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

Environmental Assessment

Tungsten Mountain Geothermal Development Project

December 2015

BLM Mission Statement

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Environmental Assessment
Tungsten Mountain Geothermal Development Project

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Carson City District, Stillwater Field Office

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Acronyms

ARPA	Archeological Resources Protection Act
ATV	All-terrain Vehicle
AUM	Animal Unit Month
APE	Area of Potential Effect
APM	Adopted Protection Measures
BLM	Bureau of Land Management
BMPs	best management practices
CEQ	Council on Environmental Quality
CESA	Cumulative Effects Study Area
CFR	Code of Federal Regulations
CRMP	Carson City District Consolidated Resource Management Plan, Approved May, 11, 2001
DOI	U.S. Department of the Interior
DR	Decision Record (for an Environmental Assessment
EA	Environmental Assessment
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESD	Ecological Site Description
FONSI	Finding of No Significant Impact
FPST	Fallon Paiute Shoshone Tribe
GHG	Greenhouse Gas
GRSG	Greater sage-grouse
HMA	Herd Management Area
IDT	Interdisciplinary Team
IM	Instruction Memorandum
KOP	Key Observation Point
kV	kilovolt
MAAT	mean annual air temperature
MAP	mean annual precipitation
MBTA	Migratory Bird Treaty Act
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NDOM	Nevada Division of Minerals
NDOW	Nevada Department of Wildlife
NDWR	Nevada Division of Water Resources
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NRS	Nevada Revised Statutes
OHMA	Other Habitat Management Area
PM10	particulate matter less than 10 microns
RDF	Required Design Features
RFFA	Reasonably Foreseeable Future Actionst
ROD	Record of Decision
ROW	Right-of-Way
SAD	Surface Area Disturbance
SFO	Stillwater Field Office of the BLM Carson City District
SWReGAP	Southwest Regional Gap Analysis Project
USC	United States Code
USDA	U.S. Department of Agriculture

USFWS	U.S. Fish and Wildlife Service
VRI	Visual Resources Inventory
VRM	Visual Resources Management
WSA	Wilderness Study Area

Chapter 1. Introduction

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1.1. Identifying Information:

Tungsten Mountain Geothermal Development Project, Environmental Assessment (EA) number DOI-BLM-NV-C010–2016–0016–EA.

1.1.1. Location of Proposed Action:

Ormat is proposing to construct, operate and maintain the Tungsten Mountain Geothermal Development Project (Project or Proposed Action) in Churchill County, Nevada (see Figure 1).

The geothermal portions of the Project are located within the Tungsten Mountain Geothermal Unit (NVN-88836X), which is comprised of federal geothermal leases N-85715, N- 86897, N-86898, N-88428, N-90744 and N-92480. The Tungsten Mountain Unit area encompasses approximately 5,840 acres of public lands in all or portions of Sections 13, 21-28 and 33-34, Township 21 North, Range 38 East (T. 21 N., R. 38 E.), Mount Diablo Baseline and Meridian (see Figure 2).

The Project also includes construction of up to approximately 17 miles of generation tie (gen-tie) line (depending on the route selected) which would originate at the proposed substation within the Unit area, trend south parallel to the County Road and terminate at the proposed Alpine switching station in Section 33, T. 19 E., R. 37 E. (see Figure 2).

1.1.2. Lead/Preparing Office:

Bureau of Land Management (BLM), Carson City District, Stillwater Field Office (SFO)LLNVC01000

1.1.3. Subject Function Code, Lease, Serial or Case File Number:

Federal Geothermal Unit #NVN-88836X

1.1.4. Applicant Name:

ORNI 43 LLC (Ormat)

1.2. Background

In 2008, ORNI 43 LLC (Ormat), began obtaining federal geothermal leases in the Tungsten Mountain area of Churchill County, Nevada. In 2011, the federal geothermal leases were unitized. Following acquisition of the federal geothermal leases and formation of the Unit, Ormat began conducting exploration activities.

Exploration activities in the Unit were previously evaluated in the Tungsten Mountain Geothermal Exploration Project EA (BLM 2012a). A Finding of No Significant Impact (FONSI) and Decision Record (DR) were signed on March 28, 2012. Geothermal exploration activities authorized by the BLM are current and ongoing. Through these exploration activities, Ormat has acquired new information about the geothermal resource and is seeking authorization for the development of power plants, associated facilities, and a gen-tie.

Ormat has submitted to the BLM SFO of the Carson City District a Utilization Plan for the development of a geothermal power plant, well field, and associated facilities; and a Plan of Development for the construction of a gen-tie to connect produced power to the electric grid.

1.3. Purpose and Need for Action:

The purpose of the Proposed Action is to allow Ormat to develop the geothermal resources within the Tungsten Mountain Geothermal Unit on public lands managed by the BLM which are leased to Ormat. The need for the action is established by the BLMs responsibility under the Geothermal Steam Act, its revisions of 2007, and its implementing regulations under 43 Code of Federal Regulations (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

The Proposed Action described below is in conformance with the Carson City District Consolidated Resource Management Plan (CRMP), approved May 11, 2001. The Proposed Action is in conformance with the CRMP because it is specifically provided for as follows:

- Page # MIN-1, RMP Level Decisions, Desired Outcomes 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), and

- Page # MIN-5, Standard Operating Procedures: 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.

The CRMPhas been amended by the Nevada and Northeastern California Greater Sage-Grouse (GRSG) Approved Resource Management Plan Amendment (USDI, BLM 2015b). The Record of Decision (ROD) (USDI, BLM 2015a) and Approved Resource Management Plan Amendments for the Great Basin Region, including the GRSG Sub-Region of Nevada and Northeastern California, were signed on September 21, 2015 by the Director of the BLM and the Assistant Secretary of Land and Minerals Management (henceforth referred to as the Decision). This Decision in conjunction with the approved resource management plans and approved resource management plan amendments constitutes BLM land use planning decisions to conserve the GRSG and its habitats throughout its remaining range that is located on public lands administered by the BLM. The efforts of the BLM, in coordination with the Forest Service on National Forest System lands within the remaining range of the species, constitute a coordinated strategy for conserving the GRSG and the sagebrush-steppe ecosystem on most Federal lands on which the species depends. Appendix C of this Decision states that Required Design Features (RDFs) are required for certain activities in all GRSG habitat. RDFs establish the minimum specifications for certain activities to help mitigate adverse impacts. The Project Area has been mapped as Other

Habitat Management Area (OHMA) and is subject to all applicable RDFs (which are included as Appendix C of this EA).

1.5. Relationships to Statutes, Regulations, Plans and Environmental Analysis

The Proposed Action is consistent with the following documents:

- Federal Land Policy and Management Act of 1976;
- Endangered Species Act of 1973;
- National Environmental Policy Act (NEPA) of 1969;
- 40 CFR 1500 (et seq.), Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA);
- Considering Cumulative Effects under NEPA (CEQ 1997);
- 43 CFR Part 46, Implementation of NEPA of 1969; Final Rule, effective November 14, 2008;
- DOI requirements (Department Manual 516, Environmental Quality) (DOI 2008);
- BLM NEPA Handbook (H-1790 1), as updated (BLM 2008a);
- The Geothermal Steam Act of 1970 (30 United States Code (USC) 1001-1025);
- 43 CFR 3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007;
- The Energy Policy Act of 2005; The National Energy Policy, Executive Order 13212 and best management practices (BMP) as defined in *Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, Fourth Edition* (Gold Book) (BLM 2007a);
- The Geothermal Energy Research, Development, Demonstration Act of 1974;
- Migratory Bird Treaty Act of 1918;
- National Historic Preservation Act (16 USC 470f);
- Archeological Resources Protection Act;
- Native American Graves Protection and Repatriation Act;
- Indian Sacred Sites – Executive Order (EO) 13007;
- Consultation and Coordination with Indian Tribal Governments – EO 13175; and
- Tungsten Mountain Geothermal Exploration Project Environmental Assessment (BLM 2012a).

In 2008, the BLMcompleted the Programmatic Environmental Impact Statement for Geothermal Resources Leasing in the Western United States (BLM 2008b). This Programmatic Environmental Impact Statement was the foundation for a ROD and Resource Management Plan Amendments for Geothermal Resources Leasing in the Western United States (BLM 2008c). This ROD amended BLM Resource Management Plans, including the CRMP (BLM 2001), to identify public lands

that are administratively and legally closed or open to leasing; and to develop a comprehensive list of stipulations, BMPS, and procedures to serve as consistent guidance for future geothermal leasing and development. Special stipulations developed in the ROD were applied to geothermal resource leases subsequently issued by BLM, including the federal geothermal leases issued to Ormat for Tungsten Mountain.

1.6. Decision to Be Made

Applications for geothermal utilization 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 Utilization Plan and right-of-way application as submitted by Ormat; approving the Proposed Action with stipulations to mitigate environmental impacts; or denying the Proposed Action. In addition, the BLM would establish an interim Visual Resource Management (VRM) class for the locations where project facilities would be developed.

1.7. Scoping, Public Involvement and Issue Identification:

The BLM SFO held interdisciplinary team (IDT) meetings in July 2014 and June 2015. Several resources were identified as being present and potentially impacted by the Proposed Action (see Table 3.1, “Supplemental Authorities ” (p. 27), Table 3.2, “Resources or Uses Other Than Supplemental Authorities ” (p. 28) and Section 3.4). External scoping was performed with the Fallon Paiute-Shoshone Tribe (FPST) regarding the possibility of Native American religious concerns or any other impacts that could result from the Proposed Action. This scoping process is detailed in Section 3.4.3 (Native American Religious Concerns).

Chapter 2. Proposed Action and Alternatives

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The previous chapter presented the purpose and need for the proposed project, as well as the relevant issues, i.e., those elements that could be affected by the implementation of the proposed project. In order to meet the purpose and need of the proposed project in a way that resolves the issues, the BLM has developed a reasonable range of action alternatives. These alternatives, as well as a no action alternative, are presented below.

2.1. Proposed Action:

ORNI 43 LLC (Ormat) is proposing the Tungsten Mountain Geothermal Development Project (Project) in Churchill County, Nevada (see Figure 1). The Project includes the construction and operation of two geothermal power plants, geothermal production and injection well pads and wells, geothermal fluid pipelines, access roads, a gen-tie line and ancillary facilities. The proposed Project Area is comprised of the Tungsten Mountain Unit area and the width of the proposed right-of-way (ROW) for the gen-tie line (200-feet wide, expanded an additional 100 feet at the angle points), (see Figure 2).

The proposed Project Area is comprised of the Tungsten Mountain Unit area and the width of the proposed ROW for the gen-tie line (200–feet wide, expanded an additional 100 feet at the angle points) (see Figure 2).

The Project is further described below.

2.1.1. Geothermal Wells

Within the Unit area, Ormat expects that together the two power plants would require up to 24 production and injection wells (see Figure 3 and Table 2.1, “Proposed Tungsten Mountain Production and Injection Wells” (p. 11)below).

The number of geothermal production and injection wells required for the Project is principally dependent on the productivity (or injectivity) of the wells and the temperature and pressure of the produced geothermal fluid. Production wells flow geothermal fluid to the surface to the power plant(s); injection wells are used to inject geothermal fluid from the power plant(s) back into the geothermal reservoir. Injection ensures the longevity and renewability of the geothermal resource.

Table 2.1. Proposed Tungsten Mountain Production and Injection Wells

Well Name (Kettleman No.)	Approximate UTM Coordinates (NAD83)	
	Easting (m)	Northing (m)
56-22	440598.3	4391279.9
17-23	441483.2	4391115.4
36-22	440921.5	4391260.2
24-22	440176.5	4391786.6
76-22	441161.0	4391404.4
13-22	439952.1	4391827.5
54-22	440653.9	4391678.7
74-22	441087.0	4391624.4
57-22*	440731.8	4391178.4
57-22b*	440634.3	4391058.3
34-23	441969.5	4391690.8
14-23**	441408.9	4391766.7
14-23b**	441467.7	4391669.0

Well Name (Kettleman No.)	Approximate UTM Coordinates (NAD83)	
	Easting (m)	Northing (m)
13-23	441566.2	4391801.3
27-22	440150.4	4391091.5
68-22	440815.5	4390992.0
67-22	440889.5	4391101.4
84-22	441301.7	4391633.9
24-23	441796.6	4391986.9
26-22	440162.7	4391212.5
16-22	439903.2	4391286.2
76-21	439516.9	4391390.0
86-21	439659.7	4391289.0
67-21	439347.8	4391182.5
*Wells 57–22 and 57–22b are located on the same well pad. **Wells 14–23 and 14–23b are located on the same well pad.		

The well locations are tentative and may need to be adjusted as additional geologic, geophysical and geothermal reservoir information is obtained as new wells are drilled and tested.

2.1.1.1. Construction Procedures and Surface Disturbance

Ormat is proposing 24 production and injection wells from 22 well pads (2 sets of the wells would be located on the same pad). Each well would take approximately 45 days to drill, though difficulties encountered during the drilling process, including the need to re-drill the well, could as much as double the time required to successfully complete each well. Temporary surface disturbance for the 22 proposed well pads would be 4.2 acres per pad, or 92.4 acres in total (22 well pads; * 4.2 acres/pad). After interim reclamation, there would be 2.5 acres of permanent disturbance at each well pad, or 55 acres in total (22 well pads; * 2.5 acres per pad).

Each drill pad would be prepared to create a level pad for the drill rig and a graded surface for the support equipment. Drill pad preparation activities would include clearing, earthwork, drainage and other improvements necessary for efficient and safe operation and for fire prevention. Only those drill pads scheduled to be drilled would be cleared. Clearing would include removal of organic material, stumps, brush and slash, which would be either be removed and taken to an appropriate dump site, or left onsite. Topsoil would be stripped (typically to the rooting depth) and salvaged during the construction of all pads, as feasible. Salvaged topsoil (and cleared organic material, stumps, brush and slash, if saved) would be stockpiled on the pads for use during subsequent reclamation of the disturbed areas.

Reserve pits would be used for the containment and temporary storage of water, drill cuttings and circulating drilling mud during drilling operations. Geothermal fluid produced from the well during flow testing would also drain to the reserve pit.

Reserve pits would be constructed in accordance with BMPs identified in the “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book)” (Fourth Edition – Revised 2007) on each pad. Specifically:

- as much as practical, the pit would be located on level ground and away from established drainage patterns, including intermittent/ephemeral drainage ways, and unstable ground or depressions in the area;

- the pit would have adequate storage capacity for safe containment of all produced water, even in those periods when evaporation rates are at a minimum. The design would provide for a minimum of 2 feet of free-board;

- the pit would be fenced or enclosed to prevent access by livestock, wildlife, and unauthorized personnel. If necessary, the pit would be equipped to deter entry by birds. Fences would not be constructed on the levees;

- the pit levees to be constructed so that the inside grade of the levee is no steeper than 1 (vertical):2 (horizonal), and the outside grade no steeper than 1:3;

- The top of levees would be level and least 18 inches wide; and

- The pit location would be reclaimed pursuant to the requirements and standards of the surface management agency.

Reserve pits would be constructed in a manner that allows wildlife to escape. Specifically, at least two sides or installed shoots would be sloped 3:1 (horizontal: vertical) or flatter. Alternatively, escape ramps would be installed in two corners. Ramps would be coated with geo-mesh, and maximum distance between any two ramps would not exceed 200 feet. If liquids harmful to birds and bats (based on toxicity, high temperatures, etc) are to be contained in the reserve pits, netting/screening, bird balls or other appropriate measures would be used to preclude access by these species.

During drilling, the reserve pits would be fenced with an exclosure fence on three sides. The drill rig would be located along the fourth side, blocking access to the pit. Temporary fencing would be placed to close exposed areas between the rig and existing fencing. The fourth side would be fenced once the rig has moved and drilling has been completed to prevent access by persons, wildlife or livestock. To prevent small mammals from entering the pits, fences would be tight to the ground and have holes smaller than 2 inches (on the bottom parts of each fence). Fences would also be placed away from the edges of reserve pits on a level surface where possible. The fence would remain in place until pit reclamation begins. For the drilling of each well, the reserve pit would measure approximately 75 feet by 200 feet by 10 feet deep.

2.1.1.2. Operation and Maintenance

Once a well is drilled and well head completed, an appropriately sized industrial grate would be placed over the hole to prevent humans and wildlife (especially small mammals) from falling into the cellar.

Each of the production wells would be equipped with a lineshaft pump to bring the geothermal fluid to the surface under pressure. The electricity to power the wellhead pump motors would be supplied via an insulated electric conductor installed from the power plant to the wellheads along the connecting pipelines.

Wellhead dimensions for the production wells are not expected to exceed a height of fifteen feet above the ground surface or four feet in diameter. Wellhead dimensions for the injection wells would be much smaller (approximately 4 feet in height) since they would not have wellhead pump motors.

An approximately 15-foot by 15-foot by 10-foot high motor control building may be located on the well pad within approximately 50 feet of each production well to house and protect: 1) the auxiliary well control systems; 2) motor switch gear controls and sensors; 3) transmitters; and 4) geothermal fluid treatment systems. The well control systems, data transmitters and geothermal fluid treatment systems used for the injection wells would be placed inside a smaller structure located on the injection well pads.

Sensors would collect key temperature, pressure and flow rate data from each well. These data would be measured for purposes of process control, resource data acquisition, safety and environmental protection. Total well depth and the static depth to water would be obtained upon completion of well construction and testing. During production well operation, flow rate, drawdown, and fluid temperature are recorded. Water quality samples are collected quarterly and submitted to the Nevada Department of Environmental Protection (NDEP). During injection well operation, sensors wells measure flow rate, temperature and well head pressure. Water quality samples are only collected during testing following well construction to demonstrate that the well was constructed within the geothermal reservoir.

2.1.2. Geothermal Pipelines

The geothermal fluid production and injection pipelines would bring the geothermal fluid from the production wells to the energy plants and deliver the cooled geothermal fluid from the energy plants to the injection wells, respectively. Approximately 4.2 miles of production and injection pipeline are proposed (see Figure 3).

The production and injection pipeline routes generally follow the shortest distance from each well pad to the next well pad or the energy plants in order to minimize the amount of pipe required, reduce heat losses and the energy required to move the fluids, and minimize the amount of ground disturbance. In addition, the proposed pipeline routes generally follow existing or proposed roads to facilitate ongoing monitoring and future maintenance.

However, the final alignment of the pipeline routes would be dictated by the specific wells completed for the project and the need to match fluid characteristics and balance fluid volumes in these pipelines.

2.1.2.1. Construction Procedures and Surface Disturbance

Ormat is proposing 4.2 miles of production and injection pipeline. Assuming a 40 foot wide construction corridor along the length of the pipeline, temporary surface disturbance would be 20.4 acres. After interim reclamation, there would be approximately 10.2 acres of permanent disturbance along the length of the pipeline, as half of the disturbed area could be reclaimed.

Pipeline construction would begin by vertically auguring nominal 24 inch diameter holes into the ground about three to five feet deep at approximately 30 foot intervals along the pipeline route (twin holes for two supports may be drilled at the pipeline anchor points, which would be located at the center of each expansion loop and in between each expansion loop). Dirt removed from the holes would be stockpiled to save for interim reclamation. The steel pipe “sleeper” would be placed in the hole and concrete poured to fill the hole slightly above the ground surface. The steel pipe sleeper would extend above the concrete, averaging approximately one foot above ground surface.

While the concrete is curing, the approximately 30 foot long steel pipe sections would be delivered and placed along the construction corridor. A small crane would lift the pipe sections onto the pipe supports and temporary pipe jacks so that they could be welded together into a solid pipeline. Once welded and the welds tested, the pipe would be jacketed with insulation and an aluminum sheath (appropriately colored, likely covert green, to blend with the area).

When completed, the top of the new geothermal pipelines would average three feet above the ground surface. However, a number of pipeline lengths could be up to six feet in height to accommodate terrain undulations and to facilitate movement of wildlife and livestock through the wellfield.

Electrical power and instrumentation cables for the wells would then either be installed in steel conduit constructed along the same pipe sleepers or hung by cable from pipe along the pipeline route.

The pipelines would be constructed across roads to allow continued vehicle access, as needed. This would typically use the cut and fill method, where a trench would be cut through the road, a prefabricated, "U" shaped, oversized pipe sleeve (containing the fabricated geothermal fluid pipeline with the insulation and metal cladding in place) installed in the trench, the excavated dirt backfilled and compacted around and above the oversize pipe sleeve, and the roadbed material repaired or replaced. Alternatively, and less likely, the pipelines could be constructed across the roads on sleepers (as described above) and the roadbed run up and over the pipeline. This would entail constructing a concrete conduit over a pipeline where it crosses a road, then compacting dirt on either side of the conduit sufficient to ramp the roadbed up and over the conduit to allow traffic to travel over the pipeline.

2.1.2.2. Operation and Maintenance

The pipelines would be periodically inspected for leak detection, safety and vandalism during normal operations. The pipelines also would be subject to periodic ultrasonic thickness testing to detect any substantial thinning of the pipe wall.

2.1.3. Geothermal Power Plant(s) and Substation

The Tungsten Mountain energy plants would each be an approximately 20 mega watt (MW) net rated (24MW gross) geothermal energy plant. The proposed energy plants would each be located on approximately 15 acres within Section 22 T21N, R38E (see Figure 3). An approximately 0.50 acre substation, used to transform generated low voltage electrical energy to the higher voltage required for a gen-tie line, would be constructed within each energy plant boundary.

2.1.3.1. Construction Procedures and Surface Disturbance

Construction activities would be the same at either energy plant site. Preparation activities would begin with clearing, earthwork, drainage and other improvements necessary for commencement of construction. Clearing would include removal of organic material, stumps, brush and slash.

A portion of the energy plant sites and adjacent well pads would be devoted to equipment and materials laydown, storage, construction equipment parking, small fabrication areas, office trailers and parking. Equipment and materials laydown space is required for large turbine parts, structural steel, piping spools, electrical components, switchyard apparatus, and building parts. Mobile

trailers or similar suitable facilities (e.g., modular offices) would be brought to the sites to be used as construction offices for owner, contractor, and subcontractor personnel. Approximately 4-5 travel trailers would be on the site and would provide for 24 hour management and emergency response. Typically, the drilling or construction manager, geologist and mud engineer would reside in these travel trailers during the duration of construction or drilling activity. Parking would be provided for construction workers and visitors within each energy plant area.

Temporary utilities would be provided for the construction offices, the laydown area, and the energy plant sites. Temporary construction energy would be supplied by a temporary generator and, if available when the gen-tie line is completed, at the site by utility-furnished power. Area lighting would be provided for safety and security. Drinking water would be imported and distributed daily. Portable toilets would be provided throughout the site, office and travel trailers and would connect to temporary septic holding systems.

The substation footprint would measure up to 250 feet by 175 feet and would be surrounded by an 8 foot tall chain link fence with vehicle and personnel access gates. The surface of the substation would be covered by gravel and the substation equipment would be placed onto concrete foundations. The high voltage equipment would be connected by overhead busbars that are 2 to 4 inches in diameter. A steel dead-end structure within the substation would provide a termination point for the 230 kilovolt (kV) interconnection gen-tie line. The electrical generator would be connected to the substation via 13.8 kV line(s).

