognized several particular noxious weed threats in Washoe County, including widespread establishment of Medusahead (*Taeniatherum caput-medusae*), perennial pepperweed (*Lepidium latifolium*), yellow starthistle (*Centaurea solstitialis*), musk thistle (*Carduus nutans*), and Scotch thistle (*Onopordum acanthium*) (NDA 2014b). None of these noxious species were observed in the project area during field surveys (SWCA 2014). The project area does include an old burn area that is heavily colonized by cheatgrass, and to a lesser degree by filaree (*Erodium cicutarium*), bur buttercup (*Ranunculus testiculatus*), and tall tumblemustard (*Sisymbrium altissimum*).

### 3.5.2 Environmental Consequences

#### 3.5.2.1 PROPOSED ACTION

The spread and introduction of noxious and invasive nonnative weed species is a primary concern during construction activities. Construction equipment and project vehicles are capable of transporting and spreading weed seed or plant parts (such as root material) from infested to non-infested areas. As described in the Proposed Action BMPs in Section 2.1.12, to prevent the spread of invasive, nonnative species, all vehicles, heavy earthmoving construction equipment, mobile trailers, and RV campers brought to and used in the project area would go through high-pressure washing of the entire vehicle/unit at a commercial wash station prior to arriving and/or being used on the project area. Additionally, following activities, the restoration and reclamation of native vegetation would increase competition with noxious and invasive species, further reducing the risk of spread of noxious and invasive species.

#### 3.5.2.2 NO ACTION

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted. Vegetation, including the presence of noxious and invasive weed species, would remain in their current condition, and would continue to be subject to existing trends.

## 3.6 General Wildlife

### 3.6.1 Affected Environment

The project area was analyzed using Southwest Regional Gap Analysis Project land cover data, which identified three land cover types (U.S. Geological Survey National Gap Analysis Program 2005). The vegetation communities identified included Inter-Mountain Basins Big Sagebrush Shrubland, Great Basin Xeric Mixed Sagebrush Shrubland, and Great Basin Pinyon-Juniper Woodland. However, no Great Basin Pinyon-Juniper Woodlands were observed during field surveys (SWCA 2014).

The Nevada Department of Wildlife (NDOW) has combined land cover analysis, wildlife distribution records, and other ecological modeling techniques to develop a statewide Wildlife Action Plan (Wildlife Action Plan Team 2012). The Wildlife Action Plan characterizes Nevada's landscape into 22 key habitat types, and identifies species of concern and commonly associated species for each habitat type. The key habitat types identified within this project area include Intermountain Cold Desert Scrub (mixed salt desert scrub) and Sagebrush (mixed sagebrush shrubland). Wildlife that may occur in the project area are those species typically associated with these key habitat types, and include and sagebrush lizard (*Sceloporus graciosus*), loggerhead shrike (*Lanius ludovicianus*), sagebrush [sage] sparrow (*Artemisospiza nevadensis*), Brewer's sparrow (*Spizella breweri*), sage thrasher (*Oreoscoptes montanus*), Great Basin pocket mouse (*Perognathus parvus*), sagebrush vole (*Lemmiscus curtatus*), and mule deer (*Odocoileus hemionus*) (Wildlife Action Plan Team 2012).

### 3.6.2 Management Indicator Species

The project area contains habitat for one Management Indicator Species, mule deer. The project area is located within Game Management Unit 194, which is managed by the NDOW for mule deer populations. Mule deer within Unit 194 are found at elevations between 5,000 and 10,500 feet. The majority of the deer observed during the general season on Peavine Mountain and at the very north end of the Carson Range are members of the Loyalton-Truckee Interstate Herd. The herd population is stable to declining with an average, estimated size around 3,200 individuals (California Department of Fish and Wildlife [CDFW] 2014). Most of the unit's deer arrive through migration from the Sierra Nevada beginning in late October, with peak migration occurring in December. The migration corridor they follow is approximately 32,098 acres (NDOW 2005b). These deer concentrate on Peavine Mountain, especially in the Bull Ranch Creek drainage and the north end of the Carson Range between Hunter Creek and the California border. Mule deer return westward through this corridor as they begin spring migration, which peaks in March (CDFW 2014; NDOW 2005a).