Consistent with safety requirements, energy plant buildings, structures, pipe, etc. would each be painted an appropriate color (likely covert green) to blend with the area and minimize visibility.

2.1.3.2. Operation and Maintenance

The most prominent features of each energy plant, both in height and mass, are the air-cooled condensers. They range between 28 and 35 feet in height and are about two thirds the length of the site. The balance of each plant is an array of pipes and a small building to house electrical equipment. The perimeter of the site is fenced with chain link to prevent unauthorized entry.

Ancillary facilities and energy plant components within each energy plant site include offices, restrooms, the electrical room and control room, maintenance building, condensing fan equipment, geothermal fluids containment basin, electrical substation and other smaller ancillary structures. All buildings housing the offices, electrical room, control room and auxiliary buildings would be a rigid, steel-frame, pre-engineered structure with steel panel walls and a steel roof.

A chain link fence would be installed around the main facility area in order to prevent unwarranted access to the facility by the public and the entering of wildlife into the facility/electrical generation area. The chain link fence would be equipped with controlled-entry gates to allow vehicle egress/ingress as necessary.

Each energy plant would include an electrical substation at which electrical power that is generated at 13.8 kV would pass through a transformer to increase the voltage to 230 kV. The substation would include a 13.8 kV circuit breaker to protect the electric generator, a minimum of 80 megavolt ampere 13.8 kV/120 kV transformer, 230 kV potential and current transformers for metering and system protection, and a circuit breaker to protect the substation. A main control building would contain instrumentation and telecommunications equipment.

2.1.4. Gen-Tie Line

Ormat is exploring two gen-tie line alternatives: Option 1, Western and Option 2, Eastern. Both alternatives originate at the proposed substation adjacent to the geothermal energy plants and share a "common" line which travels south, parallel to the County Road before forking into two parts, each spur terminating at the proposed Alpine switching station (see Figure 4). The Option 1 route is approximately 16.5 miles long, of which approximately 3,284 feet are on private lands and the remainder is on public lands managed by the BLM. The Option 2 route is approximately 17.0 miles long, of which approximately 1,950 feet are on private lands and the remainder is on public lands managed by the BLM. The proposed gen-tie line, regardless of the route selected, would require a 300-foot wide ROW (90-foot permanent width and an additional 210-foot temporary width required for construction).

2.1.4.1. Construction Procedures and Surface Disturbance

Regardless of the route selected, the gen-tie would consist of a single 230-kV circuit on direct-burial, self-supporting wooden or steel monopole structures, or would utilize "H frame" structures (standard transmission line construction seen in many parts of the country and gets its name from the H created by the poles and cross arms). Structure heights would be either approximately 55 to 70 feet if a wooden or steel monopole were utilized, or approximately 80 feet for H-frames. Each structure would require a temporary workspace of up to 300 feet by 300 feet and a 30-foot by 40-foot area for line construction equipment. Temporary surface disturbance is assumed to be approximately 2.1 acres per structure; however most of this area would be reclaimed following construction.

For the 16.5 mile Option 1 line, approximately 172 structures would be needed and total temporary surface disturbance would be 361 acres. Following interim reclamation, total permanent surface disturbance is assumed to be 2.1 acres. For the 17.0 mile Option 2 line, approximately 178 structures would be needed and total temporary surface disturbance would be 374 acres. Following interim reclamation, total permanent surface disturbance is assumed to be 2.2 acres.

The structures would be installed including tangent, angle and dead-end poles. Angle and dead-end structures would be assembled and insulators would be attached to the pole. The poles would be erected with a truck-mounted crane to lift and set the structure after it is assembled.

The 230-kV gen-tie would consist of a single conductor per phase using 397.5 MCM aluminum conductor steel-reinforced "Ibis" and optical ground wire. The overhead conductors would be non-specular to reduce sunlight reflection and minimize impacts on visual resources.

Each structure would carry a single overhead ground wire/fiber optic cable for lightning protection and fiber optic communications. The overhead ground wire measures approximately 0.75 inches in diameter and is constructed of concentric layers of galvanized steel wires surrounding a hollow core which contains 12 to 48 fiber optic strands (depending on final requirements). Metering and communications equipment would be required at each generator site.

In order to establish work areas where poles and conductors would be installed, vegetation clearing and grading within the ROW could be necessary. In order to stage equipment and conduct work, the structure work areas and stringing sites would require a relatively flat surface; therefore, the areas could be graded and gravel or soil could be imported to achieve the necessary elevation.

Construction laydown areas would be located in previously disturbed areas whenever possible (i.e., along access roads or on well pads). At each location, a work area would be cleared and leveled only if necessary. In most relatively level terrain, this would not be needed. Structure pieces would be delivered to the laydown area where workers would assemble the pole and attach insulators and hardware. The structure would be erected using a crane from the staging area.

Temporary material storage yards would be required for construction materials. These staging areas would be located at existing well pads or the power plant site and would serve as reporting locations for workers, parking spaces for vehicles, and storage spaces for equipment and materials. Structural materials such as structure steel, hardware, foundation material, spools of conductor, and shield wire, would be hauled by truck into the yard. A crane or forklift would be required to unload and transport the materials. Construction materials would be delivered by truck from the yard to lay down areas. From these areas, materials would be brought to structure sites as needed. Crews would load the material required for the workday thus limiting the weight hauled on the access roads. This would limit the impact and rutting on access roads caused by the use of heavy vehicles.

Materials, such as gen-tie poles, insulators, hardware, and guy wire anchors, would be delivered from the laydown area to each gen-tie structure site. Assembly crews would attach insulators, travelers, and hardware to form a complete structural unit. Erection crews would use a large, truck-mounted mobile crane to place the structures directly into the ground, depending on the soil conditions and results of geotechnical surveys. The poles directly embedded in the ground would be set in holes that are approximately 3 feet wide and 10 feet deep. These holes would be backfilled with native or imported materials. Guy wires to support the angle poles would be used to keep the structures vertical. As a safety precaution, guy wires would be made more visible if they cross over designated access roads. Signs, flagging, or other marking would be used to indicate the presence of guy wires.

Conductor and shield wire would be delivered on reels by flatbed truck to the various conductor pulling sites along the ROW. Other equipment required to install the conductor would include reel stringing trailers, tensioning machines, pullers, and several trucks including a bucket truck.

The conventional method of installing conductor and shield wire is to pull out a sock line or "pullrope" along the route of the line and manually lift the rope into stringing sheaves. The rope is brought to a puller at one end and a tensioner on the other end. The tensioner holds the wire reels and maintains enough tension to keep the wire off the ground and vegetation while the puller pulls the wire through the stringing sleeves. This method may require some overland travel between structures. When overland travel is required for this purpose, an all-terrain vehicle (ATV) or similar type vehicle with would be used.

Temporary guard structures would be installed to ensure that the conductors do not drop into the road or other locations that could result in a safety hazard. Splicing would occur between conductor spools. After the conductors are pulled in, conductor tension would be adjusted to properly sag the conductors. The conductors would then be clipped to the insulators and the stringing roller wheels removed.

Typically, conductor pulling sites for stringing the conductor would be spaced at 15,000 feet to 20,000 feet intervals. However, distances between each site would vary depending on the geography and topography and environmental sensitivity of the specific area, the length of the conductor pull, and the accessibility by equipment. Pulling sites would require a temporary working area. At each pulling site stringing equipment would be set up approximately 250 feet

from the initial structure for leveraging the conductor pull safely. Angle structure pulling sites would be contained within the 210-foot temporary ROW.

Sites for tensioning equipment and pulling equipment are typically areas approximately 300 feet by 300 feet in size. However, when construction occurs in the steep and rough terrain, these sites may require larger, less symmetrical pulling and tensioning sites.

2.1.4.2. Operation and Maintenance

Operations and maintenance personnel would maintain the proposed gen-tie system by monitoring, testing, and repairing equipment.

If conductor failure occurs, power would be automatically removed from the line. Lightning protection is provided by shield wires along the line.

Maintenance would include gen-tie line and pole repair and/or replacement. Ormat would inspect the gen-tie line from a light, off road vehicle and make repairs and/or facility replacement, as necessary. Ormat would not routinely travel within the ROW. Equipment damaged by vandals would be replaced immediately.

Emergency maintenance, such as repairing downed wires during storms and correcting unexpected outages, would be performed by Ormat or licensed maintenance contractors. Ormat would respond to emergency conditions along the proposed route within a few hours after an incident. The length of time needed to make the repairs would depend on the nature of the outage.

2.1.5. Site Access and Road Construction

Principal access to the Project Area is from a northeast trending County Road (Alpine Road) off of U.S. 50. The Project Area is traversed by numerous roads and “two tracks.” To the extent practicable, existing access would be used for Project construction and operation.

Up to approximately 3,230 feet of new access roads with a 20 foot wide road bed would be constructed using a dozer and/or road grader (see Figure 3). The total estimated area of surface disturbance required for new access road construction, assuming a 25 foot wide area of disturbance would be about 1.9 acres (3,230 ft. total length * 25 ft. width).

Constructed access roads crossing existing drainages may require installation of culverts. Culvert installation would follow BLM design criteria and would be constructed pursuant to standards established in the Gold Book (USDI and USDA 2007).

For the geothermal operations, up to 2.2 miles of existing access roads may need to be improved (i.e. widened, graded or bladed) to maintain a drivable roadbed and up to 0.40 miles of existing road for access to the new switching station would need to be improved (see Figure 3). The total estimated area of surface disturbance associated with road improvement activities would be about 1.5 acres (13,665 ft. total length * 5 ft. additional disturbance width).

2.1.6. Water Requirements and Source

Water required for construction activities would be obtained from geothermal fluid, an established private ranch source and trucked to each construction or drill site, or a shallow water well(s)

drilled from one or more of the proposed drill sites as approved by the BLM. As necessary, temporary construction water pipeline would be utilized and laid on the side of the existing roads and no additional surface disturbance is anticipated.

Approximately 50,000 gallons per day would be consumed during the first 2 months of construction of the energy plants and 5,000 gallons per day thereafter for 6 months. Up to approximately 325 gallons of water, to be used for septic purposes, would be consumed per day for the geothermal operations (0.37 acre feet per year). This water would be obtained from the sources identified above and would be trucked to the power plants and stored onsite. Drinking water would be purchased form a commercial bottled water source.

2.1.7. Aggregate Requirements and Source

As much as possible, native materials (derived from grading to balance cut and fill) would be used for site and road building materials. Approximately 160,000 cubic yards of surfacing material may be needed for construction of the Project.

Aggregate material would be obtained from one of two sources: a private pit located off of Alpine Road, approximately 5.5 miles north of U.S. 50, or from an approximately 5-acre area located within Section 22 of the Project Area. A Mineral Materials permit would be needed for any aggregate pit located on public land managed by the BLM.

2.1.8. Project Workforce and Schedule

Construction of the Project is expected to take approximately 8 months to complete, commencing only after all required permits and authorizations have been secured. Construction of the geothermal portion of the Project would likely require a maximum of up to 50 workers, with an average of 3-4 workers after grading and excavation. Construction of the gen-tie line would require up to 7 workers, though additional support personnel, including construction inspectors, surveyors, project managers and environmental inspectors may be required.

Once operating, the Project would have a total staff of approximately 20 employees, though approximately 1-2 employees may be onsite at a given time.

Except for those residing onsite during the construction and drilling activities (i.e. the drilling or construction manager, geologist and mud engineer), it is expected that most workers and employees would reside, dine, buy supplies, etc. from either Cold Springs, Middlegate and/or Fallon.

2.1.9. Project Decommissioning and Reclamation

Once drilling is complete, approximately half of the drill pad area can be reclaimed, but the remaining half must be kept clear for ongoing operations and the potential need to work on or re drill the well. During the operations phase of the project, the remaining 2.5 acre well pads would be fenced on all four sides to limit access, and in most cases the sump would remain on the pad to be used if a well needs to be flowed. The portions of the cleared well sites not needed for operational and safety purposes would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. Areas able to be reclaimed

would be ripped, tilled, or disked on contour, as necessary and reseeded with a BLM approved seed mixture. The stockpiled topsoils would also be spread on the area to aid in revegetation.

After the well drilling and testing operations are completed, the liquids from the reserve pits would either naturally evaporate or be removed as may be necessary (i.e. pumped into another well) to reclaim the reserve pits. The solid contents remaining in each of the reserve pits, typically consisting of non-hazardous, non-toxic drilling mud and rock cuttings, would be tested to confirm that they are not hazardous. Typical tests may include the Toxicity Characteristic Leaching Procedure (EPA Method 1311), tested for heavy metals; pH (EPA method 9045D); Total Petroleum Hydrocarbons/Diesel (EPA Method 8015B); and Oil and Grease (EPA Method 413.1). If the test results indicate that these solids are non-hazardous, the solids would then be mixed with the excavated rock and soil and buried by backfilling the reserve pit. Hazardous materials, if any, would be taken to a "permitted TSD facility" as identified on the NDEP, Bureau of Waste Management website.

At the end of Project operations the wells would be plugged and abandoned as required by Nevada Division of Minerals (NDOM) regulations. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement until the top of the cement is at ground level, which is designed to ensure that fluids would not move across these barriers into different aquifers. The well head (and any other equipment) would then be removed, the casing cut off well below ground surface and the hole backfilled to the surface.

Reclamation of the roads would include ripping, tilling or disking the roads, and recontouring the road back to the original contour. Any stockpiled top soil would be added that area reseeded, other techniques to improve reclamation success such as scarifying, replacing topsoil, pitting and mulching, may be used.

Pipeline reclamation would include removing all pipeline and supports, and breaking up the foundations and burying them. Final reclamation would also include compacting the fill over the buried foundations, regrading cut and fill slopes to restore the original contour, replacing topsoil and revegetating the areas with a BLM approved seed mixture.

The end goal of the final reclamation would be to return the site as close as possible to the conditions prior to geothermal development. All other above ground facilities would be completely removed from the site, and the concrete foundations would be broken and buried in place. All areas of surface disturbance associated with the geothermal development project would be recontoured and reseeded with a BLM approved seed mixture.

Ultimately, Ormat would prepare for NDOM approval for the plugging and abandoning of the wells, and then implement, a final site reclamation plan. The plan would address restoring the surface grades, surface drainage and revegetation of cleared areas largely as described above. Stormwater diversion would remain in place until successful revegetation is attained.

Should the geothermal plant be decommissioned and the interconnection is no longer needed, the gen-tie line, including support structures, would be removed and all disturbed areas would be reclaimed, recontoured, and seeded with a BLM approved seed mixture.

2.1.10. Summary of Disturbance

The table below (Table 2.2, "Summary of Surface Disturbance" (p. 22)) summarizes the temporary and permanent surface disturbance for the Project components as identified in the preceding sections:

Table 2.2. Summary of Surface Disturbance

Project Component	Temporary Disturbance (ac.)	Permanent Disturbance (ac.)
Geothermal Wells	92.4	55.0
Geothermal Pipelines	20.4	10.2
Geothermal Power Plants	30.0	30.0
Access Roads	3.4	3.4
Gen-Tie Line (Option 1, Western)	366.0	7.1
Gen-Tie Line (Option 2, Eastern)	381.0	7.2
Aggregate Source	5.0	0
Total (with Option 1)	**517.2**	**105.7**
Total (with Option 2)	**530.2**	**105.8**

2.1.11. Adopted Protection Measures (APM)

Ormat would comply with all geothermal lease and ROW grant stipulations. In addition, Ormat would implement the following additional adopted protection measures (APM):

- Water would be applied to the ground during the construction and utilization of the drill pads, access roads, and other disturbed areas 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, non-native species, all contractors would be required to power-wash their vehicles and equipment, including body and undercarriage, prior to entering BLM-administered lands.
- Prior to construction, Ormat would submit to BLM an invasive plant management plan to monitor and control noxious weeds. At a minimum, the plan would incorporate the following measures:
    - Existing weed infestations would be treated prior to disturbance. The location of the weeds would be communicated to the Stillwater Field Office weed coordinator, and treatment methods and herbicides used would be discussed prior to treatment. Infestations would be either avoided or treated prior to disturbance.
    - Herbicides would be applied per label instructions.
    - All personnel applying herbicides would either be certified by the BLM and/or the State of Nevada, or they would be supervised by a BLM or State of Nevada Certified Applicator.
    - Bureau or other personnel applying herbicides would use personal protective equipment while spraying or handling herbicides.

  - Herbicide application operations would be suspended when wind speed exceeds 6 miles per hour or when precipitation is imminent.
  - Some treatment areas could be signed, if needed, indicating the herbicide used and the date of treatment. Areas which that are isolated and/or receive very little use by human beings would not be signed.
  - During herbicide treatments, a pre-application sweep of the area would be completed (i.e., looking for nesting birds). Any areas that become infested with weeds during construction would be mapped and treated. If herbicide treatments are to occur during the migratory bird nesting period (March 1 to July 31 for raptors and April 1 to July 31 for all other avian species), a pre-disturbance migratory bird nest survey would occur. All nest surveys would be completed by a BLM-approved biologist.

- Any infestations of noxious weed species discovered during construction or operation would be treated prior to disturbance. The location of the weeds would be communicated to the Stillwater Field Office weed coordinator, and treatment methods and herbicides used would be discussed prior to treatment.
- 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.
- Any areas containing cultural resources of significance would be avoided, or the potential for impacts mitigated in a manner acceptable to the BLM. Ormat employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered shall be left in place and reported to the Ormat representative and/or their supervisor.
- A buffer of approximately 30 to 50 meters would be established around eligible and unevaluated cultural sites that lie close to project activities. When initial construction is close to the buffered areas, an archaeological monitor would be present to insure that eligible and unevaluated cultural sites are not disturbed.
- The proposed gen-tie line would also provide raptor protection in compliance with the standards described in the "Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006" (APLIC 2006) and "Reducing Avian Collisions with Power Lines" (APLIC 2012).
- Within areas mapped as GRSG OHMA, Ormat and the applicable energy company would install anti-perch and anti- nesting devices on the gen-tie line components.
- All power poles would utilize BLM-approved raptor deterrents.
- Construction noise would be minimized through the use of noise arresters and mufflers on equipment which may typically generate greater noise levels (such as on generators and the drill rig, as appropriate).
- Ormat would obtain and comply with an Underground Injection Control permit, as appropriate.

- During well drilling, the reserve pits would be fenced on three sides, per the Gold Book standard. Once drilling has been completed, the fourth side would be fenced. Additionally, Ormat would install a smaller-mesh barrier/wildlife deterrent fence. All fencing would remain in place until reserve pit reclamation begins.
- Speed limits of 20-25 mph would be maintained for all Project related travel through the Project Area (USDI and USDA 2007).
- A Fire Contingency Plan and Spill or Discharge Contingency Plan have been submitted, and would be complied with.

2.2. Alternatives Considered but not Analyzed in Detail

No other reasonable alternatives were identified. The renewable energy related Project components were sited to minimize surface disturbance and environmental impacts, and the gen-tie options are also the shortest and most direct route to the point of interconnection. Further, geothermal resources are naturally occurring phenomena and thus site specific, which dictates that utilization facilities be located proximal to the resource.

2.3. No Action Alternative

Under the No Action Alternative none of the plans and applications filed by Ormat for the Tungsten Mountain Geothermal Development Project would be approved by the BLM. The Proposed Action would not be implemented as proposed on federal lands, and none of the potential environmental effects of implementing the Proposed Action would occur. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

Chapter 3. Affected Environment and Environmental Consequences:

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This chapter identifies and describes the current condition and trend of elements or resources in the human environment which may be affected by the Proposed Action and the environmental consequences or effects of the action.

3.1. General Setting

The Project Area is located on the northwestern side of the Edwards Creek Valley, which hosts a large lake bed, or playa. The valley has a northeast-southwest orientation and is bordered by the Clan Alpine Mountains on the northwest, the Desatoya Mountains to the southeast, and the New Pass Mountains to the east (Geological Survey 1964). The Project Area is located in the foothills of the Clan Alpine Mountains, on the fan piedmont, below the old Tungsten Mountain mining district, and above the playa surface, at elevations ranging from approximately 5,200 feet to 5,700 feet above mean sea level. The Project Area is located approximately 36 miles west of the town of Austin, Nevada (see Figure 1).

Climate in the Project Area is semi-arid. Climate data from Middlegate (29 aerial miles west of the Project Area) indicates that the average annual precipitation is 5.6 inches, with average temperatures ranging from 16.2 degrees Fahrenheit (˚F) in January to 92.0 ˚F in July (WRCC 2015).

3.2. Supplemental Authorities

Appendix 1 of the BLM NEPA Handbook (H-1790-1) identifies Supplemental Authorities that are subject to requirements specified by statute or executive order and must be considered in all BLM environmental documents. BLM Nevada Instruction Memorandum (IM) NV-2009-030 (Supplemental Authorities to Consider in National Environmental Policy Act (NEPA) Documents) provides guidance to BLM Nevada District and Field Offices on how supplemental authorities outlined in Appendix 1 of H-1790-1 should be considered in NEPA documents. Attachment 1 to IM NV-2009-030 provides the Supplemental Authorities list as a screening tool for review and documentation of relevant authorities (laws, regulations, executive orders, directives, etc.) in NEPAdocuments. This list expands on Appendix 1 of H-1790-1 to include other legal authorities, with requirements specified by statute or executive order, which must be considered in all Nevada BLM EA documents.

The table below (Table 3.1, “Supplemental Authorities ” (p. 27)) lists the Supplemental Authorities, their status in relation to the Proposed Action, and rationale for whether the resource or use will be carried forward for detailed analysis. Supplemental Authorities determined to not be present or present, but not affected by the Proposed Action need not be carried forward or discussed further. Supplemental Authorities determined to be present and may be affected may be carried forward in the document if there are issues which necessitate a detailed analysis.

Table 3.1. Supplemental Authorities

Resource*	Present Yes/No	Affected Yes/No	Rationale
Air Quality	Yes	Yes	To be analyzed in the EA, see Section 3.4.1.
Areas of Critical Environmental Concern	No	No	Not present in the Project Area. No further evaluation is required.
Cultural Resources	Yes	Yes	To be analyzed in the EA, see Section 3.4.2.

Resource*	Present Yes/No	Affected Yes/No	Rationale
Environmental Justice	No	No	No low income or minority populations would be impacted by the proposed Project as none are located in the vicinity.
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	No	Adherence to Adopted Protection Measures and permit stipulations would result in no impacts to invasive, nonnative species.
Migratory Birds	Yes	Yes	To be analyzed in the EA, see Section 3.4.7.
Native American Religious Concerns	Yes	Yes	To be analyzed in the EA, see Section 3.4.3.
Threatened or Endangered Species (plants and animals))	No	No	Not present in the Project Area. No further evaluation is required.
Wastes, Hazardous or Solid	Yes	No	Adherence to APMs and permit stipulations would result in no impacts from hazardous or solid waste.
Water Quality (Surface/Ground)	Yes	Yes	To be analyzed in the EA, see Section 3.4.10.
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 Area (WSA)	Yes	Yes	To be analyzed in the EA, see Section 3.4.13.

**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.

3.3. Resources or Uses Other Than Supplemental Authorities

The following resources or uses, which are not Supplemental Authorities as defined by BLM Handbook H-1790-1, are outlined in Attachment 1 of IM NV-2009-030, and are evaluated by the SFO IDT in all NEPA documents. BLM resource specialists have evaluated the potential impact(s) of the Proposed Action and Alternatives on these resources and have documented their findings in the table below (Table 3.2, “Resources or Uses Other Than Supplemental Authorities ” (p. 28)). Resources or uses that may be affected by the Proposed Action are further described in this EA.

Table 3.2. Resources or Uses Other Than Supplemental Authorities

Resource or Issue**	Present Yes/No	Affected Yes/No	Rationale
Special Status Species (plants and animals)	Yes	Yes	To be analyzed in the EA, see Section 3.4.8.
Fire Management	No	No	Not present in the Project Area. No further evaluation is required.
Forest Resources	No	No	Not present in the Project Area. No further evaluation is required.
General Wildlife	Yes	Yes	To be analyzed in the EA, see Section 3.4.6.
Land Use Authorization	Yes	Yes	To be analyzed in the EA, see Section 3.4.14.

Resource or Issue**	Present Yes/No	Affected Yes/No	Rationale
Lands with Wilderness Characteristics	No	No	Not present in the Project Area. No further evaluation is required.
Livestock Grazing	Yes	Yes	To be analyzed in the EA, see Section 3.4.9.
Minerals	Yes	Yes	To be analyzed in the EA, see Section 3.4.11.
Paleontological	No	No	Paleontological resources would not be impacted by proposed Project operations as the Project Area is does not host supporting geologic structures for vertebrate paleontological resources.
Recreation	Yes	No	Recreation in the Project Area and adjacent lands is dispersed and therefore should not be impacted.
Socioeconomics	Yes	Yes	To be analyzed in the EA, see Section 3.4.15.
Soils	Yes	Yes	To be analyzed in the EA, see Section 3.4.5.
Travel Management	Yes	No	The proposed project would not impact or affect any existing routes within the project boundaries No further evaluation is required.
Vegetation	Yes	Yes	To be analyzed in the EA, see Section 3.4.4.
Visual Resources	Yes	Yes	To be analyzed in the EA, see Section 3.4.12.
Wild Horses and Burros	Yes	No	The northwestern portion of the Unit area is within the Clan Alpine Herd Management Area (HMA). This HMA encompasses approximately 315,000 acres, and is within the appropriate management level of 612-979 horses. There are no Project activities proposed within the Clan Alpine HMA therefore no impacts to wild horses and burros are anticipated.
Global Climate Change	Yes	No	There is public and scientific debate about human caused contributions to global climate change, no methodology currently exists to correlate greenhouse gas emissions (GHG) and to what extent these contributions would contribute to such climate change.
Greenhouse Gas Emissions	Yes	No	There would be negligible contribution of GHG-methane; no methodology currently exists to correlate GHG emissions from geothermal development to any specific resource impact within the Project Area.

***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.

3.4. Resources Present and Brought Forward For Analysis (All Resources)

The following resources are present in the area and may be affected by the Proposed Action:

- Air Quality;
- Cultural Resources
- Migratory Birds;
- Native American Religious Concerns;

- Water Quality (Surface/Ground);
- Wilderness/Wilderness Study Areas (WSA);
- Special Status Species (plants and animals);
- General Wildlife;
- Land Use Authorizations;
- Livestock Grazing;
- Minerals;
- Socioeconomics;
- Soils;
- Vegetation;
- Visual Resources; and
- Wild Horses and Burros

3.4.1. Air Quality

3.4.1.1. Affected Environment

The U.S. Environmental Protection Agency (EPA) has developed the National Ambient Air Quality Standards (NAAQS) for criteria pollutants, which include nitrogen dioxide, sulfur dioxide, carbon monoxide, ozone and particulate matter less than 10 microns (PM10). The NAAQS specify the concentration and duration for which pollutants may cause adverse health effects.

The Nevada Department of Conservation and Natural Resources, NDEP, Bureau of Air Pollution Control has been delegated responsibility by both the EPA and the State of Nevada to regulate air pollution and emissions of air pollutants in all areas of the State (other than Clark and Washoe counties).

Air quality in Churchill County has been designated as “attainment/unclassified” for all criteria pollutants, which means that the County either meets, or is generally assumed to meet, the applicable federal ambient air quality standards (U.S. EPA 2015).

The Project Area is not located in or adjacent to any mandatory Federal Class I air quality areas, U.S. Fish and Wildlife Service (USFWS) Class I air quality units, or American Indian Class I air quality lands.

3.4.1.2. Environmental Consequences

3.4.1.2.1. Proposed Action

The primary pollutant of concern during construction activities would be particulates in the form of fugitive dust, which would be generated from earth-moving and travel on unpaved roads during construction.

As the surface disturbance associated with the proposed Project would be greater than 5 acres, a NDEP-Bureau of Air Pollution Control Surface Area Disturbance (SAD) Permit would be required. This permit would document the areas of proposed disturbance and the best practical dust control methods to be used. Best practical dust control methods would include use of water trucks to spray water on disturbed areas on a regular basis; pre-watering of areas to be disturbed; graveling of roadways, storage areas and staging areas; posting and limiting vehicle speeds to 20-25 miles per hour, and use of wind fences to reduce wind speeds and the generation of fugitive dust. These activities, and compliance with the issued SAD permit, would minimize fugitive dust emissions during Project activities.

During Project operations, with a binary geothermal energy plant, some of the binary working fluid (pentane) would be released to the atmosphere from gaskets, rotating seals, and flanges during operations. Also during normal operations, a small quantity of air would enter the pentane loop in the air cooled condenser. This air leaked into the pentane loop would be discharged back to the atmosphere through a stack along with a small quantity of pentane. During major maintenance activities on the pentane side of the binary energy plant units, the liquid pentane would first be transferred to the pentane storage tank. However, not all of the pentane can be removed in this manner, and the residual pentane would escape to the atmosphere when the binary energy plant unit is opened for repair. All of these releases, estimated to average about 12 tons per year, are regulated through a permit issued by NDEP to ensure that these emissions do not result in ambient concentrations of ozone (which can be created from the reaction of ambient concentrations of hydrocarbons and Nitrogen Oxides) in excess of the applicable federal ambient air quality standards.

3.4.1.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.2. Cultural Resources

3.4.2.1. Affected Environment

Cultural resources include historic and prehistoric sites of interest and may include structures, archaeological sites, or religious sites of importance to Native American cultures. The U.S. National Park Service defines archaeological and historic resources as “the physical evidences

of past human activities, including evidences of the effects of that activity on the environment. Factors identifying age, location and context of a site may make it culturally significant when looked at in conjunction with its capacity to reveal information through the investigatory research designs, methods, and techniques used by archaeologists." Ethnographic resources are defined as any "site, structure, landscape, object or natural resource feature assigned traditional legendary, religious, subsistence, or other significance in the cultural system of a group traditionally associated with it" (U.S. National Park Service 1998).

The National Historic Preservation Act of 1966, (NHPA) as amended, and the Archaeological Resources Protection Act of 1979 (ARPA) are the primary laws regulating preservation of cultural resources. Section 106 of the NHPA requires federal agencies to take into account the effects of their actions on properties listed or eligible for listing on the National Register of Historic Places. Regulations codified in 36 CFR 800 define how eligible properties or sites are to be dealt with by federal agencies or other involved parties. These regulations apply to all federal undertakings and all cultural resources. The ARPA sets a broad policy that archaeological resources are important to the nation, as well as locally and regionally, and should be protected. The purpose of the ARPA is to secure the protection of archaeological resources and sites that are on public lands and Native American lands. The law applies to any agency that receives information that a federally assisted activity could cause irreparable harm to prehistoric, historic, or archaeological data and provides criminal penalties for prohibited activities.

Cardno ENTRIX conducted a literature review and Class III cultural resource inventory of approximately 1,192 acres of the Project Area in Churchill County, Nevada. This acreage includes the 994 acres originally proposed, an additional 179 acre addendum, as well as an additional 19 acres to re-route the Area of Potential Effect (APE) around two historic graves. Fieldwork for this project was conducted between April and July of 2014 and was carried out under the authority of Nevada State Antiquities Permit 471 (BLM permit number N-83340).

The current inventory resulted in the identification of 51 new sites (CrNV-03-9469 [26CH3841] through CrNV-03-9519 [26CH3891), updated three previously recorded sites (CrNV-31-3495 [26CH933], CrNV-03-8112 [26CH3288], and CrNV-03-7771 [26CH3684]), performed revisits on seven previously recorded sites (CrNV-31-3494 [26CH932], CrNV-31-3496 [26CH934], CrNV-03-8105 [26CH3281], CrNV-03-8111 [26CH3287], CrNV-03-8115 [26CH3291], CrNV-03-8427 [26CH3364], and CrNV-03-8429 [26CH3366] and identified 49 isolated finds.

The 51 newly recorded sites include 13 prehistoric sites, 35 historic sites, and three multi-component sites. All 13 of the newly recorded prehistoric sites are lithic scatters, some of which include formal and/or temporally diagnostic tools. The newly recorded historic sites include 19 refuse scatters, ten roads, two mining-related sites, two ditches, one historic fence, and one historic campsite. The three multi-component sites include prehistoric lithic scatters with historic refuse scatters. Two sites (OTM-024 and OTM-025) were identified on private land contained within the Clan Alpine Ranch area. These two remain unrecorded as the land owner provided a written letter denying access to his property along with a request not to record the resources. Site OTM-024 is the Historic Clan Alpine Ranch (architectural resource) and site OTM-025 is a refuse scatter.

Three of the newly recorded sites (CrNV-03-9478 [26CH3850], CrNV-03-9508 [26CH3880], and CrNV-03-9512 [26CH3885]) have been recommended eligible for inclusion in the National Register of Historic Places (NRHP). Site CrNV-03-9478 (26CH3850) is a discrete lithic scatter containing three temporally diagnostic projectile points and the possibility of subsurface deposits

and has been recommended eligible to the NRHP. Site CrNV-03-9508 (26CH3880) is a small historic refuse scatter with an historical grave that is likely associated with Clan Alpine. This site, due to the presence of the grave, has been recommended eligible to the NRHP. Site CrNV-03-9512 (26CH3885) is an early alignment of the historic Lincoln Highway and has also been recommended eligible to the NRHP.

The three previously recorded sites that were updated during the current inventory include sites CrNV-31-3495 (26CH933), CrNV-03-8112 (26CH3288), and CrNV-03-7771 (26CH3684). Site CrNV-31-3495 (26CH933) was previously recorded as a small lithic scatter containing only five flakes. The current update of this site identified an additional 14 pieces of lithic debitage. Site CrNV-03-8112 (26CH3288) was previously recorded as an historic mill complex with standing structures. Upon the current update of this site, the mill was found to have been deconstructed and an additional activity area associated with the mill was observed and recorded. Because this resource has been impacted to such an extent, it is no longer an architectural resource and is now an archaeological resource. Site CrNV-03-7771 (26CH3684) was first recorded as a two-track road identified on an 1879 General Land Office survey map of the area. The current update of this site extended the road further south than previously recorded. All three of the previously recorded sites were recommended not eligible for inclusion in the NRHP by the parties that first recorded them. While all of these sites were expanded upon, the additional information gained from the current updates does not warrant a change in the previously recommended eligibility justifications. Therefore; Cardno ENTRIX concurs with the previous NRHP recommendations of not eligible for all three of these sites. All seven of the revisited sites that did not require updating are recommended not eligible for inclusion in the NRHP.

Identified isolated finds include 36 historic artifacts, nine prehistoric artifacts, and four historic features. Prehistoric isolated artifacts include two undetermined projectile points and two biface fragments, one Rosegate Series projectile point, and four mid- to late-stage biface reduction flakes. Isolated historic artifacts consist primarily of cans, beverage bottles, and other road-toss, though a horseshoe and mining-related debris such as a machine guard, wire spool, and galvanized metal exhaust stack cap were also observed. The historic features include one prospect pit, two rock cairns, and an historical grave. All of these isolated finds, with the exception of the historical grave (ISO-OlO), are categorically not eligible for inclusion in the NRHP per the State Protocol Agreement between the BLM and Nevada State Historic Preservation Office (2012: Appendix E).

3.4.2.2. Environmental Consequences

3.4.2.2.1. Proposed Action

Proposed surface disturbances include geothermal power plants and substations, well pads, pipelines, access roads and a gen-tie line. Ormat would avoid any areas containing cultural resources of significance, including all historic properties that have been recommended as eligible for inclusion to the NRHP, or the potential for impacts mitigated in a manner acceptable to the BLM. Also, a buffer of approximately 30 to 50 meters would be established around eligible and unevaluated cultural sites that lie close to project activities. When initial construction is close to the buffered areas, an archaeological monitor would be present to insure that eligible and unevaluated cultural sites are not disturbed. Further, Ormat employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered shall be left in place and reported to the Ormat representative and/or their supervisor (see Section 2.1.11).

Following implementation of the above adopted environmental protection measures, if historic properties are avoided, this project should have no adverse effects to historic properties (36 CFR 800.4). If these historic properties cannot be avoided, the BLM would consult to develop and evaluate alternatives or modifications to Ormat's undertaking. All sites determined not eligible for inclusion in the NRHP do not require further treatment.

One Isolated Find (ISO-OlO) and three sites (CrNV-03-9478 [26CH3850}, CrNV-03-9508 [26CH3880], and CrNV-03-9512 [26CH3885]) were identified during the inventory and are recommended eligible for inclusion in the NRHP. Site OTM-010 is located within the northern block of the current project that would be utilized for wells and operational structures. Sites CrNV-03-9508 (26CH3880) and CrNV-03-951 3 (26CH3885) and Isolated Find ISO-OlO are all located along the proposed gen-tie route.

Consultation between the BLM and Cardno ENTRIX during the inventory resulted in re-routes of the proposed gen-tie line around site OTM-049 and Isolated Find ISO-OlO to avoid impacting these historic properties. These re-routes avoid the two historic properties (CrNV-03-9513 [26CH3885] and ISO- 010) by a distance of at least 30 meters. Additionally, due to changes in the project Plan of Utilization, the proposed project would no longer potentially impact the architectural resource and refuse scatter on private land.

3.4.2.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.3. Native American Religious Concerns

3.4.3.1. Affected Environment

Consultation with the FPST was initiated with a letter sent to Alvin Moyle, FPST Tribal Chairman, on February 15, 2011, and again with a letter sent to Chairman Len George on July 10, 2015, and included a description of the Proposed Action, a map of the Project location, and an invitation for comments or feedback regarding the Project.

Formal face-to-face consultation was initiated through an in-person meeting held between Terri Knutson, BLM SFO Field Manager, and the FPST Tribal Council on April 27, 2011 and again on March 17, 2015. Additional face-to-face consultation meetings took place between Terri Knutson, Jason Wright, and the FSPT Cultural Committee on March 20, 2015; April 10, 2015; June 26, 2015; September 18, 2015; and November 20, 2015.

Field trips to the project location were attended by Jason Wright, BLM archaeologist, and Ray Stands, FPST cultural coordinator on several occasions, including March 29, 2011; May 10, 2011; and July 12, 2011; and by Jason Wright, BLM Archaeologist, various BLM staff specialists, and Donna Cossette, FPST Cultural Committee Chair, on April 10, 2015.

3.4.3.2. Environmental Consequences

3.4.3.2.1. Proposed Action

Native American consultation with the FPST is ongoing, but no traditional cultural properties or sacred sites have been identified within the Project Area. Ongoing consultation could result in new information and additional mitigation measures. If previously unidentified and/or undiscovered gravesites, traditional cultural properties, artifacts, or similar occur, Ormat would adhere to all lease stipulations (see Appendix A) and adopted protection measures (see Section 2.1.11). These measures and stipulations include following procedures set forth in 43 CFR Part 10, Native American Graves Protection and Repatriation Regulations.

3.4.3.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.4. Vegetation

3.4.4.1. Affected Environment

The Natural Resources Conservation Service ecological sites and Southwest Regional Gap Analysis Project (SWReGAP) communities were downloaded for the survey area. Ecological Site Descriptions (ESD) describe the potential vegetation community and are based on soils, topography, and climate. ReGAP communities are based on ground-truthed remotely sensed data. The mapped ecological sites and ReGAP communities were verified and boundaries were corrected in the field. The refined vegetation community types described for the survey area were then correlated to ESDs.

A heterogeneous landscape is typical of the Great Basin, and is present throughout the survey area, with some areas having a mix of two different ESDs. The field verification indicated six ecological sites were present within the survey area, with two annual dominated states. One additional community was mapped that reflects agriculture and extensive surface disturbance. Community descriptions for the survey area are discussed below.

<u>Agriculture/Disturbance</u>

This mapping unit is not an ecological site, but rather describes areas that are disturbed by mining or agriculture. These areas are dominated by early successional species and are in various stages of succession depending on the degree of initial ground disturbance and when the disturbance occurred. Rubber rabbitbrush (*Ericameria nauseosa*) is usually the first shrub species to establish in these heavily disturbed areas. Understory species range from ruderal or early successional species to later successional species. Approximately 2.5% of the survey area (60.5 acres) is mapped as agriculture/disturbance.

Loamy Slope 8-10” P.Z. (R027XY007NV)

This community is dominated primarily by Wyoming big sagebrush in the shrub strata. At the lower elevations, other salt desert shrub species are also present within the overstory. Other shrub species found within this vegetation type include yellow rabbitbrush (*Chrysothamnus viscidiflorus*), rubber rabbitbrush, spiny hopsage (Grayia spinosa), Nevada jointfir (*Ephedra nevadensis*), mormon tea (*Ephedra viridis*), and winterfat (*Krascheninnikovia lanata*). A few scattered Utah juniper (*Juniperus osteosperma*) trees are also present within this type, but their cover is less than five percent. This community type is present from the lower to upper elevations within the survey area. The understory species present within this vegetation type include: Hood’s phlox (*Phlox hoodii*), Sandberg bluegrass (*Poa secunda*), squirreltail (*Elymus elymoides*), Indian ricegrass (*Achnatherum hymenoides*), western needlegrass (*Achnatherum occidentale*), basin wildrye (*Leymus cinereus*), hawksbeard (*Crepis* sp.), and milkvetch (*Astragalus* sp.). Where this community has burned, the vegetation community is dominated by saltlover (Halogeton glomeratus), cheatgrass (Bromus tectorum), Russian thistle (Salsola tragus), herb sophia (*Descurainia sophia*), and clasping pepperweed (*Lepidium perfoliatum*). Approximately 26.7% of the survey area (635.2 acres) is mapped as Loamy Slope 8-10” P.Z. (and Loamy Slope 8-10” P.Z. Burned, and Loamy Slope 8-10” P.Z./Loamy 4-8” P.Z.)

Droughty Loam 8-10” P.Z. (R027XY008NV)

This community is similar in composition to the Loamy Slope 8-10” P.Z. described above, except that spiny hopsage is a bigger constituent in the shrub overstory. Approximately 6.3% of the survey area (150.3 acres) is mapped as Draughty Loam 8-10” P.Z.

Loamy 4-8” P.Z. (R027XY013NV)

Within the Project Area, this community is dominated by shadscale saltbush (*Atriplex confertifolia*) and bud sagebrush (*Picrothamnus desertorum*). Other shrub species present include spiny hopsage and Bailey’s greasewood (*Sarcobatus baileyi*). This community occurs on ridges and rises throughout the Project area, from the higher elevations on the western side to the alkali soils at the eastern edge. This ecological site typically occurs on rocky shallow soils. In areas that were not burned, the understory supports a number of forb and grass species such as: buckwheat (*Eriogonum* sp.), Sandberg bluegrass, James’ galleta (*Pleuraphis jamseii*), gooseberryleaf globemallow (*Sphaeralcea grossulariifolia*), cushion cryptantha (*Cryptantha circumcissa*), and Hood’s phlox. Understory species within this ecological site vary with the level of disturbance. Some areas are burned, and although bud sagebrush and shadscale saltbush are present, the understory is mostly composed of ruderal species such as saltlover, cheatgrass, and clasping pepperweed. Approximately 44.4 % of the survey area (1,054.4 acres) is mapped as Loamy 4-8” P.Z, or Loamy 4-8” P.Z Burned.

Sodic Flat (R027XY025NV)

This community occurs at moderate to lower elevations, bordering the edge of the large playa to the east of the survey area. This community is located on alkali clay soils associated with the prehistoric Lake Lahontan lakebed. Species observed in this community type during field surveys include an overstory dominated by greasewood (*Sarcobatus vermiculatus*) and Torrey’s saltbush (*Atriplex torreyi*). Common understory species include silverscale saltbush (*Atriplex argentea*), Mojave seablite (*Suaeda moquinii*), green molly (*Bassia americana*), saltlover, James’ galleta, squirreltail, cheatgrass, and Indian ricegrass. Other shrub species found within this type include other salt desert shrub species and horsebrush (*Tetradymia* sp.). Grizzlybear pricklypear (*Opuntia*

polyacantha var. *erinacea*) was also observed in this community. Approximately 7.5% of the survey area (179 acres) is mapped as Sodic Flat and Sodic Flat/Loamy Slope 8-10" P.Z.

Gravelly Fan 8-10" P.Z. (R027XY029NV)

Within the survey area, this community is limited to the margins of a deep drainage at the far southern edge. Basin big sagebrush is the dominant shrub, with rabbitbrush species representing less than 15 percent of the shrub cover. Understory species include Sandberg bluegrass, Indian ricegrass, and basin wildrye. Approximately 0.7% of the survey area (17.5 acres) is mapped as Gravelly Fan 8-10" P.Z.

Coarse Gravelly Loam 4-8" P.Z. (R027XY050NV)

This community is dominated by Bailey's greasewood, although other salt desert shrub species, such as spiny hopsage and Nevada jointfir, are common throughout. Within the survey area, saltlover is a prevalent understory species in this community. Approximately 11.6% of the survey area (275.7 acres) is mapped as Coarse Gravelly Loam 4-8" P.Z.

PIMO-JUOS WSG: 0R0502 (F027XY081NV)

This community has singleleaf pinyon (*Pinus monophylla*) and Utah Juniper in the overstory, having at least 10 percent cover. The understory is dominated by Wyoming big sagebrush with various forbs and grasses. This vegetation type occurs on the far western side of the survey area, at the highest elevations, along the lower slopes of the Clan Alpine mountains. Approximately 0.1% of the survey area (1.3 acres) is mapped as PIMO-JUOS WSG: 0R0502.

3.4.4.2. Environmental Consequences

3.4.4.2.1. Proposed Action

Surface disturbance associated with the Project activities would result in the loss of vegetation. Temporary surface disturbance associated with the Proposed Action would be approximately 517 acres (if Option 1 is selected) or 530 acres (if Option 2 is selected). Nearly all of the surface disturbance, regardless of the Option selected, would occur in the Loamy 4-8" P.Z. vegetation community, and to a much lesser extent, the Loamy 8-10" P.Z. community. These vegetation communities are widespread throughout the Project Area and vicinity.

As part of the Project and Ormat's adopted protection measures (see Section 2.1.11), following Project construction most of this surface disturbance would undergo interim reclamation in accordance with the Project reclamation plan (see Section 2.1.9). Approximately 105.7 acres (if Option 1 is selected) or 105.8 acres (if Option 2 is selected) of proposed disturbance within the Project Area is permanent (see Table 3.3, "Soil Map Unit Information" (p. 41)) and would remain disturbed during the life of the Project, undergoing final reclamation once the Project has been decommissioned.