### 3.6.3 Environmental Consequences

#### 3.6.3.1 PROPOSED ACTION

Under the Proposed Action, there would be a long-term loss of up to 3.7 acres of habitat. Potential adverse impacts to wildlife in the project area include short-term disturbance during grading activities, and well drilling. Increased human presence during well drilling activities would result in increased noise and vibration which may stress or harass wildlife and temporarily displace them from the area. Increased mortality of smaller, less mobile wildlife species may result from crushing by construction activities and increased vehicle traffic.

In addition, smaller, less mobile wildlife species in the project area would not be able to easily avoid increased vehicle traffic should the wells be developed for operation. Increased vehicle traffic on the

access road during operation would result in increased risk of injury or mortality to smaller individual animals.

### 3.6.3.2 MANAGEMENT INDICATOR SPECIES

Mule deer may be temporarily displaced as a result of well exploration activities, which would be short-term in duration. The 3.7 acres of disturbance resulting from project activities is considered to be negligible (less than 0.01%) relative to the total acreage available within the remaining portion of the mule deer migration corridor. The Proposed Action is not anticipated to measurably affect seasonal mule deer movements within the migration corridor.

Because mule deer in the project area are highly mobile, increased activity associated with the Proposed Action would likely result in habitat avoidance for the duration of the project. Mule deer are expected to return following drilling activities, because the overall loss of habitat is negligible relative to available habitat. Impacts to mule deer would be minimized through application of adopted BMPs identified in Section 2.1.12 as part of the Proposed Action.

### 3.6.3.3 NO ACTION

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to general wildlife species including mule deer in the project area. Wildlife that use the area as habitat would continue to be subject to current local conditions and regional trends.

## 3.7 Migratory Birds

### 3.7.1 Affected Environment

Migratory birds are protected under the Migratory Bird Treaty Act of 1918, as amended (16 USC 703 *et seq.*). Under the Migratory Bird Treaty Act it is unlawful to take, kill, or possess migratory birds. Executive Order 13186 issued January 11, 2001, further defines the responsibilities of federal agencies to protect migratory birds. The U.S. Fish and Wildlife Service (USFWS) defines a migratory bird as any species or family of birds that lives, reproduces, or migrates within or across international borders at some point in their annual life cycle. Almost all bird species with potential to occur within the project area are migratory bird species.

The project area is located in sagebrush-dominated habitat that supports a variety of migratory bird species. Migratory bird species known to occur within the project area are those typically associated with the great basin sagebrush ecosystem, and include the sage thrasher, brewer's sparrow, sage sparrow, and gray flycatcher (*Empidonax wrightii*). Other birds, such as the green-tailed towhee (*Pipilo chlorurus*), lark sparrow (*Chondestes grammacus*), loggerhead shrike, and black-throated sparrow (*Amphispiza bilineata*) are associated with a greater variety of shrubland habitats, but often rely on sagebrush habitats for breeding habitat within the Intermountain West. Grassland species such as the vesper sparrow (*Pooecetes gramineus*) and western meadowlark (*Sturnella neglecta*) occur throughout the sagebrush biome where habitat conditions are adequate (California Partners in Flight [CalPIF] 2005).

The Nevada Partners in Flight Conservation Plan has designated "priority" bird species throughout the state of Nevada. Priority species are those species at risk due to population declines, significant threats, dependence on restricted or threatened habitats, or small population size (Great Basin Bird Observatory [GBBO] 2010). Table 7 identifies the focal species for sagebrush and if they are considered a Priority species in the State of Nevada (GBBO 2010) and recent trend information for the state of Nevada

(Sauer et al. 2007). Typically, the breeding season is when these species are most sensitive to disturbance, which in the project vicinity occurs from March 1 through August 30 (BLM 2014b).