Disturbed areas could have an increase in invasive, non-native species. To prevent the spread of invasive, non-native species, prior to construction, Ormat would submit to BLM an invasive plant management plan to monitor and control noxious weeds. Any infestations of noxious weed species discovered during construction or operation would be treated prior to disturbance. The location of the weeds would be communicated to the Stillwater Field Office weed coordinator, and treatment methods and herbicides used would be discussed prior to treatment. Additionally,

Ormat has committed to require all contractors to power-wash their vehicles and equipment, including body and undercarriage, prior to entering BLM-administered lands.

The following mitigation measure is recommended to seed disturbed areas and minimize the spread of invasive, nonnative species.

Mitigation Measures:

Seeding of disturbed areas associated would be completed using the following BLM approved native seed mixture and would be comprised of the following species: fourwing saltbush (Atriplex canescens), squirreltail (Elymus elymoides), siberian wheatgrass (Agropyron fragile), desert needlegrass (Achnatherum speciosum) and small burnet (Sanguisorba minor). Nonnative seeds deemed appropriate by the BLM (based on site specific conditions and concerns) would also be considered.

Monitoring for revegetation and meeting the prescribed successful revegetation goals would ensure successful reclamation of all surface disturbances.

3.4.4.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.5. Soils

3.4.5.1. Affected Environment

Soil types in the Project Area were identified using the "Churchill County Area, Parts of Churchill and Lyon Counties" soil survey prepared by the U.S. Department of Agriculture Natural Resource Conservation Service (NRCS). Within the Project Area, there are 13 mapped soil associations: *Budihol-Minneha-Rock outcrop* (102), *Old Camp-Singatse-Rock outcrop* (302), *Settlement-Chuckles-Rustigate* (331), *Ricert-Trocken-Pineval* (353), *Chuckles-Playas complex* (400), *Trocken-Hessing-Pineval* (422), *Kram-Attella-Rock outcrop* (430), *Yody-Buffaran-Pineval* (480), *Yody-Ricert-Pineval* (481), *Rebel-Pineval-Yody* (590), *Rebel loam, 0 to 2 percent slopes* (591), *Mazuma-Bluewing* (643), and *Playas* (900) (see Figure 5). The Project Area does not contain mapped hydric soils.

<u>MAP UNIT 102 – *Budihol-Minneha-Rock Outcrop Association*.</u>

This map unit is comprised of 40% Budihol stony sandy loam, 30-50% slopes; 35% Minneha very stony loam, 30-50% slopes; 15% Rock Outcrop; and the remainder is minor components. This association is found on mountains and hillsides between 5,000 and 7,000 feet elevation. The mean annual precipitation (MAP) is 8 to 13 inches; mean annual air temperature (MAAT) is about 47 to 50 degrees F. Budihol soils consist of very shallow and shallow, well drained soils formed in residuum and colluvium derived from granitic rocks. Minneha soils consist of shallow,

somewhat excessively drained soils that formed in residuum derived from granitic rocks (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 302 – *Old Camp-Singatse-Rock Outcrop Association*

This map unit is comprised of 50% Old Camp very stony loam, 30-50% slopes; 20% Singatse very gravely loam, 30-50% slopes; 15% Rock outcrop; and the remainder is minor components. This association is found on mountains between 5,000 and 7,000 feet elevation. The MAP is 5 to 10 inches; MAAT is 48 to 52 degrees F. Old Camp soils consist of shallow, well drained soils that formed in residuum and colluvium derived from volcanic rocks. Singatse soils consist of very shallow, somewhat excessively drained soils that formed in residuum and colluvium derived from volcanic rocks (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 331 – *Settlement-Chuckles-Rustigate Association*

This map unit is comprised of 40% Settlement silty clay loam, 0-2% slopes; 25% Chuckles loam, 0-2% slopes; 20% Rustigate silt loam, 0-2% slopes; and the remainder is minor components. This association is found on lake terraces between 5,000 and 5,200 feet elevation. The MAP is 4 to 7 inches; MAAT is 51 to 53 degrees F. Settlement soils consist of very deep, poorly drained soils that formed in alluvium derived from mixed rocks. Chuckles soils consist of very deep, moderately well drained soils that formed in alluvium derived from mixed rocks over lacustrine sediments. Rustigate soils consist of very deep, somewhat poorly drained soils that formed in alluvium derived from mixed rocks. A small portion of the gen-tie line would occur within this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 353 – *Ricert-Trocken-Pineval Association*

This map unit is comprised of 45% Ricert gravely loam, 4-8% slopes; 30% Trocken gravelly, sandy loam, 4-8%; 10% Pineval gravelly loam, 4-8% slopes; and the remainder are minor components. This association is found on fan remnants and fan aprons between 5,200 and 6,000 feet elevation. The MAP is 5 to 9 inches; MAAT is 48 to 51 degrees F. Ricert soils consist of very deep, well drained soils that formed in alluvium derived from mixed rocks, loess, and volcanic ash. Trocken soils consist of very deep, well drained soils that formed from mixed rocks. Pineval soils consist of very deep, well drained soils that formed in alluvium derived from volcanic or mixed rocks. A majority of the gen-tie line would travel through this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 400 – *Chuckles-Playas Complex*

This map unit is comprised of 65% Chuckles loam, 0-2% slopes; 20% Playas silty clay loam, 0-1% slopes; and the remainder are minor components. This association is found on lake terraces and playas between 5,100 to 5,200 feet elevation. The MAP is 5 to 7 inches; the MAAT is 48 to 50 degrees F. Chuckles soils are discussed in detail above (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 422 —*Trocken-Hessing-Pineval Association*

This map unit is comprised of 50% Trocken gravelly very fine sandy loam, 2-4%; 20% Hessing silt loam 2-4%; 15% Pineval gravelly loam, 4-8% slopes; and the remainder are minor components. This association is found on fan skirts between 5,100 and 5,400 feet in elevation. The MAP is 6 to 10 inches; the MAAT is 48 to 51 degrees F. Trocken and Pineval soils are described above. Hessing soils consist of very deep, well drained soils that formed in alluvium derived from

mixed rocks, loess and volcanic ash. The entirety of the geothermal operations (energy plants, substation, well field, pipelines and access roads), and a small portion of the gen-tie line, would occur in this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 430 — *Kram-Attella-Rock Outcrop Association*

This map unit is comprised of 45% Kram very gravelly very fine sandy loam, 15-50% slopes; 25% Attella very gravelly loam, 30-50% slopes; 20% Rock outcrop association; and the remainder are minor components. This association is found on mountains between 7,000 to 8,200 feet in elevation. The MAP is 10 to 12 inches; MAAT is about 43 to 48 degrees F. Kram soils consist of very shallow and shallow, somewhat excessively drained soils that formed in residuum derived from limestone and dolomite. Attella soils consist of very shallow, well drained soils that formed in residuum and colluvium derived from dolostone and calcareous shale with additions of loess and volcanic ash (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 480 – *Yody-Buffaran-Pineval Association*

This map unit is comprised of 50% Yody gravelly sandy loam, 4-8% slopes; 20% Buffaran gravelly loam, 4-8% slopes; 15% Pineval gravelly loam, 4-8% slopes; 8% Rebel loam, 4-8% slopes; and the remainder are minor components. This association is found on fan remnants between 5,000 to 6,500 feet in elevation. The MAP is 7 to 10 inches; MAAT is about 47 to 51 degrees F. Yody soils consist of moderately deep to a duripan, well drained soils that formed in alluvium derived from volcanic rocks. Buffaran soils consist of shallow to a duripan, well drained soils that formed in alluvium derived from mixed rocks. Pineval soils are described above. A small portion of the gen-tie line would occur within this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 481 – *Yody-Ricert-Pineval Association*

This map unit is comprised of 50% Yody gravelly sandy loam, 4-8% slopes; 20% Ricert gravelly sandy loam, 4-8% slopes; 15% Pineval gravelly loam, 4-8% slopes; and the remainder are minor components. This association is found on fan remnants between 5,300 and 5,800 feet elevation. The MAP is 7-10 inches; MAAT is about 48 to 50 degrees F. Yody, Ricert and Pineval soils are described above. A small portion of the gen-tie line would occur within this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 590 – *Rebel-Pineval-Yody Association*

This map unit is comprised of 50% Rebel loam, 4-8% slopes; 20% Pineval gravelly loam, 4-8% slopes; 15%

Yody gravelly sandy loam, 4-8% slopes; and the remainder are minor components. This association is found on inset fans between 5,500 and 6,500 feet elevation. The MAP is 7-10 inches; MAAT is about 48 to 51 degrees F. The Rebel soils consist of very deep, well drained soils that formed in alluvium derived from mixed rocks. Pineval and Yody soils are described above. Portions of the western spur of the gen-tie line (were the western option selected) would occur within this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 591 — *Rebel Loam, 0 to 2 Percent Slopes Association*

This map unit is comprised of 90% Rebel loam, 0-2% slopes; and the remainder are minor components. This association is found on inset fans between 5,500 and 6,500 feet elevation. The

MAP is 7 to 9 inches; MAAT is 49 to 51 degrees F. Rebel soils are described above. Portions of the eastern spur of the gen-tie line (were the eastern option selected) would occur within this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 643 — *Mazuma-Bluewing Association*

This map unit is comprised of 45% Mazuma fine sandy loam, 0-2% slopes; 40% Bluewing very gravelly sandy loam, 2-8% slopes; and the remainder are minor components. This association is found on barrier beaches between 3,800 and 4,500 feet elevation. The MAP is 5 to 7 inches; MAAT is 50 to 52 degrees F. Mazuma soils consist of very deep, well drained soils that formed in alluvium and lacustrine deposits derived from mixed rocks. Bluewing soils consist of very deep, excessively drained soils that formed in alluvium derived from mixed rocks. Portions of the proposed gen-tie line would occur in this soil association (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

MAP UNIT 900 — *Playas Association*

This map unit is comprised of 95% Playa silty clay, 0-1% slopes; and the remainder are minor components. This association is found on playas between 3,850 and 4,250 feet in elevation (see also Table 3.3, "Soil Map Unit Information" (p. 41)).

Table 3.3. Soil Map Unit Information

Soil Assn.	Amt. in Project Area	% of Project Area	Wind Erosion Hazard	Water Erosion Hazard	Fugitive Dust Resistance	Soil Compaction Resistance	Soil Restoration Potential
Budihol-Minneha-Rock Outcrop (102)	~210 ac.	~3.5%	moderately low	severe	moderate	moderate	low
Old Camp-Singatse-Rock Outcrop (302)	~5 ac.	<1%	low	severe	moderate	low	moderate
Settlement-Chuckles-Rustigate (331)*	~475 ac.	~7.9%	moderately high	slight	moderate	low	low
Ricert-Trocken-Pineval (353)*	~180 ac.	~3%	moderately low	slight	moderate	low	low
Chuckles-Playa Complex (400)	~135 ac.	~2.2%	moderately low	slight	low	low	low
Trocken-Hessing-Pineval (422)*	~1,825 ac.	~30.4%	moderately low	slight	moderate	moderate	low
Kram-Attella-Rock Outcrop (430)	~125 ac.	~2.1%	moderately low	moderate	low	low	moderate
Yody-Buffaran-Pineval (480)*	~90 ac.	~1.5%	moderately low	slight	moderate	low	moderate
Yody-Ricert-Pineval (481)*	~35 ac.	<1%	moderately low	slight	moderate	low	moderate
Rebel-Pineval-Yody (590)*	~7 ac.	<1%	moderately low	slight	low	moderate	low
Rebel Loam, 0-2 Percent Slopes (591)*	~25 ac.	<1%	moderately low	slight	low	moderate	low
Mazuma-Bluewing (643)*	~1,530 ac.	~25.4%	moderately high	slight	moderate	low	low

Soil Assn.	Amt. in Project Area	% of Project Area	Wind Erosion Hazard	Water Erosion Hazard	Fugitive Dust Resistance	Soil Compaction Resistance	Soil Restoration Potential
Playas (900)	~1,370 ac.	~22.8%	moderately high	not rated	moderate	low	not rated
* Designates soil associations on which there are surface disturbing activities proposed.							

(Source: NRCS 2015a and 2015b)

Soil Erosion

The soils within the Project Area have been rated by the NRCS for soil erosion susceptibility by wind (see Table 3.3, “Soil Map Unit Information” (p. 41)). A wind erodibility group consists of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible.

The soils within the Project Area have also been rated by the NRCS for soil erosion susceptibility by water (see Table 3.3, “Soil Map Unit Information” (p. 41)). The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Fugitive Dust Potential

The soils within the Project Area have been rated by the NRCS for their ability to resist the formation of fugitive dust emissions (see Table 3.3, “Soil Map Unit Information” (p. 41)). This interpretation rates the vulnerability of a soil for eroded soil particles to go into suspension during a windstorm. “Low resistance” indicates the soil has features very favorable for the formation of dust; “moderate resistance” indicates the soil has features favorable for the formation of dust; and “high resistance” indicates the soil has features unfavorable for dust formation.

Soil Compaction Resistance

The soils within the Project Area have been rated by the NRCS for resistance to soil compaction (see Table 3.3, “Soil Map Unit Information” (p. 41)). Compaction tends to reduce water infiltration which affects plant production and composition, increases runoff which generally increased erosion rates, and affects organisms living within the soil. Compaction is predominantly influenced by moisture content; depth to saturation; percent of sand, silt, and clay; soil structure; organic matter content; and content of coarse fragments. “High resistance" indicates that the soil has features that are very favorable to resisting compaction. "Moderate resistance" indicates that the soil has features that are favorable to resisting compaction. "Low resistance" indicates that the soil has one or more features that favor the formation of a compacted layer.

Soil Restoration Potential

The soils within the Project Area have been rated by the NRCS for the soil restoration potential (see Table 3.3, “Soil Map Unit Information” (p. 41)). This interpretation rates each soil for its inherent ability to recover from degradation, which is often referred to as soil resilience. The ability to recover from degradation means the ability to restore functional and structural integrity

after a disturbance. Rating class terms indicate the extent to which the soils are made suitable by all of the soil features that affect the soil's ability to recover. "High potential" indicates that the soil has features that are very favorable for recovery, and good performance can be expected. "Moderate potential" indicates that the soil has features that are generally favorable for recovery, and fair performance can be expected. "Low potential" indicates that the soil has one or more features that are unfavorable for recovery, and poor performance can be expected.

3.4.5.2. Environmental Consequences

3.4.5.2.1. Proposed Action

Nine of the fourteen soil associations within the Project Area have surface disturbing activities proposed on it: associations 331, 353, 422, 480, 481, 580, 590, 591 and 643 (see Table 3.3, “Soil Map Unit Information” (p. 41)above). All of the disturbance within the Unit Area and portions of the gen-tie line would occur within association 422; the majority of the gen-tie poles would be constructed within the remaining associations (primarily association 353).

Soil ratings within the Project Area suggest the susceptibility to sheet and rill erosion by water is slight, however the susceptibility of these soils to wind erosion is moderate and moderately favorable to dust formation. The soils with surface disturbance within the Project Area have soil features moderately favorable to resisting compaction; however these soils also rate low for their potential for soil recovery due to the low amounts of available precipitation received annually.

Implementation of the Project would result in the temporary disturbance of 517 acres of soils in the Project Area if Option 1 is selected, and 530 acres of temporary disturbance if Option 2 is selected. Permanent surface disturbance would be 105.7 acres if Option 1 is selected, and 105.8 acres if Option 2 is selected. Construction of the Project would require the removal of vegetation and topsoil material for clearance purposes, which would increase the potential for water and wind erosion through exposure to denuded surfaces. Additionally, soil would be compacted during construction activities due to heavy vehicle travel and heavy equipment use, which would serve to increase surface runoff and erosion potential.

Based on implementation of adopted environmental protection measures specified by Ormat, water and/or aggregate would be applied on disturbed areas to control dust and stabilize erosive soils, which would reduce the impacts of the Proposed Action on soils in the Project Area. Disturbed areas that would 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 revegtetation.

The Project would be required to produce a Stormwater Pollution Prevention Plan. As required by NDEP, Ormat would design, install, and maintain erosion and sediment controls that minimize the discharge of pollutants from earth-disturbing activities. Ormat would minimize the amount of soil exposed during construction activities and control stormwater volume and velocity to minimize soil erosion. Specifically, buffers would be maintained; perimeter controls installed; sediment track-out would be minimized; disturbance on steep slopes would be minimized; and soil compaction would be minimized and topsoil preserved. To minimize erosion from storm water runoff, access roads would be maintained consistent with best management practices, as outlined in the Gold Book. Storm water would be intercepted and channeled to dissipate energy as necessary to minimize erosion around the power plant (USDI and USDA 2007).

3.4.5.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.6. General Wildlife

3.4.6.1. Affected Environment

Habitat types within the Project area are described using SWReGAP land cover data. Within the survey area, 14 ecological systems were identified (see Table 3.4, "Ecological Systems and Key Habitat Types" (p. 44)below).

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. Within the survey area, there are 7 key habitats (see Table 3.4, "Ecological Systems and Key Habitat Types" (p. 44) below).

Table 3.4. Ecological Systems and Key Habitat Types

Key Habitat	Ecological System
Intermountain (cold desert) scrub	Intermountain Basins Greasewood Flat
	Intermountain Basins Mixed Salt Desert Scrub
	Intermountain Basins Semi-desert Shrub Steppe
	Intermountain Basins Wash
Lower montane woodlands	Great Basin Pinon-Juniper Woodland
Desert playas & ephemeral pools	Intermountain Basins Playa
Sagebrush	Great Basin Xeric Mixed Sagebrush Shrubland
	Intermountain Basins Big Sagebrush Shrubland
	Intermountain Basins Montane Sagebrush Steppe
Cliffs and canyon	Intermountain Basins Cliff and Canyon
Barren landscapes	Barren Lands, non-specific
	Recently Burned
Invasive grasslands and forblands	Invasive Annual and Biennial Forbland
	Invasive Annual Grassland

Stantec Consulting Services Inc. observed 20 avian species, 19 mammalian species, and three reptilian species during biological baseline surveys conducted in the summer and fall of 2014 and spring of 2015 (the species are listed in Table 3.5, "Wildlife Species Observed Within the Project Area" (p. 45) below) (Stantec 2014, Stantec 2015). Of these species, several (mostly bats) are BLM Statewide and Carson City District Special Status Species. These species would be discussed in the Special Status Species section of this EA.

Table 3.5. Wildlife Species Observed Within the Project Area

Scientific Name	Common Name	Scientific Name	Common Name
Birds			
Alectoris chukar	Chukar	Eremophila alpestris	Horned lark
Amphispiza belli	Sagebrush sparrow	Falco mexicanus	Prairie falcon
Amphispiza bilineata	Black-throated sparrow	Falco sparverius	American kestrel
Aquila chrysaetos	**Golden eagle**	**Gymnorhinus cyanocephalus**	**Pinyon Jay**
Buteo jamaicensis	Red-tailed hawk	Hirundo rustica	Barn swallow
Cathartes aura	Turkey vulture	Salpinctes obsoletus	Rock wren
Charadrius vociferous	Killdeer	**Spizella breweri**	**Brewer's sparrow**
Chordeiles acutipennis	Lesser nighthawk	Sturnella neglecta	Western meadowlark
Corvus corax	Common raven	Zenaida macroura	Mourning dove
Dendroica petechial	American yellow warbler	**Athene cunicularia**	**Burrowing Owl**
Mammals			
Antilocapra Americana	Pronghorn antelope	**Myotis ciliolabrum**	**Western small-footed bat**
Antrozous pallidus	**Pallid bat**	**Myotis evotis**	**Long-eared myotis**
Canis latrans	Coyote	**Myotis lucifugus**	**Little brown bat**
Corynorhinus townsendii	**Townsend's big-eared bat**	**Myotis thysanodes**	**Fringed myotis**
Dipodomys ordii	Ord's kangaroo rat	**Myotis volans**	**Long-legged myotis**
Eptesicus fuscus	**Big brown bat**	**Myotis yumanensis**	**Yuma myotis**
Lasionycteris noctivagans	**Silver-haired bat**	**Parastrellus hesperus**	**Western pipistrelle**
Lasiurus cinereus	**Hoary bat**	Sylvilagus nuttallii	Mountain cottontail
Lepus californicus	Black-tailed jackrabbit	**Tadarida brasiliensis**	**Mexican free-tailed bat**
Myotis californicus	**California myotis**		
Reptile			
Crotalus sp.	Rattlesnake	Gambelia wislizenii	Long-nosed leopard lizard
Pituophis catenifer sayi	Bullsnake		
Note: BLM Statewide and Carson City District Special Status Species are denoted in **bold** print. These species will be discussed in the Special Status Species section of this EA.			

Various species of raptors, which use diverse habitat types, may reside in the vicinity of the Project Area. American kestrel, bald eagle, barn owl, burrowing owl, Cooper's hawk, ferruginous hawk, great horned owl, long-eared owl, merlin, northern goshawk, northern harrier, northern sawwhet owl, osprey, peregrine falcon, rough-legged hawk, sharp-shinned hawk, short-eared owl, Swainson's hawk and western screech owl have distribution ranges that include the Project Area and four-mile buffer area (NDOW 2015). See also Section 3.4.8 (Special Status Species) and Section 3.4.7 (Migratory Birds).

Occupied bighorn sheep and mule deer distributions exist within portions of the Unit area, and within a 4-mile buffer area from both gen-tie lines. Pronghorn antelope distributions exist within the Unit area and both gen-tie lines. No known occupied elk distribution exist in the Project Area or vicinity (NDOW 2015).

3.4.6.2. Environmental Consequences

3.4.6.2.1. Proposed Action

The Project includes the temporary disturbance of 517 acres if Option 1 is selected and 530 acres if Option 2 is selected. Surface disturbance required for construction of the well pads, power plant sites, pipelines, gen-tie line, substations, and access roads would result in the loss of wildlife

habitat and direct displacement of wildlife. Further, wildlife utilizing the location would likely be displaced and forced to utilize the neighboring habitat, which would put additional pressure on the resources within the neighboring habitat. These impacts are expected to affect individuals (causing conflict or death) but should not impact local or regional wildlife populations on the whole.

Increased vehicular traffic, especially during construction, is expected. Vehicles could crush or collide with a variety of wildlife, especially less mobile species, such as rodents, small mammals, and lizards, resulting in increased wildlife mortality and injury. These impacts are expected to affect individuals and would not impact species at a local or regional population level. These impacts would be further minimized by the 20-25 mph Project Area speed limit agreed to by Ormat (see Section 2.1.11).

It is also expected that Project generated noise and human activity would deter some wildlife from using the area surrounding the Project. This noise and human activity would result in the disruption of normal behavioral patterns of some wildlife. This effect is expected to be greatest during construction when surface disturbance and when drilling is peaking in activity. This heightened effect is expected to be temporary, primarily lasting for the duration of construction or drilling. Wildlife may also avoid or tolerate habitat affected by the longer-term noise generated by the energy plants and wellheads. These effects may displace individuals or reduce breeding success of species sensitive to noise and human activity. These impacts are expected to affect individuals and would not impact local or regional wildlife populations.

Surface disturbing activities associated with the Project could result in an increase of invasive plant species and a subsequent decrease in native plant species and quality of habitat, especially as invasive species are present in the Project Area currently. In areas where vegetation would be completely cleared (i.e. well pads, access roads and power plant sites), native species may not re-establish, even with reclamation of the sites. Also, increased vehicular use of the area may contribute to the spread of invasive species if they are not properly washed. Ormat has adopted environmental protection measures to help minimize the spread of invasive species, including power washing vehicles and equipment prior to entering BLM-administered lands. Also, prior to construction, Ormat would submit to BLM an invasive plant management plant to monitor and control noxious weeds (see Section 2.1.11)

Permanent structures associated with the Project (power plants, wells, pipelines, gen-tie line and access roads) could impact wildlife utilizing the habitat around the Project features. Specifically, avian and bat species could be injured or killed as a result of electrocution and collisions Also, structures such as fencing and the gen-tie line would provide additional perching opportunities for raptors and ravens, which could impact ground and shrub nesting birds and small mammals within the vicinity of the Project Area (see discussion in Migratory Birds Section 3.4.7, and Special Status Species Section 3.4.8).

Habitat fragmentation effects from Project development are expected to be greatest near the power plants, pipelines, and wells, as this is the area with the most concentrated surface disturbance. Some species, such as lizards and rodents, may be able to go under sections of the raised pipeline. Larger species, including big game species (such as bighorn sheep, mule deer and antelope), may be most impacted by fragmentation caused by Project development. These effects are expected to be minimal and affect individuals and local groups of animals using or migrating through the area. Species are expected to respond primarily by avoiding the area of development and fragmented habitat. As the Project footprint is small in relation to the amount of big game habitat affected, it is unlikely that there would be a significant impact to bighorn sheep, mule deer and antelope.

3.4.6.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.7. Migratory Birds

3.4.7.1. Affected Environment

On January 11, 2001, President Clinton signed EO 13186 placing emphasis on the conservation and management of migratory birds. Migratory birds are protected under the Migratory Bird Treaty Act (MBTA) of 1918, and the EO addresses the responsibilities of federal agencies to protect them by taking actions to implement the MBTA. The BLM management for these species is based on IM 2008-050 dated December 18, 2007.

The NV Comprehensive Bird Conservation Plan (2010) and the USFWS Birds of Conservation Concern (2008) identify the avian species that have been classified as priority species by the USFWS and/or the state of Nevada. The priority species that are known to occur, or could potentially occur, within and out to 1 mile of the Project Area are identified in Table 3.6, "Priority Avian Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 47) below.

Table 3.6. Priority Avian Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area

Species (Common Name)	Species (Scientific Name)	Habitat Status
Golden Eagle	Aquila chrysaetos	Documented occurrences in area. Primary food base are rabbits and hares, particularly black-tailed jackrabbit.
Swainson's Hawk	Buteo swainsoni	Unlikely to occur, with the exception during migration or dispersal. Potential in open habitats. Nesting habitat of tress is limited in the survey area. Has been identified in the vicinity of the Project Area (NDOW 2015).
Western burrowing owl	Athene cunicularia hypogaea	Suitable habitat is limited; however, potential habitat exists in open habitats. Known to reside in the vicinity of the Project Area (NDOW 2015). A burrowing owl mortality was found along the gen-tie line during baseline surveys.
Ferruginous hawk	Buteo regalis	Suitable nesting and foraging habitat exists within the survey area.
Peregrine falcon	Falco peregrinus	Unlikely to occur, suitable nesting habitat does not occur as the survey area is dry, may occasionally be noted as a fly-over species. Known to reside in the vicinity of the Project area (NDOW 2015).
Pinyon Jay	Gymnorhinus cyanocephalus	Suitable nesting and foraging habitat is limited within the survey area.
Loggerhead shrike	Lanius ludocicianus	Potential nester in taller shrubs.

Species (Common Name)	Species (Scientific Name)	Habitat Status
Sage Thrasher	Oreoscoptes montanus	Suitable habitat exists within and adjacent to the Project Area where sagebrush stands exist.
Brewer's sparrow	Spizella breweri	Suitable habitat exists within and adjacent to the Project Area where sagebrush stands exist.

Migratory bird surveys were conducted in June 2014 and April 2015 by Stantec Consulting Services Inc. (Stantec). The only priority avian species (see Table 3.6, "Priority Avian Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 47)) observed during the 2014 and 2015 migratory bird surveys were the golden eagle and Brewer's sparrow. More detailed information about golden eagles and Brewer's sparrow is contained within the Special Status Species section of the EA (Section 3.4.8).

Additional bird species observed at 18 point counts during the 2014 migratory bird survey, and/or at 2 point counts during the 2015 survey include: American kestrel, barn swallow, black-throated sparrow, Brewer's blackbird, Eurasian collared-dove, horned lark, house finch, mourning dove, northern rough-winged swallow, killdeer, common raven, red-tailed hawk, rock wren, sagebrush sparrow, western meadow lark, yellow-headed blackbird, turkey vulture and an unknown species of swallow [Stantec biologists were unable to determine the species observed during a flyover on June 25; however field notes indicate that the birds were likely barn swallows (*Hirundo rustica*)]. Of these species, the horned lark and Brewer's blackbird were the most common species observed during the migratory bird point count surveys.

During the 2014 survey, which consisted of a 5 mile buffer around the Unit Area and a 2 mile buffer around the proposed gen-tie line, six occupied red-tailed hawk nests were documented. Three prairie falcon nests were also located, two of which were occupied. Nine unoccupied nests were not attributable to a species, but are potentially raptor nests. Some of these nests appeared to be under construction or nesting attempts and each had the appearance of little or no use. In addition, seven common raven nests were recorded within the survey area. See Table 3.7, "Occupied Raptor and Common Raven Nest Sites Identified During the 2014 and 2015 Aerial Surveys" (p. 49)below for a summary of occupied nests and location in relation to the proposed project boundaries. Lastly, a total of 23 golden eagle nest sites were identified, two of which were occupied. More detailed information about golden eagles is contained within the Special Status Species section of the EA (Section 3.4.8).

During the 2015 survey, which also consisted of a 5 mile buffer around the Unit Area and a 2 mile buffer around the proposed gen-tie line, eight red-tailed hawk nest sites, six occupied and two unoccupied, were observed. Three occupied nest sites were also occupied by red-tailed hawks during the 2014 survey. Two occupied nest sites were identified as unoccupied golden eagle nest sites during the 2014 survey. One red-tailed hawk nest site identified during the 2014 survey could not be located during the 2015 survey. See Table 3.7, "Occupied Raptor and Common Raven Nest Sites Identified During the 2014 and 2015 Aerial Surveys" (p. 49)below for a summary of occupied nests and location in relation to the proposed project boundaries.

Four prairie falcon nest sites were observed during the 2015 survey, 3 of which were occupied. Two nest sites were not identified during the 2014 survey (one was unoccupied and occurs adjacent to a golden eagle nest, and the other nest site was identified as a probable common raven nest during the 2014 survey); one nest site was occupied by prairie falcon during both the 2014 and 2015 surveys; and the other nest site could not be located during the 2015 survey. See

Table 3.7, "Occupied Raptor and Common Raven Nest Sites Identified During the 2014 and 2015 Aerial Surveys" (p. 49)below for a summary of occupied nests and location in relation to the proposed project boundaries.

Sixteen unoccupied potential raptor nests were observed during the 2015 survey, which also consisted of a 5 mile buffer around the Unit Area and a 2 mile buffer around the proposed gen-tie line, four of which were also observed during the 2014 survey. In addition to raptor nests, eight common raven nest sites were observed during the 2015 survey. Seven nests were occupied and one was unoccupied. Two of the common raven nests were not identified during the 2014 survey. Two nest sites were identified as golden eagle nests (one occupied) during the 2014 survey. See Table 3.7, "Occupied Raptor and Common Raven Nest Sites Identified During the 2014 and 2015 Aerial Surveys" (p. 49)below for a summary of occupied nests and location in relation to the proposed project boundaries.

Table 3.7. Occupied Raptor and Common Raven Nest Sites Identified During the 2014 and 2015 Aerial Surveys

Species (2014)	Species (2015)	Occupancy Status (2014)	Occupancy Status (2015)	Distance from Unit Area (mi.)	Distance from Gen-Tie Line (mi.)
Red-tailed Hawk	Red-tailed Hawk	Occupied	Occupied	2.6	3.7
Red-tailed Hawk	--	Occupied	--	1.9	2.9
--	Common Raven	--	Occupied	2.3	3.3
Red-tailed Hawk	Red-tailed Hawk	Occupied	Occupied	4.7	5.6
Potential Raptor	Red-tailed Hawk	Unoccupied	Occupied	5.1	4.4
Potential Raptor	Common Raven	Unoccupied	Occupied	3.2	1.8
Common Raven	Prairie Falcon	Unoccupied	Occupied	3.6	2.6
Common Raven	Common Raven	Occupied	Unoccupied	4.6	3.9
Golden Eagle	Red-tailed Hawk	Unoccupied	Occupied	10.2	2.0
Red-tailed Hawk	Red-tailed Hawk	Occupied	Occupied	7.7	2.1
Golden Eagle	Red-tailed Hawk	Unoccupied	Occupied	4.8	1.9
Golden Eagle	Common Raven	Occupied	Occupied	3.9	1.2
--	Golden Eagle & Common Raven	--	Unoccupied & Occupied	0.8	2.0
Common Raven	Potential Raptor	Occupied	Unoccupied	4.7	2.2
Potential Raptor	Common Raven	Unoccupied	Occupied	3.8	1.6
Red-tailed Hawk	Red-tailed Hawk	Occupied	Unoccupied	5.0	7.7
Prairie Falcon	Prairie Falcon	Occupied	Occupied	13.2	0.8
Common Raven	Golden Eagle	Unoccupied	Occupied	1.8	2.7
Prairie Falcon	--	Unoccupied	Occupied	2.6	3.8
Red-tailed Hawk	Red-tailed Hawk	Occupied	Unoccupied	4.9	7.2
Common Raven	Common Raven	Unknown	Occupied	4.9	7.0
--	Common Raven	--	Occupied	5.0	6.9
Prairie Falcon	--	Occupied	--	1.0	1.7
--	Prairie Falcon	--	Occupied	0.1	0.9

Source: Stantec 2015b

Lastly, a total of 22 golden eagle nest sites were identified, five of which were occupied. More detailed information about golden eagles is contained within the Special Status Species section of the EA (Section 3.4.8).

3.4.7.2. Environmental Consequences

3.4.7.2.1. Proposed Action

Impacts to migratory birds include the reduction of foraging and potential nesting habitat due to Project construction and operations. These impacts are limited to the 517 acres of habitat if Option 1 is selected and 530 acres of habitat if Option 2 is selected, that would be disturbed due to Project construction and the associated habitat fragmentation. Impacts to habitat would be on-going until reclamation is completed.

The greatest impacts would occur during Project construction when increased noise and human activity may deter migratory birds from using the Project Area and its surrounding habitat. These impacts may displace migratory birds and/or reduce breeding success of some birds, especially those most sensitive to disturbance.

Vehicular traffic can pose a risk to avian species from vehicle collisions. Risk would be increased along the new and existing access roads, as well as along United States Highway 50, from traffic accessing the Project site. Additional risk may occur for scavenger species (e.g., turkey vulture, raven, raptors) foraging along roads for vehicle caused wildlife mortalities. As the construction phase of the Project is expected to employ 50 persons, risks of vehicle collisions would be increased during the eight month construction phase (as operation of the Project is expected have one to two onsite employees per shift, operational impacts from vehicular traffic are less than those anticipated during construction).

To minimize impacts to migratory bird species during construction, the following mitigation measure would be employed:

Mitigation Measure for migratory bird species:

All surface disturbing activities should occur outside of the migratory bird nesting period (March 1 to July 31 for raptors and April 1 to July 31 for all other avian species). If surface disturbing activities are to occur during this period, pre-construction avian surveys would be conducted in appropriate habitats by qualified biologists (approved by the BLM) prior to surface disturbing activities commencing. The exact area to be surveyed would be based on the scope of the surface disturbing activities (as determined by the BLM). If ground disturbing activities do not take place within 14 days, the areas would be resurveyed. If nesting migratory birds are present, appropriate buffers determined by the BLM, in coordination with the NDOW, would be applied until an approved biologist determines the young have fledged or the nest has failed.

Subsequent to construction, some surface disturbance can be reclaimed. Total permanent disturbance would be approximately 105 acres regardless of the Option selected; this habitat would be unavailable over the year life of the Project. Also, new man-made structures associated with the Proposed Action (e.g. fencing, lighting, well pads, power plants, substations and gen-tie line) could impact migratory birds within and around the Project Area.

Specifically, fences around the energy plant and substations may be utilized for perching or roosting by many bird species. Fences can also create a collision flight hazard, and tend to pose the greatest risk for species that are heavy bodied and are not quick to take flight. Though fence strikes could impact some individuals, this would most likely have negligible impacts on local populations.

The use of facility lighting can attract insects, which in turn attracts foraging birds. This risk is associated with any and all facilities that have night time lighting. The lighting itself poses no direct risk to birds, but the increased activity in these areas near anthropogenic activity could pose some amount of risk to these species. Additionally, migrating birds may become attracted to or disoriented by artificial lights, particularly during inclement weather, which could pose collision risks with facility and gen-tie line infrastructure. To reduce potential impacts to migratory birds, Ormat has committed to avoid nighttime construction to the extent practicable. Additional mitigation measures regarding facility lighting can be found in Section 3.4.12 (Visual Resources).

Substations may pose a risk of electrocution for birds by perching or nesting on infrastructure. Additionally, the substation would be surrounded by chain link fencing, which may be utilized for perching or roosting, increasing predation risks to prey species.

Bird species are susceptible to potential collisions with the gen-tie lines; especially with shield wires and guy wires, but also with power poles. Avian species may be susceptible to collisions with gen-tie lines due to an inability to see or distinguish the lines. If the gen-tie lines are spotted during flight, heavy-bodied, less agile birds or birds within large flocks may lack the ability to quickly negotiate the lines, making these birds more susceptible to a potential collision. Adverse weather conditions obscuring sunlight and moonlight could also contribute to poor detection of the gen-tie lines and guy wires.

Raptors that may hunt from perches on the power poles and aerial foraging birds (e.g., swifts and swallows) would be the bird species most susceptible to collision while foraging. The potential for collision with the power poles is also present when avian species are flying to or from a nesting or roosting site on the power pole. Some avian species may have an increased predation risk due to the improved perching locations of raptors and corvids on the gen-tie line structures.

Avian electrocutions can occur when a bird simultaneously contacts energized and/or grounded structures, conductors, hardware, or equipment (APLIC 2006). Birds are susceptible to electrocution risks along gen-tie and distribution lines, at transformers, and at substation facilities.

Nests on gen-tie structures that pose the greatest risk to birds are those that are built in close proximity to energized conductors and hardware. While a nest that is not in close proximity to energized parts may not be an electrocution risk in and of itself, it would tend to cause the parent bird and possibly nest predator birds to routinely land on other parts of the power pole or surrounding poles that may be unsafe (APLIC 2006). In the Project Area, the species most likely to nest on power poles are ravens and raptors.

To reduce the potential of injury or mortality to migratory birds from the Proposed Action, and to ensure adequate monitoring is in place to determine if mortalities are occurring, a Bird and Bat Conservation Strategy was developed with the goal of reducing the potential impacts of avian mortality resulting from construction and operation of the Project. Further, Ormat has agreed to adopt gen-tie line raptor protection practices which would minimize bird electrocutions and reduce bird mortality. Additionally, all power poles would utilize BLM-approved raptor deterrents, and within areas mapped as GRSG OHMA, anti-perching and anti- nesting devices would be installed on the gen-tie line components (see Section 2.1.11).

3.4.7.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the

Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.8. Special Status Species

3.4.8.1. Affected Environment

Some species of plants and wildlife are accorded special status by Federal and state agencies largely because they are either scarce on a regional level, facing clearly defined threats, or in a position within the regional landscape to potentially become scarce. Special status species include:

- Threatened, endangered, proposed, or candidates for Federal listing under the Endangered Species Act of 1973 or equivalent state laws;
- BLM-sensitive species designated by the BLM Nevada State Director;
- Protected under Title 47, Chapter 527 (Protection and Preservation of Timbered Lands, Trees and Flora) of the Nevada State Code;
- At-risk taxa tracked by the Nevada National Heritage Program within the Department of Conservation and Natural Resources; and/or
- Designated as sensitive by the Nevada Native Plant Society.

The State of Nevada can fully protect wildlife species through the stipulations of Nevada Revised Statute (NRS) 501. Furthermore, the State of Nevada protects “critically endangered” plant species, as well as cacti, under NRS 527.

There are no Federally listed as endangered or threatened, or proposed for listing species under the Endangered Species Act known to occur within the Project Area and its associated area of influence; therefore, the Project would have no effect on endangered, threatened or proposed species. The GRSG was a candidate for listing. However, on September 21, 2015, the ROD and Approved Resource Management Plan Amendments for the Great Basin Region, including the GRSG Sub-Regions of: Idaho and Southwestern Montana, Nevada and Northeastern California, Oregon, and Utah (USDI, BLM 2015a) were signed on September 21, 2015 by the Director of the BLM and the Assistant Secretary of Land and Minerals Management. A determination was made by the USFWS that the GRSG does not warrant protection under the Endangered Species Act. However, as the BLM considers the GRSG a special status species, it is discussed further below.

Table 3.8. : Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area

Species (Common Name)	Species (Scientific Name)	Habitat Status
PLANTS		
Windloving buckwheat	Eriogonum anemophilum	Found on generally high elevation dry, exposed, relatively barren ridges and knolls on shallow soils over bedrock from 4,750 to 9,840 feet in elevation. Barren clay habitat does not exist in the Project Area and no windloving buckwheat were observed during either the 2014 or 2015 biological surveys.
Beatley buckwheat	Eriogonum beatleyae	Occurs on whitish clay hills. There is a little of his habitat at the north end of the Project Area. No Beatley buckwheat were observed during either the 2014 or 2015 biological surveys.
Sand cholla	Grusonia pulchella	Found on sandy to rocky flats, often in sandy areas from 3,800 to 5,000 feet in elevation throughout most of Nevada. It may occur on the outwash fans from the Clan Alpine Range. Sand cholla was not observed during either the 2014 or 2015 biological surveys.
Lahontan beardtongue	*Penstemon palmeri* var. *macranthus*	Found along washes, roadsides and canyon floors from 3,430 to 5,500 feet in elevation and is associated with carbonate soils and some subsurface moisture. Stantec observed five occurrences of Lahontan beardtongue within the Unit Area during the 2014 biological survey.
Grizzlybear pricklypear	Opuntia erinacea	The grizzlybear prickly pear is not a BLM Nevada sensitive species, however all cacti are protected in Nevada under NRS 527.060-120. The grizzlybear pricklypear is found in sandy or gravelly soils of valleys, plains, low hills, or canyonsides in the desert or woodland, prairie. This species was observed during the baseline biological surveys.
BIRDS		
Golden Eagle	Aquila chrysaetos	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). Detailed information about the golden eagle use within a 5-mile buffer around the Unit Area and a 2-mile buffer around the proposed gen-tie line is provided below.
Swainson's Hawk	Buteo swainsoni	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). No Swainson's hawks were observed during either the 2014 or 2015 biological surveys.
Western burrowing owl	Athene cunicularia hypogaea	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). Burrowing owl surveys were conducted in June and July 2014. No burrowing owls were observed or heard during the calling/listening surveys. One burrowing owl mortality and one unoccupied burrow were observed along the access road that parallels the proposed gen-tie line.
Ferruginous hawk	Buteo regalis	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). No ferruginous hawks were observed during either the 2014 or 2015 biological surveys.
Peregrine falcon	Falco peregrinus	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). No peregrine falcons were observed during either the 2014 or 2015 biological surveys.
Pinyon Jay	Gymnorhinus cyanocephalus	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). At least one pinyon jay was observed within the Project Area during the biological surveys.
Loggerhead shrike	Lanius ludocicianus	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). No loggerhead shrikes were observed during either the 2014 or 2015 biological surveys.

Species (Common Name)	Species (Scientific Name)	Habitat Status
Sage Thrasher	Oreoscoptes montanus	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). No sage thrashers were observed during either the 2014 or 2015 biological surveys.
Brewer's sparrow	Spizella breweri	General habitat requirements are described in the Migratory Birds section (EA Section 3.4.7). A single observation of Brewer's sparrow was made during the 2014 survey.
MAMMALS		
Pallid bat	Antrozous pallidus	Pallid bats are found throughout NV in low to mid elevations in habitats that include pinyon-juniper, blackbrush, creosote, sagebrush and salt desert scrub. Foraging occurs both in vegetation and on the ground surface. Detailed information about all bat species is provided below.
Townsend's big-eared bat	Corynorhinus townsendii	Townsend's big-eared bats are found in a variety of habitats, such as pinyon-juniper, sagebrush and salt desert scrub. The bat primarily forages on moths in open forest habitats of pinyon-juniper, mahogany, aspen and cottonwood, and would travel long distances to reach suitable foraging areas. Detailed information about all bat species is provided below.
Big brown bat	Eptesicus fuscus	Big brown bats occur in a variety of habitats that include aspen stands, pinyon-juniper woodlands, lowland/upland riparian areas, sagebrush communities, grasslands, desert scrub communities and agricultural fields. They roost in hollow trees, mine crevices, caves, tunnels and buildings. They forage over open land and water and consume a variety of insects. Detailed information about all bat species is provided below.
Spotted bat	Euderma maculatum	The spotted bat occurs in varied habitats, including desert-scrub, pinyon-juniper woodland, mixed conifer forest, canyon bottoms, riparian areas, fields and open pastures. Spotted bats roost in cracks, crevices and caves high in rock cliffs. Their primary diet consists of moths. Detailed information about all bat species is provided below.
California myotis	Myotis californicus	The California myotis inhabits riparian woodlands, canyons, grasslands, and desert habitats and utilizes rock crevices, caves, buildings and abandoned mine workings for roosting, maternity and hibernation. These bats forage on insects along margins of tree canopy and over water. Detailed information about all bat species is provided below.
Western small-footed myotis	Myotis ciliolabrum	The western small-footed myotis is associated with desert scrub, grassland, sagebrush steppe, pinyon-juniper woodland and agricultural areas. Caves, mines and trees are used as roosting sites. The species forages in open areas, and consume small moths, leafhoppers, mosquitoes and flying ants. Detailed information about all bat species is provided below.
Long-eared myotis	Myotis evotis	The long-eared myotis inhabits forested habitats and primarily roosts beneath the bark or within cavities of old trees. The species will occasionally roost in the crevices of cliffs and buildings. This is one of the most wide ranging bat species in North America, occurring from Alaska to Mexico. Detailed information about all bat species is provided below.
Little brown myotis	Myotis lucifugus	The little brown myotis is a wide-ranging bat, typically found in mesic or forested habitats. Detailed information about all bat species is provided below.
Fringed myotis	Myotis thysanades	The fringed myotis favors oak and pinyon-juniper habitats. Detailed information about all bat species is provided below.