**Table 7.** Migratory Bird Species Considered Focal Species for Sagebrush Shrub Plant Communities

Common Name	CalPIF Conservation Plan Focal Species <sup>1</sup>	Nevada Partners in Flight Priority Species <sup>2</sup>	Breeding Bird Survey Population Trend Information for Nevada <sup>3</sup>	Known to Occur in the Project Area Vicinity
Gray flycatcher	X	X	Stable	X
Sage thrasher	X	X	Stable/slight decline	X
Green-tailed towhee	X		Stable/slight decline	X
Spotted towhee	X		Stable/slight decline	X
Brewer's sparrow	X	X	Stable/slight decline	X
Vesper sparrow	X		Stable/slight decline	X
Sagebrush sparrow	X	X	Stable	X
Lark sparrow	X		Stable	X
Western meadowlark	X		Stable	X

<sup>1</sup> CalPIF conservation plans (CalPIF 2005).

<sup>2</sup> Nevada Partners in Flight Priority Species for sagebrush plant communities (GBBO 2010).

<sup>3</sup> North American Breeding Bird Survey (Sauer et al. 2007)

## 3.7.2 Environmental Consequences

### 3.7.2.1 PROPOSED ACTION

The project area is located in suitable nesting and foraging habitat for a variety of migratory bird species. Activities associated with the Proposed Action would result in the short- and long-term disturbance of 3.72 acres of migratory bird habitat in the project area. Activities associated with the Proposed Action would result in an increased risk of injury and mortality to individual migratory birds in the project area. However, these species are highly mobile and would be able to avoid vehicle traffic, clearing, grading, and excavation activities that would take place during the construction period. A project site speed limit of 15 mph would further reduce the risk of direct injury or mortality to migratory birds.

Indirect effects from noise and vibration associated with well exploration activities may disturb migratory bird behavior in an area exceeding the project footprint. The increased noise associated with construction activities would be audible throughout the project area over the course of drilling operations. Increased noise would result in habitat avoidance and changes to breeding behavior of migratory birds in the project area if conducted during the breeding season. It is anticipated that migratory birds would return to the area once the noise and vibration associated with exploration is completed.

Migratory bird species known to occur within the project area are commonly found within the Great Basin Ecoregion and impacts to individuals are not expected to have any local or regional population impacts. Impacts to migratory birds would be reduced through the implementation of adopted BMPs identified in Section 2.1.12 as part of the Proposed Action. Impacts would be further reduced by conducting activities outside the migratory bird nesting period.

### **3.7.2.2 NO ACTION**

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to migratory birds in the project area. Migratory birds that use the area as habitat for nesting, breeding, and/or foraging would continue to be subject to current local conditions and regional trends.

## **3.8 Water Quality and Quantity**

### **3.8.1 *Affected Environment***

The project area is located in Truckee Meadows Hydrographic Area (Number 87 in Nevada). This hydrographic area is part of the Truckee River Basin hydrographic region and is 129,920 acres in size. There are no surface waters in the project area. In addition, there are no ephemeral washes in or crossing the project area and no riparian vegetation was observed during field surveys (SWCA 2014). The nearest perennial streams are Whites Creek and Steamboat Creek; both more than 1 mile from the project area.

Groundwater in the project area is made up entirely of deeper thermal waters that do not meet drinking water standards. The static water level at the project area is expected to be present at a depth of 220 feet. There are no confining layers, or separated aquifers (Ormat 2014).

### **3.8.2 *Environmental Consequences***

#### **3.8.2.1 PROPOSED ACTION**

Under the Proposed Action, there are no surface waters in the project area, and there would be no impact to surface waters from the Proposed Action. There would be increased potential erosion resulting from ground-disturbing activities on 3.7 acres associated with the well pad and access road, increased vehicle traffic along the access roads, and the operation of heavy drilling equipment. The drill pad would also be graded to the reserve pit, to prevent any movement of stormwater from the drill pad off of the construction site.

Water needed in support of conducting drilling activities would be purchased from the City of Reno and trucked in on a daily basis. To reduce potential impacts to groundwater quality, exclusive of short- and long-term flow testing where fluids would be discharged to the reserve pit, geothermal fluids would not be discharged to the ground under normal operating conditions. Further, geothermal wells are cased to prevent comingling of the geothermal fluids with underground aquifers.

#### **3.8.2.2 NO ACTION**

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to surface water or groundwater quality. Water quality would continue to be subject to current local conditions and regional trends.