Species (Common Name)	Species (Scientific Name)	Habitat Status
Long-legged myotis	Myotis volans	The long-legged myotis is most common in forested habitats though does occur in more arid habitats. Detailed information about all bat species is provided below.
Yuma myotis	Myotis yumanensis	The Yuma myotis inhabits riparian areas, scrublands, deserts, and forests and is commonly found roosting in bridges, buildings, cliff crevices, caves, mines, and trees. Its primary diet is emergent aquatic insects such as caddis flies, midges, and small moths and beetles. Detailed information about all bat species is provided below.
Brazilian free-tailed bat	Tadarida brasiliensis	Brazilian free-tailed bats utilize a wide range of habitats which include caves, cliffs, bridges, and tree hallows. The species generally occurs in large colonies Lactating females are voracious feeders, generally feeding on moths. Considered migratory in northern Nevada. Detailed information about all bat species is provided below.
Western pipistrelle	Pipistrellus Hesperus	The western pipistrelle is the smallest of all North American bats and is usually associated with rocky canyons and outcrops where they are known to roost in small crevices. It is also known to occupy mines and caves. Its food sources include ants, mosquitoes, fruit flies, and leafhoppers. Detailed information about all bat species is provided below.
Pygmy rabbit	Brachylagus idahoensis	The pygmy rabbit occurs throughout much of the Great Basin in areas of tall, dense sagebrush (Artemisia spp.) or mixed sagebrush habitats. Pygmy rabbit burrows are typically found in relatively deep, loose soils of wind- or water-born origin suitable for burrowing. No pygmy rabbits, burrows, scat or tracks were observed during the 2014 survey.
Dark kangaroo mouse	Microdipodops megacephalus	The dark kangaroo mouse inhabits stabilized sand dunes and other sandy soils in valley bottoms and alluvial fans dominated by big sagebrush (Artemisia tridentata), rabbitbrush (Chrysothamnus spp.), and horsebrush (Tetradymia spp.). Species also occurs on fine gravelly soils or sandy soils with varying amounts of gravel. The dark kangaroo mouse was not observed during either the 2014 or 2015 biological surveys, though no specific surveys for this species were conducted.
INSECTS		
Early blue	Euphilotes enoptes primavera	The early blue is a subspecies of Pacific dotted blue butterfly. Larvae feed primarily on naked buckwheat (*Eriogonum nudum*) and other buckwheat (*Eriogonum ssp.*). Although host plants (*Eriogonum sp.*) have the potential to occur within the Project Area, the early blue is unlikely to occur in the locale.
Sand Mountain blue	Euphilotes phallecscens arenamontana	The sand mountain blue is a subspecies of Pallid blue butterfly. Larvae feed on buckwheat plants. Although host plants (*Eriogonum sp.*) have the potential to occur in within the Project Area, the Sand Mountain blue is unlikely to occur in the locale
Great Basin small blue	Philotiella speclosa septentrionalis	The Great Basin small blue is subspecies of the small blue (*Philotiella speciosa*). Habitat for the small blue is desert flats and dry washes. Adults are sedentary and stay close to their larval food plant. The Great Basin small blue is unlikely to occur. The range of subspecies is still unknown but is likely restricted due to lack of mobility of adults. However, host plants (*Eriogonum sp.*) have the potential to occur within the Project Area.

(Source: Stantec 2015a)

Greater sage-grouse (GRSG)

Approximately 1,185 acres of GRSG habitat was surveyed in July, September and October 2014 in accordance with the BLM Statewide Wildlife Survey Protocols. The survey area included a 5-mile buffer around the Unit Area and a 2-mile buffer of the proposed gen-tie line. The mapping process for the sage-grouse Environmental Impact Statement classified portions of the Project Area (power plants, most of the well pads, and the majority of the transmission line) as sage-grouse OHMA (see Figure 6). During the 2014 survey no greater sage grouse, droppings, feathers or tracks were observed.

Golden eagles

A total of 23 golden eagle nest sites were identified during the June 2014 survey, two of which were occupied. One occupied nest was located approximately 2.0 miles north of the Unit Area (and 3.2 miles north of the gen-tie line) on an outcrop in Inter-Mountain Basins big sagebrush shrubland; the other occupied nest was located approximately 1.2 miles west of the gen-tie line (and 3.9 miles south of the Unit Area) on an outcrop in Great Basin xeric mixed sagebrush shrubland (Stantec 2015b).

A total of 22 golden eagle nest sites were identified during the April 2015 survey (which included a 5 mile buffer around the Unit Area and a 2 mile buffer of the proposed gen-tie line), five of which were occupied. None of the occupied nest sites in 2015 were the same nest sites that were occupied during the 2014 survey. One occupied nest was located approximately 1.8 miles southwest of the Unit Area (and 2.7 miles northwest of the gen-tie line) on a cliff face in Great Basin pinyon-juniper woodland; one occupied nest was located approximately 4.0 miles north of the Unit Area (and 5.6 miles north of the gen-tie line) on a cliff face in Great Basin pinyon-juniper woodland; one occupied nest was located approximately 1.6 miles south of the gen-tie line terminus (and 14.1 miles south of the Unit Area) on an outcrop in Great Basin pinyon-juniper woodland; one occupied nest was located approximately 0.9 miles west of the gen-tie line (and 9.8 miles southwest of the Unit Area) on an outcrop in Great Basin xeric mixed sagebrush shrubland; and one occupied nest was located approximately 2.5 miles west of the gen-tie line (and 3.3 miles southwest of the Unit Area) on a rock fin in Great Basin pinyon-juniper woodland (Stantec 2015b).

There is one golden eagle nest located within the northwest corner of the Unit Area. The closest golden eagle nest to the gen-tie line is approximately 0.8 miles west located on an outcrop in Great Basin xeric mixed sagebrush shrubland. Both nests were unoccupied in the 2014 and 2015 surveys.

Potential nesting habitat for golden eagles includes cliffs and rocky outcrops, which occur within 5 miles of the Unit Area and 2 miles of the proposed gen-tie line. Potential nesting habitat also includes trees and gen-tie line poles. Nest site density within 5 miles of the Unit Area and 2 miles of the proposed gen-tie line was 1.25 occupied and unoccupied nest sites per 10 square miles in 2014 and 1.19 occupied and unoccupied nests sites per 10 square miles in 2015. However, potential for bias in density calculations exists due to the heterogeneous landscape in the survey area and the extent of suitable nesting habitat. The entire Project Area is considered suitable golden eagle foraging habitat. No eagles were observed foraging within the Project Area during baseline surveys conducted in 2014 and 2015 (Stantec 2015b).

Bats

The Project Area and vicinity include old mine shafts and adits which are potential roosting and hibernacula sites, as well as a meadow with surface water and suitable pinyon-juniper habitat. There are 6 adits, 1 decline and 1 shaft that provide suitable bat habitat within and out to 1 mile from the Unit Area.

Bat use was sampled at four locations within and adjacent to the Project Area (portal, ridge, shaft and Clan Alpine Ranch meadow) during June, July, September and October 2014. The bat survey resulted in a total of 14 species identified between the four locations and sample dates: pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat (*Eptesicus fuscus*), silver haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), California myotis (*Myotis californicus*), Western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*Myotis evotis*), little brown bat (*Myotis lucifugus*), fringed myotis (*Myotis thysanodes*), long-legged myotis (*Myotis volans*), Yuma myotis (*Myotis yumanenis*), western pipistrelle (*Parastrellus hesperus*) and Brazilian free-tailed bat (*Tadarida brasiliensis*). Overall, bat use within and around the Project Area was high. The long-legged myotis and pallid bat were the most abundantly recorded species, followed by the little brown bat, the western pipistrelle, and the big brown bat. The least abundantly recorded species was the fringed myotis, which was only recorded at the Portal location during the summer sampling (Stantec 2015a).

3.4.8.2. Environmental Consequences

3.4.8.2.1. Proposed Action

General impacts to the key habitats (see Table 3.4, "Ecological Systems and Key Habitat Types" (p. 44)) and these wildlife species (see Table 3.5, "Wildlife Species Observed Within the Project Area" (p. 45)) are described in Section 3.4.6 (General Wildlife) and Section 3.4.7 (Migratory Birds). More specific impacts to individual special status species not already addressed are described below.

Plants

Clearing and disturbing approximately 517 acres (if Option 1 is selected) or 530 acres (if Option 2 is selected) would result in the loss and fragmentation of habitat available to the special status plant species identified in Table 3.8, ": Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 53). Suitable habitat for the Windloving buckwheat, Beatley buckwheat and sand cholla is minimally available in the Project Area, and no species were observed; the Lahontan beardtongue and grizzlybear pricklypear was observed during the 2014 and 2015 biological surveys. The following mitigation measure would reduce the likelihood of plant mortality.

Mitigation Measure for special status species:

Appropriate buffers would be placed around BLM sensitive plants (e.g. Lahontan beardtongue) and cacti (e.g. grizzlybear prickly pear) where reasonably possible to protect them from surface disturbing activities. In areas where avoidance is not reasonably possible, all BLM sensitive plant species and cacti must be replanted immediately in undisturbed locations containing suitable habitat that is adjacent to the project area. Unless otherwise directed by the BLM botanist, all replanted plants must be watered and otherwise maintained for a period of one year. The goal is to have at least 80% survival of all transplanted plants.

Avoidance of direct impacts to specific special status plant species or plant colonies through the use of buffers would assist continued propagation of these species and should effectively prevent loss of individual plants or plant colonies.

Birds

Potential impacts to bird species (see Table 3.8, ": Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 53), and also GRSG) include the loss of foraging habitat, injury or mortality from collisions with structures, displacement by noise from vehicles and equipment, and nest destruction (see impact discussion in Section 3.4.6, General Wildlife and Section 3.4.7, Migratory Birds).

Given the limited surface disturbance and area of habitat fragmentation, impacts to foraging habitat would be minimal and concentrated around the power plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road.

Further effects of the transmission line to bird species would be minimized by Ormat's agreement to employ environmental protection measures as described by the APLIC (2006) and APLIC (2012). Because the habitat surrounding the Project Area is relatively undisturbed, bird species would be expected to shift their foraging efforts away from the Project development to the more undisturbed habitat. These impacts are expected to affect individuals of the local population, but no effect to the regional population is expected.

Portions of the Project Area (power plants, most of the well pads, and the majority of the transmission line) are mapped as GRSG OHMA. Appendix C of the Nevada and Northeastern California GRSG Approved Resource Management Plan Amendments (BLM 2015b) includes RDFs which are required for certain activities in all GRSG habitat, including areas mapped as OHMA (see Appendix C). RDFs establish specifications to help mitigate adverse impacts to the GRSG. Ormat would comply with the applicable RDFs. Additionally, all power poles would utilize BLM-approved raptor deterrents, and within areas mapped as GRSG OHMA, anti-perching and anti- nesting devices would be installed on the gen-tie line components (see Section 2.1.11). Adherence to the RDFs and adopted protection measures, in addition to mitigation identified in BLM Section 3.4.7 (Migratory Birds) requiring pre-construction surveys, potential impacts to GRSG would be further reduced.

No occupied nests were observed within the Project Area and no impacts to golden eagle and raptor nests are anticipated. A mitigation measure identified in the Migratory Bird section of this BLM (see Section 3.4.7) requiring pre-disturbance surveys would further reduce the likelihood of negative impacts to nesting raptors in the event an occupied nest was to occur within the Project Area or its area of influence.

Mammals

Bats

Potential impacts to the bat species (see Table 3.8, ": Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 53)) include effects to the adits, shaft and decline; the loss of foraging habitat, particularly riparian vegetation; injury or mortality from collisions with structures; displacement by noise from vehicles and

equipment; and alteration of behavior from night lighting (see impact discussion in Section 3.4.6, General Wildlife and Section 3.4.7, Migratory Birds).

Direct impacts to the adits, shaft and decline in the Project Area and vicinity are not anticipated as these sites are avoided and no activities are proposed at these sites. However, the surveyed sites in Section 21, T. 21 N., R. 38 E. (see Table 3.8, ": Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 53)) have a high hazard rating due to human activity and the extent of workings. The following mitigation measure is recommended which would reduce the potential for any impacts to either bats which use the adits or to human safety.

Mitigation Measures

Ormat would provide the funding necessary to install bat friendly gates over the entrances of all adits/shafts within the Unit Area that are used by bats for roosting. This would prevent humans from disturbing roosting bats. The construction of bat gates would occur during the spring and/or fall (dependent on bat usage of each structure).

Foraging habitat for bats is available throughout the Project Area and vicinity, particularly the Clan Alpine Ranch meadow area south of the geothermal operations and other sources of riparian vegetation and suitable pinyon-juniper habitat in the Project vicinity. As there are no surface disturbing activities proposed within either riparian areas or pinyon-juniper habitat, impacts would affect only individual bats and would not impact the local or regional bat population. Additionally, adverse impacts to the springs and seeps in the Project vicinity is unlikely, therefore indirect impacts to the associated riparian vegetation are not anticipated.

Noise and activities associated with the project (particularly during construction and drilling operations) could impact bats roosting in the adits/shafts within and adjacent to the Project Area. Disturbance to roosting bats could be especially damaging to local populations if the adits/shafts function as hibernation and/or maternity locations and impacts were to occur during these critical periods. Mitigation measures are identified below to protect roosting bats during the hibernation and maternity periods, and should reduce potential impacts to bats.

Mitigation Measures

To reduce impacts to roosting bats during the critical hibernation and/or maternity periods, no construction activities or drilling operations would occur within 0.25 miles of structures used by bats during these critical periods. The hibernation period is generally from October 30 to March 30, and the maternity period is generally from May 15 to July 30. It must be stated that these dates would vary by species and are influenced by annual climatic conditions.

If hydrologic monitoring indicates that project related activities are resulting in the desiccation of important bat foraging/drinking areas within and immediately adjacent to the Project Area, Ormat would maintain an artificial water source within the Unit Area that would provide water and foraging opportunities for bats. The artificial water source could also be used to deter bats from drinking/foraging around reserve pits (if reserve pits contain liquids that are harmful to bats).

Lights used for drilling at night and power plant operations may attract and concentrate moths and other insects on which the bats may feed, which could be a beneficial effect, though could also alter bat behavior. A mitigation measure which would reduce the impacts to bats from project

lighting is provided below. Additional mitigation for visual impacts associated with lighting are also included in Section 3.4.12 Visual Resources.

Mitigation Measure

To reduce impacts to bats from project lighting, motion activated lighting, directed lighting, shielding methods, and or/reduced lumen intensity would be used.

Pygmy rabbit

No impacts to pygmy rabbits are expected as pygmy rabbit habitat is marginal and no pygmy rabbits or their sign were observed during the biological surveys.

The additional traffic resulting from the construction crew traffic would increase the amount of dust in the area and would increase the probability of running over a pygmy rabbit (should one be present). However, Ormat has agreed to limit vehicle speeds to 20-25 mph through the area, and has also proposed to apply water to the ground during the construction and utilization of the drill pads and access roads as necessary to control dust (see Section 2.1.11). Therefore, the proposed Project may impact individuals, but would not likely contribute to a trend towards Federal listing or cause a loss of viability to the population or species.

Dark kangaroo mouse

Surface disturbance associated with construction activities would result in the loss of dark kangaroo mouse habitat. Given the limited surface disturbance, habitat impacts would be minimal and concentrated around the power plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road. Similar habitat is abundant in the Project vicinity. Potential impacts are expected to affect individuals, but would not likely cause a loss of viability to the population or species.

The use of artificial night lighting sources (primarily during drilling and construction, and to a lesser extent, during Project operations) could impact the dark kangaroo mouse (should they occur in the area). During increased illumination at night, nocturnal rodents (such as the dark kangaroo mouse) have been observed to decrease activity (Kramer and Birney 2001; Wolfe and Summerlin 1989; Clarke 1983) and alter foraging behavior (Vasquez 1994). Also, during increased nocturnal illumination, owl hunting effectiveness on nocturnal rodents can increase (Clarke 1983). Mitigation measures which would reduce the impacts of night lighting are provided in Section 3.4.12 Visual Resources.

<u>Insects</u>

Several buckwheat species were observed during the survey within the Project Area: two species of perennial buckwheat [cushion buckwheat (*Eriogonum ovalifolium*) and Heermann's buckwheat (*Eriogonum heermannii*)] and three species of annual buckwheat [Palmer's buckwheat (*Eriogonum palmeranium*), Spotted buckwheat (Eriogonum maculatum) and nodding buckwheat (*Eriogonum cernuum*)]. These species are not considered sensitive, but are known host plants for sensitive butterflies and skippers. However, no butterflies fitting the description of those identified in Table 3.8, ": Special Status Species Occurring, or Potentially Occurring, within and out to 2 miles from the Proposed Project Area" (p. 53)were observed utilizing any buckwheat species within the Project Area, nor were any caterpillars observed on buckwheat plants. As no

surface disturbing activities are proposed in areas containing buckwheat species, no impacts are anticipated.

3.4.8.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.9. Livestock Grazing

3.4.9.1. Affected Environment

BLM manages rangelands on public lands under 43 CFR 4100 and BLM Handbooks 4100 to 4180 (BLM 1984; BLM 2011).

The Project Area is within the Clan Alpine Allotment (which also includes the Bell Flat Pasture). This allotment includes 365,229 acres with 10,210 animal unit months (AUM) permitted. See Table 3.9, "Current Grazing Schedule" (p. 61)for grazing schedule information.

Table 3.9. Current Grazing Schedule

Use Area (Pasture)	Season of Use	Species	AUMs[1]
Shoshone[2]	05/01-06/30	927 cattle	1,859 AUMs
Alpine[2]	05/01-06/30	927 cattle	1,859 AUMs
Desatoya/Cherry Valley	07/01-08/31	927 cattle	1,890 AUMs
Edwards	09/01-10/31	927 cattle	1,859 AUMs
Cold Springs	11/01-11/30	927 cattle	914 AUMs
Bell Flat	12/01-03/31	927 cattle	3,688 AUMs

[1] An AUM is the amount of forage needed to sustain one cow, five sheep, or five goats for one month.

[2] Use is rotated annually.

3.4.9.2. Environmental Consequences

3.4.9.2.1. Proposed Action

Long term surface disturbance associated with the Project would be 105.7 acres if Option 1 is selected, and 105.8 acres if Option 2 is selected. The total 10,210 AUM within the allotment would be reduced by 3 AUM, or less than one percent of the AUM within the allotment.

To prevent access by cattle to areas which might be harmful to them, Ormat has committed to fence the reserve pits and power plant sites in conformance with the Gold Book, and has not proposed any Project activities which would substantially limit livestock's access to the undisturbed portions of the Tungsten Mountain Unit area.

Due to the small percentage of allotted acres lost to direct disturbance, fencing of those Project facilities potentially harmful to livestock and the fact that project facilities and practices would not prevent continued access by livestock to the undisturbed lands within the Project Area, no impacts on livestock grazing are expected.

3.4.9.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.10. Water Quality (Surface/Ground)

3.4.10.1. Affected Environment

The Project Area is located in the Edwards Creek Valley Hydrographic Area (Number 133 of 256 in the State of Nevada). This Hydrographic Area is part of the Central Hydrographic Region (Number 10 of 14 in the State of Nevada), which is by far the largest Hydrographic Region in Nevada at nearly 30 million acres. The Edwards Creek Valley Hydrographic Area is relatively small, only 266,240 acres, or less than one percent of the Central Hydrographic Region. The Edwards Creek Valley Hydrographic Area is not a "designated" area or groundwater basin (NDCNR-DWR 2015).

All drainages to the west of the Unit Area in the Clan Alpine range are ephemeral and flow towards the playa only following storm events. There are no other forms of surface water within the Project Area, nor are there any surface thermal manifestations (e.g. hot springs, fumaroles). There are, however, widely scattered small seeps and unregistered, leaking artesian wells outside of the Project Area, located along the apron of the alluvial fan where it overlaps the playa.

Using Google Earth images, 21 anomalous surface features were identified in the vicinity of the Unit Area: 4 features were leaking artesian wells (none of which are documented on the Nevada Division of Water Resources (NDWR) website), 11 were circular groundwater seeps, 2 were buried fiberglass water storage tanks, and 4 were shallow drainages with vegetation but no surface water. However, none of the features are within the Project Area: four of the features are 1-2 miles east of the Project Area, 7 are a mile or more southeast of the Project Area and 9 are approximately 2 miles south-southwest of the Project Area. Ormat measured the conductivity and temperatures of the 21 surface features in 2015 (see Table 2.2, "Summary of Surface Disturbance" (p. 22)).

Table 3.10. Surface Features Evaluation Results, 2015

ID #	UTM		Flow (gpm)	pH	Specific Conductivity (mS)	TDS (mg/L)	Temp (F)	Description
	Easting	Northing						
1[1]	444660	4392659	1	8.6	410		57.2	Old artesian well seeping around base.
2[2]	443951	4391837	seep	9.6	3,700		77.7	Circular 50' across. Muddy water with plants at center.

ID #	UTM		Flow (gpm)	pH	Specific Conductivity (mS)	TDS (mg/L)	Temp (F)	Description
	Easting	Northing						
3[3]	444005	4391770	none	9.3	19,500		79.5	Man-made, 30x100' dark red color. Drains from buried fiberglass tank.
4[2]	443867	4391723	seep					Circular 60' across. Too muddy and shallow to sample.
5[1]	443844	4391735	1	9.8	2,680	1,700	71	15' oblong. Leaking old artesian well. Water trickles up around base. Small pool with clear water and algal growth.
6[2]	443167	4390968	seep	7.7	1,025	730	67	Largest circular area in complex. Fenced.
7[1]	443193	4390914	1	8.3	379	274	56	Small seep below #6. Leaky artesian well. 1 gpm or less bubbles out of top.
8[3]	443262	4390857	none		>20,000			Man-made, 30x100' dark red color. Discharge from buried tank.
9[2]	443138	4390877	seep	8.54	4,700	3,320	74.1	40' across. Measured from wet spots between vegetation in center.
10[4]	443011	4390862	seep					Small green area with damp soil. No water at surface.
11[4]	442682	4390623	damp					Small linear green area along drainage. No water at surface.
12[4]	442638	4390555	damp					Small linear green area along drainage. No water at surface.
13[2]	440786	4388302	seep	8.7	360		70.3	Circular 60' across. Water seepage near center in between grass clumps.
14[2]	440660	4388095	seep	7.2	415	292	75.4	Circular 60' across. Water seepage near center in between grass clumps.
15[2]	440450	4388140	seep + well	8.4	398	282	57.7	Circular 50' across. Small amount of seepage near center. Two tanks and old well, but no water from well.
16[4]	440362	4387876	dry		430			Not a spring, just 50'x20' dark green area. No surface water.
17[2]	439970	4387650	seep	7.4	440		65.7	Circular 70' across. Large area but very little water.
18[1]	439570	4387753	20	8.8	420		63.1	Artesian well. Water with about 1' of head flows from opening at top of well. Nice clear water flows 200' or more to east.
19[2]	439561	4387975	2-3	8.9	435	194	80.8	30x150' wet area, flows to SE. Large wet meadow area.