The Proposed Action would not interfere with existing land uses or leases, and would not further restrict access to public lands or Forest Service–managed lands.

## **3.9 Socioeconomics**

### **3.9.1 Affected Environment**

The project area occurs within Washoe County, Nevada. The county seat and state capitol is Reno, the third largest city in Nevada. The population of Reno is approximately 50% of the county's population. In 2013, the population of Washoe County was estimated at 438,420 (Economics Modeling Specialists International 2013). In 2013, there were 250,435 jobs in Washoe County with average earnings of \$46,461. Retail, accommodation, food services, and government are some of the largest employers in the County.

The State of Nevada has recognized the need for new and diverse energy resources, including renewable energy generation options. The Nevada Renewable Portfolio Standard (RPS) (NRS 704.7821) was revised on June 6, 2013, by Senate Bill 252 to state that by calendar year 2025, no less than 25% of the total amount of electricity sold by NV Energy to its retail customers in Nevada must be from renewable energy resources. NV Energy is expecting to acquire renewable energy from multiple generating facilities to meet, at a minimum, the mandated RPS target of 12% of retail sales coming from renewable resources in 2009–2010, 15% in 2011–2012, 18% in 2013–2014, 20% in 2015–2019, 22% in 2020–2024, and 25% in 2025.

A large source of renewable energy in Nevada is from geothermal energy. Nevada's geothermal electric generation facilities are located primarily in the northern part of the state, including Washoe County. There are currently 22 operating geothermal plants at 14 different locations across the state (Nevada Division of Minerals 2013).

### **3.9.2 Environmental Consequences**

#### **3.9.2.1 PROPOSED ACTION**

Under the Proposed Action, there would be a short-term increase in the number of workers on-site to accomplish the well drilling activities, up to 18 additional workers on-site. This would only last for the duration of the exploration activities (up to 45 days). There would be no other impacts to employment. Although workers would stay on-site in trailers, there would be a minor short-term increase in demand for lodging. In addition, this short-term increase in employment would contribute to an increased demand for local services (restaurants, grocery stores, gas stations, etc.). It would also result in increased local spending, which would benefit Reno area businesses. Because of the short-term nature of the work and the limited number of additional workers, this impact is expected to be minor.

If the drilling results are successful and a full-size well is drilled, there would be an additional contribution from the Steamboat Geothermal Unit to meeting Nevada's RPS. This would be a positive impact to meeting the 20% RPS of all electricity sold by NV Energy in 2015–2019.

#### **3.9.2.2 NO ACTION**

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to socioeconomics. Under the No Action alternative, there would be no contribution to meeting Nevada's RPS.

## **3.10 Soils**

### **3.10.1 Affected Environment**

There are three soil associations that occur within the project area. The soil descriptions in this section are based on information from the DOA's Natural Resources Conservation Service (NRCS) web soil survey (NRCS 2014). The web soil survey data are based on the soil survey of Washoe County. For the purposes of this section, terminology consistent with that used by the NRCS was used to identify specific soil types in the proposed project area.

The Old Camp-rock outcrop soil complex occurs on slopes of 30% to 50%, is well drained, has very low water capacity (1.4 inches), and is not known to pond or flood. The proposed drill pad component of the project area occurs entirely within the Old Camp-rock outcrop soil complex.

The access road component of the project area crosses the remaining two soil types in the project area. The Oppio cobbly sandy loam soil occurs on slopes of 8% to 15%. This loam is well drained, has low water capacity (2.0 inches), and is not known to pond or flood. The Chalco cobbly sandy loam occurs on slopes of 15% to 30%. This loam is well drained, has low water capacity (3.1 inches), and is not known to pond or flood.

A majority of the soils in the project area have been previously disturbed by human activities. The proposed pad area has been previously graded and the proposed access is along an existing vehicle route.

### **3.10.2 Environmental Consequences**

#### **3.10.2.1 PROPOSED ACTION**

Implementation of the Proposed Action would result in the disturbance of 3.7 acres of soils in the project area. A majority of soils in the project area, 2.8 acres, are identified as occurring on slopes of 30% to 50%. With the removal of vegetation and topsoil materials for clearance purposes, soils in the project area would be more vulnerable to wind and water erosion. Soils would be also be subjected to increased compaction from heavy equipment use and increased vehicle traffic. Where aggregate is applied to access road surface (0.92 acre), the texture and structure of soils at the surface would be altered.