ID #	UTM		Flow (gpm)	pH	Specific Conductivity (mS)	TDS (mg/L)	Temp (F)	Description
	Easting	Northing						
20[2]	439460	4388011	seep	8.5	505	363	85.6	Circular 30' across. Only small amount of water in very small areas between grass clumps.
21[2]	439532	4388065	seep	8.2	504	357	82.4	Circular area 25' across. Very minor open water.

[1] artesian well

[2] seep

[3] discharge from buried tank

[4] damp soil with no surface water

(Source: Ormat 2015)

In 2010, Ormat collected water quality samples from most of the sites identified above (see Table 3.11, "Summary of Analytical Results, 2010" (p. 64)).

Table 3.11. Summary of Analytical Results, 2010

ID #	Temp (F)	pH	SiO2	Cl	F	HCO3	SO4	Ca	Mg	Na	B	Li
1	61.6	7.9	91	26	2.1	140	56	33	1.9	52	0.28	0.14
1	56.2	7.96	89	26	2.1	130	55	31	1.8	49	0.27	0.13
2	53.3	7.46	94	42	7.9	230	76	12	1.1	140	0.97	0.29
4	56	7.48	80	36	8	190	84	13	1.3	120	0.82	0.26
5	66.1	8.16	76	25	5.1	120	48	19	1.2	63	0.16	0.17
7	54.4	7.98	76	19	0.95	130	41	39	4.3	35	0.12	<0.10
9	50.5	7.33	78	35	5.2	220	70	43	5.5	99	0.72	0.16
13	54.4	7.58	39	15	0.14	140	38	38	6.6	28	0.1	<0.10
15	51.1	7.96	33	14	0.16	140	33	39	7.4	28	<0.10	<0.10
19	52.3	7.23	30	23	0.17	240	45	62	18	36	0.14	<0.10
20	56.8	7.71	22	18	0.17	220	38	57	15	29	0.12	<0.10
21	53.0	7.84	24	15	0.13	190	34	51	14	29	0.13	<0.10
NT-23[a]	180.0	9.39	190	38.9	12.2	63.4	93.9	3.48	0.12	156	1.09	2.7

(Source: Ormat 2015)

Within the Unit Area, Ormat has drilled 5 shallow core holes (35-23, 45-22, 65-22, 75-22 and 86-22), 1 deep core hole (67-22), 1 slim hole (84-22) and 1 full-size well (56-22). Limited geochemical data is available for the geothermal resource. Water quality samples from 84-22 and the old Newcrest drill hole sample (NT-23) show the geothermal fluid has relatively low total dissolved solids, but has yielded elevated concentrations of sodium, silica, fluoride and lithium, which are the best indicatory elements for this system; however the geothermal fluid also has elevated concentrations of boron and sulfate. The geothermal fluid has moderate salinity and does not meet drinking water standards (Ormat 2015).

As per the NDWR website, seven water wells exist in the general area of the northern Edwards Creek Valley, and are present on the east side of the playa, or several miles southwest of the Project Area. The only water well on or near the Project Area is the Tungsten Mt Mining Company well, drilled in 1959, located in the SW¼, SW¼ Section 22, T21N, R38E. As indicated

in the driller's log, the well is 200 feet deep, had an original static water level of 105 feet below ground surface (bgs), was completed in alluvial sand and gravel with intervals of boulders and clay, and was non-artesian (Ormat 2015).

Depth to groundwater was measured in the geothermal wells (except for Well 45-22, as it was inaccessible) and the Tungsten Mining Well in June 2015 (see Table 3.12, "Depth to Groundwater" (p. 65)). The groundwater is present at relatively shallow depths, but does not rise to the surface. As would be expected, groundwater in general becomes progressively shallower towards the playa; however, the results within the geothermal field are very irregular, and at this time cannot be explained.

Table 3.12. Depth to Groundwater

Well #	Depth to Water (feet below ground surface)
35-23	45.52
65-22	160.10
75-22	104.40
86-22	67.80
WW1 (Tungsten Mining Well)	113.29
67-22	104.62
84-22	102.80
56-22	227.03

Source: Ormat 2015

The artesian wells near the playa margin indicated that groundwater is confined in that area. There are no well logs available to show how deep the wells were drilled, or how they were constructed, but the wells produce a very small amount of water (except for site 18 to the far south). The groundwater in the Tungsten Mining Well appears to be unconfined as the 1964 NDWR drillers log does not show a confining layer above the water table. Currently, there is no indication of perched water at the site.

Water rights within the Unit Area and vicinity are summarized below (see Table 3.13, "Summary of Water Rights" (p. 65).

Table 3.13. Summary of Water Rights

App #	File Date	Source	Location	Owner of Record	Annual Duty (AFA)
7973	1/10/1927	Spring	SWNW Sec. 10, T.21N., R38E.	Casey, Michael and Claudia	11.20
V10071	7/29/2011	Spring	SESW Sec. 15, T.21N., R38E.	Casey, Michael and Claudia	0.00
23054	3/21/1966	Underground	NWSW Sec. 22, T.21N., R38E.	Farr, Dale and Evans, John	33.60
81026	7/29/2011	Underground	NWSW Sec. 22, T.21N., R38E.	Casey, Michael and Claudia	22.40
V02057	1/10/1927	Stream	SESW Sec. 29, T.21N., R38E.	Casey, Claudia	301.95
83315	12/23/2013	Underground	SESE Sec. 33, T.21N., R38E.	Casey, Michael and Claudia	400.00
V02058	1/10/1927	Stream	SWNE Sec. 34, T.21N., R38E.	Casey, Claudia	90.23
				TOTAL	859.38
				Vested (stream and spring)	403.38

App #	File Date	Source	Location	Owner of Record	Annual Duty (AFA)
				Vested (underground)	456.00
				Basin Perennial Yield	8,000

(Source: Ormat 2015)

3.4.10.2. Environmental Consequences

3.4.10.2.1. Proposed Action

The Project could affect water resources in several ways if it would: degrade the quality of surface water by increasing erosion or sedimentation; contaminate surface or groundwater due to materials and/or practices used, or by causing geothermal and non-geothermal mixing; decrease groundwater supply or interfere substantially with groundwater recharge.

Project construction would involve removal of vegetation. Lack of vegetation and periodic disturbance for maintenance in the areas of permanent disturbance would potentially increase sedimentation and decrease infiltration and groundwater recharge. To minimize erosion and stream channel sedimentation, storm water runoff from undisturbed areas around the constructed well pads, power plant sites and substations would be directed into ditches surrounding the disturbed areas and back onto undisturbed ground consistent with best management practices for storm water. Access roads would also be constructed and maintained consistent with the best management practices for road construction applicable to the intended use (temporary or permanent) of the road. To minimize erosion and stream channel sedimentation, grading or clearing of the surface for construction of the gen-tie line would occur only when absolutely necessary for safe access or installing the conductors and would only occur within the proposed ROW.

The geothermal wells would be drilled using non toxic drilling mud to prevent the loss of drilling fluids into the rock and the risk of contamination to any aquifers from the drilling fluid. Reserve pits would be constructed at each well site for the containment and temporary storage of drilling mud, drill cuttings, geothermal fluid and storm water runoff from each constructed well pad. Because non toxic drilling mud would be used, the reserve pits are not proposed to be lined. Additionally, the bentonite drilling muds discharged into the reserve pits would tend to act as a liner, in the same way they prevent the loss of drilling fluids in the well bore into the rock. Therefore, contamination of the local ground water aquifers as a result of the temporary discharges into the reserve pits is unlikely.

Also, the geothermal wells would be cased with steel to a depth well below the shallow ground water reservoirs. The casing would be cemented into the ground to prevent the loss of any geothermal resource into, and prevent the contamination or mixing of, any shallow ground waters by the geothermal production or injection fluid. The Underground Injection Control Permit required for the project's injection program from the NDEP Bureau of Water Pollution Control would require that the injection program be designed and monitored to prevent degradation of underground sources of drinking water due to the geothermal fluid injection practices.

Over the operational life of the project, accidental discharges of geothermal fluids could contaminate surface or ground waters. These are unlikely because of the frequent inspections and ultrasonic testing of the geothermal pipelines, the pipeline flow and pressure monitoring and

the well pump and pipeline valve shutdown features. However, should an accidental discharge occur, a temporary adaptation to the hydrologic monitoring plan to reflect any potential changes necessary to mitigate against groundwater or surface water contamination may be necessary. Contamination of surface or ground waters from spills of petroleum products (such as diesel fuel or lubricants) could also occur. However, this is also unlikely because the well pads and power plant sites, where most petroleum products would be used and stored, would be bermed to contain and control any spills. Further, the containment structures would be lined with an approved liner to prevent surface and ground water contamination.

Water required for construction activities would be obtained from geothermal fluid, an established private ranch source and trucked to each construction or drill site, or a shallow water well(s) drilled from one or more of the proposed drill sites as approved by the BLM. The water would likely be obtained from a shallow well located away from the geothermal system. As necessary, temporary construction water pipeline would be utilized and laid on the side of the existing roads and no additional surface disturbance is anticipated.

Approximately 50,000 gallons per day would be consumed during the first 2 months of construction of the energy plants and 5,000 gallons per day thereafter for 6 months. This one time quantity of construction water would be obtained from the geothermal fluid, an existing private water source or a shallow water well drilled from one or more of the proposed drill sites (see Section 2.1.6). During Project operations, up to approximately 325 gallons of water, to be used for septic purposes, would be consumed per day. This water would also be obtained from the sources identified above and would be trucked to the power plants and stored onsite. Drinking water would be purchased form a commercial bottled water source. As the water consumed by the Project primarily during construction (approximately 18.21 AFA) and to a lesser extent during Project operation (approximately 0.36 AFA), is substantially less than the 8,000 AFA perennial yield estimated for the basin, adverse impacts on the quantity of either surface waters or ground waters are not anticipated.

There are 21 anomalous surface features (4 leaking artesian wells, 11 groundwater seeps, 2 buried storage tanks and 4 shallow drainages with vegetation but no surface water) in the vicinity of the Unit Area (see Table 3.10, "Surface Features Evaluation Results, 2015" (p. 62)). These features are likely the result of groundwater (from precipitation or snow melt) moving down the mountain being forced to the surface by an impermeable, or relatively impermeable, natural barrier. As it is highly unlikely that they share the same water source, there is very little possibility that the geothermal activity proposed for down in the valley floor would have any impact on these features. However, and consistent with mitigation identified during the Tungsten Mountain Geothermal Exploration Project, the following measure is recommended to ensure that there is no impact to the surface features.

Mitigation Measure:

A hydrologic monitoring program would be developed. Monitoring activities would include reporting the number of aquifers encountered, their quality and their saturated thickness. This information would be submitted to the BLM SFO in a timely manner.

One spring (Site #1, as identified in Table 3.10, "Surface Features Evaluation Results, 2015" (p. 62), Table 3.11, "Summary of Analytical Results, 2010" (p. 64)and Figure 7) is located on the east side of the Unit area near the edge of the Edwards Creek Valley playa in Section 13. To ensure that there is no impact to this spring, Ormat has committed to monitor this spring,

consistent with the mitigation measure described below. Following implementation of this mitigation measure, impacts to this spring are not anticipated.

Mitigation Measure:

Lessee shall continue to monitor and collect the following hydrologic data from the spring located in the SE¼ of the SE¼ of Section 13:

- ***Representative temperature, flow or stage, and basic thermal water chemistry – once immediately prior to the commencement of drilling and once immediately following the completion of drilling;***
- ***During the drilling or flow testing of well 57 13 – Representative temperature and flow or stage – once each week until drilling or flow testing is completed;***
- ***Each year following the drilling of the first well until all wells have been abandoned – Representative temperature, flow or stage, and basic thermal water chemistry – once per year.***
- ***Collected data shall be reported to the BLM SFO Project Lead and Hydrologist in written form within one week of receipt by the lessee.***

3.4.10.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.11. Minerals

3.4.11.1. Affected Environment

The Project Area lies immediately west of the Tungsten Mountain Mine, which mined and shipped principally tungsten ore (as well as lead and zinc ores) (USGS 2015). There are 15 active mining claims on the public lands within the Project Area (see Table 3.14, “Mining Claims Filed Within the Project Area” (p. 68)).

Table 3.14. Mining Claims Filed Within the Project Area

Serial Number	Legal Description	Claim No.	Claimant
NMC1097413	T. 21 N., R. 38 E., Sec. 21 NE	CAN #100	Gold Range Company, LLC
NMC1097415	T. 21 N., R. 38 E., Sec. 21 NE,NW	CAN #102	Gold Range Company, LLC
NMC1097417	T. 21 N., R. 38 E., Sec. 21 NW	CAN #104	Gold Range Company, LLC
NMC1100574	T. 21 N., R. 38 E., Sec. 21 NE,NW	TMP 8	Michael M. Dobie
NMC1100575	T. 21 N., R. 38 E., Sec. 21 NE T. 21 N., R. 38E., Sec. 22 NW	TMP 9	Michael M. Dobie
NMC1101168	T. 21 N., R. 38 E., Sec. 21 NE,SE	TMP 6	Michael J. Weiser
NMC1101169	T. 21 N., R. 38 E., Sec. 21 NE,NW,SW,SE	TMP 7	Michael J. Weiser

Serial Number	Legal Description	Claim No.	Claimant
NMC1101242	T. 21 N., R. 38 E., Sec. 21 NE,SE T. 21 N., R. 38E., Sec. 22 NW,SW	TMP 3	Stephen A. Zayac
NMC1101243	T. 21 N., R. 38 E., Sec. 21 NE,SE	TMP 4	Stephen A. Zayak
NMC1106475	T. 21 N., R. 38 E., Sec. 21 SW,SE	TMP 1	Susan R. Ellis
NMC1106476	T. 21 N., R. 38 E., Sec. 21 SE T. 21 N., R. 38E., Sec. 22 SW	TMP 2	Susan R. Ellis
NMC1106477	T. 21 N., R. 38 E., Sec. 21 NE,SE	TMP 5	Susan R. Ellis
NMC1016455	T. 21 N., R. 38 E., Sec. 22 NW,SW	CA 6	Clan Alpine Mining, LLC
NMC988856	T. 21 N., R. 38 E., Sec. 22 NW	TM #1	Clan Alpine Mining, LLC
NMC999286	T. 21 N., R. 38 E., Sec. 22 NW,SW	CA 5	Clan Alpine Mining, LLC

Within the Project Area, there is one expired notice (NVN-89415) for exploration trenches within some of the active mining claims. There are no mining plans approved in the area.

3.4.11.2. Environmental Consequences

3.4.11.2.1. Proposed Action

Of the 15 mining claims within the Project Area, 4 of the claims (TM #1, TMP 2, CA 5 and CA 6) could present surface conflicts as proposed Project components have the potential to overlap the active mining claims. Specifically, geothermal well sites 76-21 and 86-21, and portions of the access road to site 13-22 potentially overlap claim TMP 2. Geothermal well site 24-22 and the pipeline to it potentially overlap claim CA 5 and TM #1. Portions of the geothermal pipeline to well site 54-22 potentially overlap claim CA 6.

BLM manages the land consistent with the Multiple Minerals Development Act (CFR 3740s). Any claimants in the Project Area would be notified by the SFO of the Proposed Action. Neither Ormat nor the claimant(s) may proceed with operations on leased or claimed public lands without notice to the BLM. Should operations be proposed which would result in potential conflict, BLM would attempt to assist the two parties to reduce or eliminate the conflict, consistent with the multiple mineral development act (43 CFR 3740s). No impacts are anticipated.

Approximately 160,000 cubic yards of surfacing material may be needed for construction of the Project. Aggregate material would be obtained from one of two sources: a private pit located off of Alpine Road, approximately 5.5 miles north of U.S. 50, or from an approximately 5-acre area located within Section 22 of the Project Area. A Mineral Materials permit would be processed for any aggregate pit located on public land managed by the BLM.

3.4.11.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.12. Visual Resources

3.4.12.1. Affected Environment

Section 102(a)(8) of the FLPMA establishes the policy that public lands be managed in a manner that would protect the quality of scenic values (43 USC §1701(a)(8)). To meet this responsibility, the BLM utilizes the VRM system (BLM Manual 8400, Manual H-8410-1 and Manual H-8431.

The VRM system is used to manage visual resources in a manner which would protect the quality of the scenic (visual) values, maintain the existing visual quality, and protect unique visual resources that exist on public lands. A Visual Resource Inventory (VRI), which is considered baseline data to establish VRM objectives, was conducted in the Carson City District in 2011 and established the VRI classes for visual ratings. These ratings describe an area in terms of visual or scenic quality and viewer sensitivity to the landscape (the degree of public concern for an area's scenic quality). The VRI classes describe the existing conditions on the ground and are used in conjunction with the management objectives to determine the VRM objectives.

VRI Classification Definitions:

- VRI Class I: Assigned to all special areas where the current management situation requires maintaining a natural environment essentially unaltered by man, such as Wilderness Areas or Wilderness Study Areas.
- VRI Class II: Highest visual value assigned through the inventory process and based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.
- VRI Class III: Moderate visual value based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.
- VRI Class IV: Low visual value based on the combination of Scenic Quality, Visual Sensitivity Levels, and Distance Zones.

VRM class designations are assigned based on the VRI in combination with land use allocations and management objectives outlined in the land use plan. Visual resources (the landscape) consist of landform (topography and soils), vegetation, and human-made structures (roads, buildings, and modifications of the land). These elements of the landscape are described in terms of their form, line, color, and texture. The more variety of these elements there is in a landscape, the more interesting or scenic the landscape becomes and the greater the importance to protect the visual resources. Once an area has been assigned a VRM class, the management objectives of that class can be used to analyze and determine if the visual impacts of proposed activities would be within the prescribed amount of change allowed to the landscape characteristics. The Visual Contrast Rating system is used to determine the amount of change that would occur to the landscape from a proposed project.

The VRM system uses four classes to describe different degrees of modification allowed to the landscape and are used to gauge the amount of disturbance an area can tolerate before it exceeds the visual management objectives of the assigned VRM class.

VRM Classes:

- Class I: The objective of this class is to preserve the existing character of the landscape. The level of change by the activity to the characteristic landscape should be very low and must not attract attention.
- Class II: The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- Class III: The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape can be moderate. Management activities may attract attention, but should not dominate the view of the casual observer.
- Class IV: The objective of this class is to provide for management activities which require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high.

The BLM manages landscapes for varying levels of protection and modification, giving consideration to other resource values, land uses, and the scenic quality of the landscape. The analysis area for visual resources includes lands where potential changes to the landscape from the Project may occur.

The Project Area is located in the foothills of the Clan Alpine Mountains on the northwestern side of the Edwards Creek Valley. As is typical of the Great Basin, a heterogeneous landscape is present throughout the Project Area. A northeast trending County dirt road runs through the Project area; U.S. Highway 50 is approximately 8 miles south. Numerous roads and "two tracks" traverse the area.

Visual Contrast Rating

The degree to which a project adversely affects the visual quality of a landscape relates directly to the amount of visual contrast between it and the existing landscape character. The degree of contrast is measured by separating the landscape into major features (land, water, vegetation, structures) then assessing the contrast introduced by the project in terms of the basic design elements of form, line, color, and texture (BLM Manual 8431, Visual Contrast Rating). The degree of contrast introduced by a proposed project with landscape elements is then rated as none, weak, moderate, or strong (see Table 3.15, "Degree of Contrast Ratings" (p. 71)). The purpose of this method is to reveal elements and features that cause the greatest visual impact, and to guide efforts to reduce the visual impact of a proposed action or activity. This process is described in detail in Handbook H-8431-1, Visual Resource Contrast Rating, and documented using BLM Form 8400-4. Visual Contrast Ratings Worksheets and Photo Logs for the potential impacts the proposed Project may have on visual quality are provided as Appendix B.

Table 3.15. Degree of Contrast Ratings

Degree of Contrast	Criteria	Conformance with VRM Class
None	The element contrast is not visible or perceived.	VRM Class I – IV
Weak	The element contrast can be seen but does not attract attention.	VRM Class II – IV
Moderate	The element contrast begins to attract attention and begins to dominate the characteristic landscape	VRM Class III – IV
Strong	The element contrast demands attention, will not be overlooked, and is dominant in the landscape.	VRM Class IV only

(Source: BLM Manual 8431, Visual Contrast Rating)

Key Observation Points

Seven Key Observation Points (KOPs) were chosen for visual contrast rating analysis (see Table 3.16, " KOP Location and Description" (p. 72)and Appendix B).

Table 3.16. KOP Location and Description

KOP #	Location	Distance from Project	Comments
KOP 1	Point along Alpine Road.	0.5 miles south	Provides first view of proposed gen-tie line for motorized travelers heading north from Cold Springs on Highway 50.
KOP 2	Point along Alpine Road.	2.0 miles south	Provides first view of proposed gen-tie line (Option 1) for motorized travelers heading north on Alpine Road.
KOP 3	Point along Alpine Road.	2.9 miles south	Provides first view of the proposed gen-tie line (Option 2) for motorized travelers heading north on Alpine Road.
KOP 4	Point along Alpine Road.	4.5 miles southwest	Provides first view of the proposed power plants for motorized travelers heading northeast on Alpine Road north of Clan Alpine.
KOP 5	Point along Antelope Road.	7.8 miles southeast	Provides first view of the power plants for motorized travelers heading northwest on Antelope Road.
KOP 6	Point along Highway 50.	8.1 miles southeast	Provides first view of the power plants for motorized travelers heading west on Highway 50 from Austin.
KOP 7	Point along Highway 50.	8.1 miles southeast	Provides first view of the proposed gen-tie line for motorized travelers heading southwest on Highway 50.

From each KOP, the viewshed can be divided into three distinct distance zones: the foreground, midground and background (see Table 3.17, "Viewsheds from KOPs" (p. 72)).

Table 3.17. Viewsheds from KOPs

KOP #	Foreground	Midground	Background
KOP 1	Consists of open, relatively smooth, flat, slightly concave valley floor sloping south. Vegetation is composed primarily of indistinct sage brush scrub which is low, uniform and continuous with predominate colors of yellow, grays, light tans or browns and occasional green.	Same as foreground.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.
KOP 2	Consists of open, relatively smooth, flat, slightly concave valley floor sloping south. Vegetation is composed primarily of indistinct sage brush scrub which is low, uniform and continuous with predominate colors of yellow, grays, light tans or browns and occasional green.	Same as foreground.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.
KOP 3	Consists of open, relatively smooth, slightly rising valley floor sloping north. Vegetation is composed primarily indistinct sage brush scrub which is low, uneven, and sparse with predominate colors of yellow, grays and light tans or browns and green.	Consists of a small ridge perpendicular to the view.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.