The implementation of erosion control BMPs listed in Section 2.1.12 after construction would reduce the impacts of the Proposed Action on soils in the project area. Disturbed areas that will not be used after construction would be revegetated with an approved seed mixture and planting procedures. Any topsoil enriched in organic material stockpiled on previously disturbed areas would be applied to enhance the opportunity for successful revegetation.

#### **3.10.2.2 NO ACTION**

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to soils. Soils in the project area would continue to be subject to current local conditions.

## **3.11 Visual Resources**

### **3.11.1 Affected Environment**

Visual resources (the landscape) consist of landform (topography and soils), vegetation, and human-made structures (roads, buildings, and modifications of the land, vegetation, and water). These elements of the landscape can be described in terms of their form, line, color, and texture. Normally, the more variety of these elements there is in a landscape, the more interesting or scenic the landscape becomes if the elements exist in harmony with each other. The BLM and Forest Service manage landscapes for varying levels of protection and modification, giving consideration to other resource values, land uses, and the scenic quality of the landscape (BLM 1992; Forest Service 1995).

Visual resources on Forest Service lands in the project area are managed for partial retention; and management activities should remain visually subordinate to the characteristic landscape (Forest Service 1986). Activities may repeat the form, line, color, or texture that is common to the characteristic landscape. The project area is located on a hillside that has recently experienced fire. Vegetation in the project area consists of low-growing shrubs and invasive grasses, with visible signs of charred shrubs from the recent fire. The project area is also located in an existing geothermal lease area with a number of existing well pads, wells, aboveground pipelines, dirt surface roads, and power generation facilities.

### **3.11.2 Environmental Consequences**

#### **3.11.2.1 PROPOSED ACTION**

Impacts to visual resources associated with construction activities would result from regrading the existing access road and other ground-disturbing actions. The regraded access road would introduce a stronger linear contrast in the landscape. Other ground-disturbing actions during construction would introduce visual contrasts into the color, form, texture, and line of the existing characteristic landscape. In addition, construction equipment, vehicles, and associated project activities, including restoration, would be temporarily visible during construction activities. In addition, project lighting during exploration and operation would result in increases in artificial lighting in the area. Lights would be directly visible from nearby communities. By using directional lighting pointed down during exploration, and motion sensitive lighting during operations, these impacts would be reduced.

Impacts to visual resources associated with operation of geothermal wells would result from the introduction of wells into the existing landscape. Additionally, all aboveground structures associated with geothermal wells (including fences and aboveground pipeline) would produce visual contrasts as a result of their typical physical characteristics (form, color, line, and texture). Because of the existing well pads, wells, aboveground pipelines, dirt surface roads, and power generation facilities in the area, the visual contrasts from a geothermal well, access road, and pipeline would be minor and would fit within the BLM and Forest Service visual management values, repeating the basic elements of form, line, color, and texture present in the area. In addition, painting the wellheads to blend with the area as described in Section 2.1.12 would further reduce impacts to visual resources.

#### **3.11.2.2 NO ACTION**

Under the No Action alternative, the Steamboat Geothermal Well 16-32 Project would not be permitted, and there would be no project-related impacts to visual resources. The landscape character of the project area would remain the same, and there would be visible contrasts to the existing scenery.

## 4.0 CUMULATIVE IMPACTS

A cumulative impact, as defined by the CEQ (40 CFR 1508.7), is the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts are interdisciplinary and multi-jurisdictional and usually do not conform to political boundaries. To determine any cumulative effects, all applicable past, present, and future actions within the same geographic extent as the Proposed Action were evaluated.

The BLM NEPA Handbook (BLM 2008a) states that the purpose of the cumulative effects analysis is to ensure that decision-makers consider the full range of the consequences of the Proposed Action and No Action alternative. Those resources identified for detailed analysis that would be directly or indirectly affected by the Proposed Action are analyzed below. If the actions under the Proposed Action and No Action alternative have no direct or indirect effect on a resource, then the cumulative impacts on that resource are not addressed below.

Unless described otherwise for a specific resource, the cumulative study area is defined as the Steamboat Geothermal Unit Lease Area and the adjacent geothermal power plant area, located largely on private lands. Past actions are considered those that have occurred within the past 50 years. Present actions are considered those occurring at the time of this evaluation. Future actions are those that are in planning stages with a reasonable expectation of occurring over the next 20 years. The primary activities from the past, present, and reasonably foreseeable future that would contribute to cumulative impacts when added to the impacts from the Proposed Action include: exploration and development of geothermal resources and wildland fire.

**Geothermal Leases**—Past, present, and reasonably foreseeable future activities in the geothermal lease area include geophysical and drilling exploration, and geothermal production. Facilities associated with geothermal leases in the cumulative study area include well pads, access roads, aboveground pipelines, transmission lines, and generation plants. Disturbance associated with the Proposed Action accounts for 3.7 acres of disturbance within the cumulative study area.

**Wildland Fire**—Past, present, and future wildland fires occur naturally and through human activities in the cumulative study area. The Washoe Fire was a wildland fire which occurred in 2012 and burned approximately 3,176 acres total, including the project area.

The following sections discuss the cumulative impacts of the Proposed Action when combined with those past, present, and reasonably foreseeable future actions in the cumulative study area as defined above.

### 4.1 Air Quality

The cumulative study area for air quality is Hydrographic Area 87. Past and present actions have contributed to air quality impacts, including increased PM<sub>10</sub> in the cumulative study area. This includes wildfire, wildfire suppression activities, geothermal lease development, and supporting road construction and maintenance. Reasonably foreseeable actions that may contribute to air quality impacts include wildfire and future geothermal energy development. The incremental and additive effect of the Proposed Action, when combined with the past, present, and reasonably foreseeable actions, would be negligible. In addition, the application of BMPs for the Proposed Action as identified in Section 2.1.12, such as water application to surface disturbance for dust control, would further reduce cumulative adverse effects.

## 4.2 Vegetation

Past and present actions in the cumulative study area have had a direct effect on vegetation in the cumulative study area, contributing to direct loss of vegetation, and changing vegetation communities. Reasonably foreseeable actions would also contribute to the loss of vegetation associated with increased potential wildfire and surface disturbance. The Proposed Action would contribute an incremental increase in surface disturbances that would contribute to vegetation loss, and increased risk of introducing invasive, nonnative species on 3.7 acres.

## 4.3 Invasive, Nonnative Species

Past and present actions in the cumulative study area have contributed to the spread of invasive, nonnative species, and the same is expected of the reasonably foreseeable actions. Past and present actions with impacts created from noxious weeds and invasive, nonnative species include road construction and maintenance, wildfire and wildfire suppression measures, and geothermal exploration and utilization. The application of mitigation measures for all other actions would aid in reducing potential adverse effects. Noxious weeds and invasive nonnative species could increase within the cumulative study area in spite of the best management practices and standard operating procedures that would be in place for the Proposed Action. Therefore, the Proposed Action may result in incremental increases in noxious weeds; however, Ormat's commitment to washing vehicles and equipment before and after entering the project area would minimize this potential.

## 4.4 General Wildlife

Past and present actions in the cumulative study area have had a direct effect on wildlife species, contributing to displacement, injury, mortality, loss of habitat, and habitat fragmentation. Reasonably foreseeable actions would also contribute to the loss of habitat, habitat fragmentation, and increased risks of displacement and mortality associated with increased human presence, increased vehicle traffic, loss of vegetation, and surface disturbance. The Proposed Action would contribute an incremental increase in human presence, vehicle traffic, and surface disturbances that would add to displacement, habitat loss, and increased risk of injury and mortality to smaller, less mobile species.

## 4.5 Migratory Birds

Past and present actions in the cumulative study area have had a direct effect on migratory birds, contributing to displacement, injury, mortality, loss of habitat, and habitat fragmentation. Reasonably foreseeable actions would also contribute to the loss of habitat, habitat fragmentation, and increased risks of displacement and mortality associated with increased human presence, increased vehicle traffic, loss of vegetation, and surface disturbance. The Proposed Action would contribute an incremental increase in human presence, vehicle traffic, and surface disturbances that would add to displacement, habitat loss, and increased risk of injury and mortality.

## 4.6 Water Quality and Quantity

Past and present actions have contributed to increased erosion and impacts to water quality in the cumulative study area. This includes wildfire, wildfire suppression activities, geothermal lease development, including ancillary facilities, and road construction. Reasonably foreseeable actions that may contribute to water quality impacts include future geothermal energy development. The incremental

and additive effect of the Proposed Action, when combined with the past, present, and reasonably foreseeable actions, would be negligible since the Proposed Action follows an existing road disturbance and would utilize a previously disturbed area for a well pad.

## **4.7 Socioeconomics**

The cumulative study area for socioeconomics is Washoe County. Past and present actions have contributed to socioeconomic patterns and characteristics throughout Washoe County. This includes geothermal lease development. Reasonably foreseeable actions that may contribute to socioeconomics include future geothermal exploration and utilization. The incremental and additive impact of the Proposed Action, when combined with the past, present, and reasonably foreseeable actions, would result in an indirect but minor beneficial cumulative impact, with some small income flow to the county, in addition to a small contribution to meeting Nevada's future RPS.

## **4.8 Soils**

Past and present actions have contributed to increased soil compaction and erosion in the cumulative study area. This includes wildfire, wildfire suppression activities, and geothermal lease development, including ancillary facilities and road construction. Reasonably foreseeable actions that may contribute to increased soil compaction and erosion include future geothermal energy development. The incremental and additive effect of the Proposed Action, when combined with the past, present, and reasonably foreseeable actions, would be negligible since the Proposed Action follows an existing road disturbance and would utilize a previously disturbed area for a well pad.

## **4.9 Visual Resources**

Past and present actions have contributed to the visual contrasts to the existing landscape character in the cumulative study area. This includes wildfire, geothermal lease development, including ancillary facilities, and road construction. Reasonably foreseeable actions that may contribute to visual contrasts in the cumulative study area include future geothermal energy development. The incremental and additive effect of the Proposed Action, when combined with the past, present, and reasonably foreseeable actions, would be negligible since the Proposed Action follows existing disturbances, and would repeat the basic elements of form, line, color, and texture present in the area.

## 5.0 CONSULTATION AND COORDINATION

Informal consultation with the USFWS is currently in progress. A review of species with potential to occur in the project area was conducted on March 25, 2014, using the USFWS online Information, Planning, and Consultation (IPaC) tool (USFWS 2014). Ormat and SWCA also attended coordination meetings (March 13, 2014) with the Carson Ranger District and BLM to identify resource concerns.

### 5.1 Summary of Tribal Consultation

On March 13, 2013, the Proposed Action was discussed at a consultation meeting between the Carson Ranger District and the Washoe Tribe of Nevada and California. Tribal Chair Wanda Bachelor had no concerns with the project and did not identify any traditional cultural properties or sacred sites within the project area.

### 5.2 List of Preparers/Reviewers

**Table 8.** List of Preparers/Reviewers

<b>Name</b>	<b>Title</b>	<b>Affiliation</b>	<b>Responsibility</b>
<b>Data Providers and Reviewers</b>			
Kenneth Depaoli	Project Manager/ Geologist	BLM	Project Manager, Minerals Reviewer
David Risley	District Geologist	Forest Service	Minerals
Angelica Rose	Planning and Environmental Coordinator	BLM	NEPA Compliance, Socioeconomics
Maureen Easton	Wildlife Biologist/Natural Resource Officer	Forest Service	Biology
Joseph Garrotto	District Archaeologist	Forest Service	Cultural Resources
<b>Preparers</b>			
Steve Leslie	Project Manager	SWCA	Project management, document production, and review
Adrian Hogel	Environmental Planner	SWCA	Document production and review; Purpose and Need; Proposed Action
Matt Villaneva	Biologist/Botanist	SWCA	Site surveys, vegetation, wildlife
Mike Swink	Biologist	SWCA	Document production and review
Bruce Schneider	GIS Specialist	SWCA	GIS analysis, map production
Eric Koster	Biologist	SWCA	Review

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