KOP #	Foreground	Midground	Background
KOP 4	Consists of open, relatively smooth, slightly rising valley floor sloping southwest. Vegetation is composed primarily indistinct sage brush scrub which is low and even but discontinuous with predominate colors of yellow, grays and light tans or browns and occasional green.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.	Same as middle ground.
KOP 5	Consists of open, relatively smooth, flat, slightly concave alluvial fan sloping north to the dry lake bed. Vegetation is composed primarily of indistinct salt desert scrub and grasses which are low, uniform and continuous with predominant colors of yellow, and light tans or browns and occasional dark green.	Consists of a smooth flat continuous dry lake bed surface with little to no vegetation cover. The predominant color is light tan.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.
KOP 6	Consists of open, relatively smooth, flat, slightly concave alluvial fan sloping north to the dry lake bed. Vegetation is composed primarily of indistinct salt desert scrub and grasses which are low, uniform and transitional with predominant colors of yellow, and light tans or browns and occasional dark green.	Consists of a smooth flat continuous dry lake bed surface with little to no vegetation cover. The predominant color is light tan.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.
KOP 7	Consists of open, relatively smooth, flat, slightly concave valley floor sloping south. Vegetation is composed primarily of indistinct sage brush scrub which is low, uniform and continuous with predominate colors of yellow, grays, light tans or browns and occasional green.	Same as foreground.	Consists of rugged terrain comprised of small ridges and canyons and pyramidal, angular shapes that provide dark and light contrasts from shadows. Predominant colors are dark browns and greens.

Visual Resource Management Objectives

The assignment of VRM objectives in the CRMP was not completed for all lands in the planning area, including the Project Area; these lands are considered to be unclassified. When no VRM objectives exist, the CRMP standard operating procedures state that an interim VRM objective is to be assigned at the time a project is proposed. The VRM objectives are to be developed using the guidelines established in BLM Manual H-8410-1 and must conform to land use allocations set forth in the CRMP.

A review of the VRI was conducted and the current management activities in the area were assessed. The Project Area and surrounding lands are recommended an interim VRM Class III objective to allow for management decisions consistent with the resource allocations for the area. Since the primary resource use within the Project Area is grazing and energy development, establishing an interim VRM Class III objective would be in compliance with current guidelines and policy for VRM.

3.4.12.2. Environmental Consequences

3.4.12.2.1. Proposed Action

The Proposed Action for visual resources is to establish interim VRM objectives for the Project Area until such time as permanent objectives are designated in the ongoing Carson City District Resource Management Plan revision. Once the Carson City Resource Management Plan revision is final, the management decision regarding VRM would supersede the interim VRM objectives established through this EA should they vary.

The visual contrast rating analysis for all 7 KOPs found the Project components would be visible and create a contrast with the surrounding landscape. The predominant vegetation is under three feet in height and would not provide screening of the project. The horizon line would be broken and discontiguous, thereby reducing contrasting impacts to the landscape lines and form since power lines and facilities would not protrude above the skyline. The Project would be extending existing visual disturbances and introducing additional elements into the landscape. However, non-natural features to line and form are already present from the existing utility poles and lines, man-made structures, fence lines, and dirt roads with exposed natural sediment.

Further, drilling operations would be visible in the Project Area during site construction and intermittently over the life of the Project. The drill rigs proposed for the Project would be up to 175 feet in height. Well drilling operations would typically take about 45 days to complete for each well and would be 24 hours per day, 7 days per week. During drilling operations, lights used when drilling at night would increase rig visibility. Impacts to visual resources from drilling operations would primarily affect the elements of line and color. As drilling operations would occur around the clock, lighting from the drill rigs would affect nighttime darkness. Drilling operations would be temporary and short-term, therefore impacts associated with drilling operations would also be temporary.

Ormat has committed to paint all power plant buildings, structures, pipe, etc. covert green or other appropriate color equivalent to or consistent with the BLM Standard Environmental Color Chart to blend in the area and minimize visibility, unless precluded by safety requirements. Also, the following mitigation measures are recommended to reduce the visual impacts of the Proposed Action.

Mitigation Measures

All drill rig and well test facility lights would be limited to those required to safely conduct the operations, and would be shielded and/or directed in a manner that focuses direct light to the immediate work area.

To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

As the degree of contrast and modification imposed on the landscape by the Project would fall within the parameters of VRM Class III objectives, the Project would be in conformance with VRM guidelines and policy. Further, as installation of the prescribed lighting types along with

properly shielded lighting would limit light pollution into the natural darkness of the high desert environment, these mitigations would limit lighting impacts to the Nevada "dark skies" as well as limit light pollution effects to local wildlife populations.

3.4.12.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.13. Wilderness/WSA

3.4.13.1. Affected Environment

The north and northwest boundary of the Unit area is adjacent to the eastern edge of the Clan Alpine Wilderness Study Area (WSA) in Edwards Creek Valley.

3.4.13.2. Environmental Consequences

3.4.13.2.1. Proposed Action

Ormat is not proposing any activity within the Clan Alpine WSA therefore direct impacts are not anticipated.

It is Ormat's responsibility to ensure that activities remain outside of the established WSA boundary. In issuance of federal geothermal lease N-92480 to Ormat, a metes and bounds survey of a portion of the boundary of the Clan Alpine WSA in T. 12 N., R. 38 E. was conducted in August-September 2011, so establishment of a boundary is not an issue.

3.4.13.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.14. Land Use Authorizations

3.4.14.1. Affected Environment

There are several land use authorizations granted on public lands within the Project Area (see Table 3.18, "Land Use Authorizations Within the Project Area" (p. 76)).

Table 3.18. Land Use Authorizations Within the Project Area

Holder	ROW/Activity	Case File No.	Location
Navy Facility Engineering Command – Real Estate	Five mobile threat emitter sites	NVN-073748	T. 21 N., R. 38 E., sec. 23
ORNI 43 LLC	Geothermal lease	NVN-085715	T. 21 N., R. 38 E., sec. 13, 21, 23-28
ORNI 43 LLC	Geothermal lease	NVN-086897	T. 21 N., R. 38 E., sec. 22
ORNI 43 LLC	Geothermal lease	NVN-086898	T. 21 N., R. 38 E., sec. 33, 34
ORNI 43 LLC	Geothermal lease	NVN-088428	T. 21 N., R. 38 E., sec. 23, 26, 27
ORNI 43 LLC	Geothermal lease	NVN-090744	T. 21 N., R. 38 E., sec. 13, 22, 23, 24
ORNI 43 LLC	Geothermal lease	NVN-092480	T. 21 N., R. 38 E., sec. 13, 22, 23
ORNI 43 LLC	Geothermal unit	NVN-088836X	T. 21 N., R. 38 E., sec. 13, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34
Clan Alpine Mining LLC	Notice of intent – gold	NVN-089415	T. 21 N., R. 38 E., sec. 22
Hussey Oil & Gas Inc.	Oil and gas lease (noncompetitive)	NVN-093429	T. 21 N., R. 38 E., sec. 1, 2, 3, 4, 5, 13, 23, 24, 25, 26, 27, 34, 35, 36

3.4.14.2. Environmental Consequences

3.4.14.2.1. Proposed Action

Project facilities and activities would be located away from the authorized ROWs, so there would be no impacts to lands and realty within the Project Area. Although the proposed gen-tie line conductors (wires) would pass over several land use authorizations, they would not interfere with any existing ROWs, therefore no impacts are anticipated.

Any Rights-of-Way holders in the Project Area would be notified by the Stillwater Field Office of the Proposed Action. Should operations be proposed which would result in potential conflict between Ormat and a ROW holder, the BLM would attempt to assist the two parties to reduce or eliminate the conflict. No impacts are anticipated.

3.4.14.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Renewable Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

3.4.15. Socioeconomics

3.4.15.1. Affected Environment

County Data

The Project Area is located in Churchill County, Nevada. The land area of Churchill County is approximately 4,929 square miles and there are 94.3 square miles of water area in the county. The County seat is Fallon.

As of 2012, the population of Churchill County was estimated at 24,375 people. The population density of the County is 5 persons per square mile. The median resident age in Churchill County is 39 years vs. the Nevada median age of 36.6 years. The gender of the population within the county is 12,508 males and 12,369 females. The racial makeup of the county is 76.5% White Non-Hispanic, 12.1% Hispanic or Latino, 4.0% American Indian and Alaska Native alone, 2.5 % Asian, 1.5% Black Non-Hispanic, and 3.1% identified as two or more races (City Data 2015).

Total employment for Churchill County as of 2013 was at 19,289 persons age 16 and over. As of 2013, the three largest industries providing employment were: educational, health and social services (15.5%); arts, entertainment, recreation, accommodation and food services (12.8%); and Retail trade (12.4%). Of those employed, approximately 67% were in the private sector, 27% were in government and 7% were self employed (City Data 2015, U.S. Census Bureau 2015).

Median income for a household in the County in 2012 was $48,826. The unemployment rate for the county is 6.5% (2014), and is lower than the state's unemployment rate of 9.8%. The unemployment rate for the county has decreased steadily since 2010, when the unemployment rate was 12%. (City Data 2015, U.S. Census Bureau 2015).

There are 10,576 housing units available in Churchill County, of which 9,253 are occupied and 1,503 are unoccupied. Of the occupied units, approximately 5,728 are owner occupied and 3,525 are renter occupied. The homeowner vacancy rate is 1.1%, whereas the rental vacancy rate is 12.0% (City Data 2015, U.S. Census Bureau 2015)

Nevada Renewable Portfolio Standard

On June 6, 2013, the state of Nevada enacted Senate Bill 252, which revised the Nevada Renewable Portfolio Standard (NRS 704.7821) 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 sources.

A large source of renewable energy in Nevada is from geothermal energy. Currently, the State of Nevada has 586 MW of nameplate generating capacity from 22 operating geothermal energy plants from 14 different locations (NDOM 2015).

3.4.15.2. Environmental Consequences

3.4.15.2.1. Proposed Action

Implementation of the Project would provide minor economic benefits to the local economy. Construction of the geothermal portions of the Project would likely require a maximum of up to 50 workers; construction of the gen-tie line would require approximately 7 workers. Some of these workers would be recruited locally, though most would be specialized workers from outside the local area. A few of the workers (drilling or construction manager, geologist and mud engineer) are expected to live onsite in travel trailers during construction or drilling activities, but most workers would be expected to stay in local hotels, rental housing units or recreational vehicles and campgrounds, primarily in Cold Springs, Middlegate and/or Fallon, all in Churchill County, Nevada. Typically, non-skilled workers do not bring families with them on temporary construction assignments. There are enough available housing/rental units and campground opportunities that the temporary increase in workers for construction should not strain the local communities or stress their resources.

Non-local construction workers are typically paid a per diem rate for daily housing and meal costs. Workers normally spend the per diem on motel accommodations or RV campground space rent, restaurants, groceries, gasoline, and entertainment. In addition, Ormat would likely rent or purchase some portion of the equipment and supplies from local suppliers, primarily in Cold Springs, Middlegate and/or Fallon. This spending activity associated with the construction of the Project would have a small but positive effect on local businesses in Churchill County.

Once operating, the Project would have a staff of approximately 20 employees. Given the small amount of workers needed, the Project would not induce population growth in the area. Neither does the proposed Project create or provide any infrastructure which would indirectly induce substantial population growth.

Once the renewable energy plants are operating, they would contribute to meeting Nevada's Renewable Portfolio Standard. This would be a positive impact.

3.4.15.2.2. No Action

Under the No Action alternative, the Tungsten Mountain Geothermal Development Project as currently proposed would not be constructed or operated, and the affected environment for the Proposed Action would remain the same. No additional jobs would be created and additional revenues would not occur within Churchill County. There would be no disruption to local services, nor increased demand for goods or lodging at this time. Geothermal exploration well drilling and testing activities, as approved under the Tungsten Mountain Geothermal Exploration EA (BLM 2012a), are ongoing and would be allowed to continue (see Section 1.5: Relationships to Statutes, Regulations, Plans and Environmental Analysis).

Chapter 4. Cumulative Impacts:

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The purpose of the cumulative impacts analysis for the proposed action is to evaluate the combined, incremental effects of human activity within the scope of the project. Council of Environmental Quality (CEQ) regulations defines scope to include connected actions, cumulative actions, and similar actions (40 CFR 1508.25). The Council on Environmental Quality formally defines cumulative impacts as follows:

For the purposes of this EA, the cumulative impacts are the sum of all past, present (including proposed actions), and reasonably foreseeable future actions (RFFAs) resulting primarily from mining, grazing and public uses. The purpose of the cumulative analysis in this EA is to evaluate the significance of the Proposed Action's contributions to cumulative environment.

As required under the NEPA and the regulations implementing NEPA, this chapter addresses those cumulative effects on the environmental resources in the Cumulative Effects Study Areas (CESAs) which could result from the implementation of the Proposed Action and No Action Alternative, past actions, present actions, and RFFAs. Unless otherwise specified below, the CESA for all resources is the Unit Area and gen-tie line corridor.

For the purposes of this analysis and under federal regulations, 'impacts' and 'effects' are assumed to have the same meaning and are interchangeable.

4.1. Past, Present and Reasonably Foreseeable Future Actions

The past, present, and RFFA applicable to the assessment area are identified as described below.

Table 4.1. Past, Present, and Reasonably Foreseeable Future Actions

Project – Name or Description	Status (x)		
	Past	Present	Future
Livestock Grazing	X	X	X
Dispersed Recreation	X	X	X
Mineral exploration/geothermal exploration/abandoned mine land reclamation	X	X	X
Mineral Material Disposals	X	X	X
Range Improvements (including fencing, wells and water developments)	X	X	X
Utility and other Rights-of-Way	X	X	X

4.2. Cumulative Effects on Air Quality

4.2.1. Cumulative Impacts of the Proposed Action

Although minimized by the adopted protection measures (see Section 2.1.11), the Proposed Action would generate particulates in the form of fugitive dust from earth moving activities and travel on unpaved roads. Diesel engines used (primarily during earth moving and well drilling) would create combustion emissions, criteria air pollutant precursors and greenhouse gas emissions.

Past and present actions have generated fugitive dust, principally from surface disturbing activities and travel on unpaved roads. Wildfires have and would continue to intermittently contribute emissions to the air basin. There are no known other industrial complexes proposed in the CESA boundary.

As a result of the Project's compliance with the requisite Surface Area Disturbance Permit and Project APMs (see Section 2.1.11), ambient air quality in the Project Area would be maintained.

Any increases in fugitive dust, combustion emissions, criteria air pollutant precursors or greenhouse gas emissions would be minimal. Similar air pollutants generated by past, present and RFFA are expected to be sporadic and dispersed across the CESA. Cumulative impacts to air quality are anticipated to be negligible.

4.2.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to air quality would be limited to those discussed above for the past, present and RFFA.

4.3. Cumulative Effects on Cultural Resources

4.3.1. Cumulative Impacts of the Proposed Action

Impacts to the integrity of setting of any subsequently identified National Register listed/eligible sites where integrity of setting is critical to their listing/eligibility could occur from the Proposed Action and the RFFA. Construction activities could increase the likelihood of vandalism of cultural sites.

Effects to cultural resources could be prevented by site avoidance and by prosecuting offenses under the Archaeological Resources Protection Act. In some cases archaeological monitors (archaeologists permitted by Nevada BLM) may be required by the BLM to ensure that sites are avoided by the project activities. If all sites that are determined eligible for inclusion on the NRHP are avoided, and sites whose NRHP status is unevaluated are also avoided, then the project would have no effect to historic properties and the cumulative effect would be negligible.

4.3.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to cultural resources would be limited to those discussed above for the past, present and RFFA.

4.4. Cumulative Effects on Native American Religious Concerns

4.4.1. Cumulative Impacts of the Proposed Action

Over the last couple decades, BLM and the tribes have witnessed an increase in the use of lands administered by BLM, by various groups, organizations, and individuals. New ways to utilize the public lands are also on the rise. Livestock grazing; pursuit of recreation opportunities; hunting/fishing; Oil, Gas, Geothermal, and Mining leasing, exploration and development; along with uses such as off-highway vehicle use, interpretive trails, and mountain biking are among many increasing uses. In addition to all the existing, growing, and developing uses of the public lands, fluid mineral leasing, exploration and development would continue to contribute to the general decline in sites and associated activities of a cultural, traditional, and spiritual nature.

It is believed that cultural resources, including tribal resources and sites of cultural, traditional, spiritual use and associated activities are increasingly in danger of losing their physical and spiritual integrity. However, as populations grow, public interest in utilizing lands administered

by the BLM increases and thus the potential for the decline of culturally sensitive areas also increases. Diverse world views, social and spiritual practices, economic and employment pursuits, resource utilization, and traditions and beliefs often conflict with each other. Because traditional lands encompass the majority of the State of Nevada, it is imperative that BLM and affected Tribes remain flexible and open to productive and proactive communication in order to assist each other in making decisions that would significantly reduce or eliminate any adverse effects to all party's interests, resources, and/or activities.

4.4.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to Native American Religious Concerns would be limited to those discussed above for the past, present and RFFA.

4.5. Cumulative Effects on Vegetation

4.5.1. Cumulative Impacts of the Proposed Action

Surface disturbance associated with the proposed Project activities would result in the loss of vegetation. Approximately 105 acres of the disturbance within the Project Area (regardless of Option selected) would be long-term, as these areas would remain disturbed over the operational life of the proposed Project. All disturbed areas would be subject to final reclamation following project decommissioning (see Section 2.1.9).

Within the CESA, past, present and RFFA which have or could have a cumulative effect on the impacts to vegetation are any that would result in surface disturbance. Like much of the public lands BLM administers, the area has been impacted from overland travel, mining, settlements, livestock grazing and wildland fire. These disturbances have altered the ecological processes which maintained the biological integrity of the rangelands and has provided for the introduction and expansion of exotic invasive species.

The direct disturbance and removal of vegetation associated with the Proposed Action would be cumulative with these past, present, and reasonably foreseeable future effects to vegetation. However, as mitigation measures and Project reclamation would limit effects to relatively small areas and short periods of time, no cumulative impacts to vegetation are anticipated.

4.5.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to vegetation would be limited to those discussed above for the past, present and RFFA.

4.6. Cumulative Effects on Soils

4.6.1. Cumulative Impacts of the Proposed Action

Ground disturbing activities associated with the construction, operation, maintenance, and decommissioning of the Proposed Action, along with other past, present, or RFFA, could result in a cumulative effect on soil resources. With the Proposed Action, ground disturbing activities

would increase the potential for down gradient soil loss through wind- and water-driven erosion. While soil erosion BMPs would be in place for the Project, localized soil erosion can be expected, given the acreage disturbed, typically dry soil conditions, and occurrence of high winds in the development area. These residual impacts would be most prevalent on dry, windy days, when wind-driven erosion on denuded surfaces would be most likely to occur. When combined with other RFFA, the Proposed Action would result in an incremental addition to soil resource related impacts. It is assumed all reasonably foreseeable development on BLM lands near the Project would be subject to similar design considerations and site-specific environmental analysis to reduce the potential cumulative impacts to soil resources.

4.6.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to soils would be limited to those discussed above for the past, present and RFFA.

4.7. Cumulative Effects on General Wildlife (Including Migratory Birds and Special Status Species)

4.7.1. Cumulative Impacts of the Proposed Action

The cumulative effects identified would be similar for general wildlife, migratory birds, and sensitive and special status plant and wildlife species.

The Proposed Action would result in the long term loss of approximately 105 acres of wildlife habitat and direct displacement of wildlife over the life of the Project. Direct effects could also include injury or mortality during surface-clearing activities. Project-generated noise and human activity would also deter some wildlife from using the area surrounding the project. Increased wildlife mortality and injury from collisions would result from increased vehicular traffic associated with the Proposed Action. Habitat fragmentation resulting from the project facilities and activities would affect various types of wildlife.

Disturbance to, loss of and fragmentation of wildlife habitat resulting from the Proposed Action would be cumulative with past and present actions and RFFA implemented in the CESA. Indirect effects could result from human activity and noise surrounding projects. The extent of these effects to habitat would depend on the cumulative size of the footprint of these activities, their locations relative to wildlife habitats, and the duration and frequency of activities disruptive to wildlife. The direct and indirect effects to wildlife from the Proposed Action (summarized above) are very small relative to the wildlife habitat in the vicinity and region, and wildlife should be able to move from away from small areas of direct disturbance and into adjacent suitable habitat. Reclamation of disturbed areas, as proposed by the Project, could reestablish habitat for wildlife. Thus, overall cumulative effects to wildlife would be negligible. Cumulative effects to individuals of species and local meta-populations utilizing specific sites could be affected, but greater effects to regional populations within the CESA are not expected.

4.7.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to general wildlife (including migratory birds and special status species) would be limited to those discussed above for the past, present and RFFA.

4.8. Cumulative Effects on Water Quality (Surface and Ground)

4.8.1. Cumulative Impacts of the Proposed Action

Impacts to water quality could be expected to occur from additional mineral exploration and other reasonably foreseeable activities within the area of cumulative effects. Additional roads could be constructed and mineral exploration holes drilled. Each of these activities would have the potential to degrade surface water quality in the affected areas, although measures requiring the implementation of best management practices for erosion and sedimentation could help reduce the potential effects if implemented for the other actions. Over the operational life of the proposed Project, accidental discharges of geothermal fluids and contamination of surface or ground waters from spills of petroleum products is unlikely. Also, as the water consumed by the Project is substantially less than the perennial yield estimated for the basin, adverse impacts on the quantity of either surface waters or ground waters is not anticipated. Because the proposed Project would have little potential for affecting the quality of either surface waters or ground waters in the proposed Project area due to the adoption of best management practices and adherence to identified mitigation measures, and would have no measurable impact on water quantity, the proposed Project would not contribute to any cumulative impacts to water quality and quantity.

4.8.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to water quality (surface and ground) would be limited to those discussed above for the past, present and RFFA.

4.9. Cumulative Effects on Visual Resources

4.9.1. Cumulative Impacts of the Proposed Action

The Proposed Action would add to the existing disturbances which affect visual resources but would be contiguous and consistent with existing disturbances in the area. The level of change to the visual character of the area would also be consistent with the impacts which currently exist, which are moderate in nature, and acceptable for a VRM Class III designation.

Current disturbances in the area include the graded County Road (Alpine Road), off-highway travel routes including graded dirt roads, an electrical gen-tie line, previous mineral exploration and grazing disturbances. There are no reasonably foreseeable projects on public lands within the area at this time.

4.9.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to visual resources would be limited to those discussed above for the past, present and RFFA.

4.10. Cumulative Effects on Socioeconomics

4.10.1. Cumulative Impacts of the Proposed Action

The Proposed Action would not induce a substantial growth or concentration of population, nor would it cause a substantial net increase in the county expenditures or revenues of Churchill County. The majority of the impacts would occur during construction and decommissioning activities as these are when there would be the highest number of workers at the site. During facility operations, few workers (approximately 20) would be permanent at the site. The Project would not create a substantial demand for public services as only 20 full-time workers are expected throughout the project life and local communities have the available resources (housing, goods and services) to support these workers. There would not be a major increase in impacts to socioeconomics as a result of the implementation of the Project. Cumulative impacts to socioeconomics from the past, present, and RFFA when combined with the Proposed Action are considered negligible.

4.10.2. Cumulative Impacts of the No Action

Under the No Action Alternative, impacts to socioeconomics would be limited to those discussed above for the past, present and RFFA.

4.11. Summary of Mitigation Measures

In addition to the APMs identified in EA Section 2.1.11 committed to by Ormat, the following mitigation measures are recommended to further reduce impacts from the Project. The mitigation measures are listed in the order they appear in the above analysis. When a mitigation measure applies to another section, the section name is listed, where applicable.

Vegetation

- Seeding of disturbed areas associated would be completed using the following BLM approved native seed mixture and would be comprised of the following species: fourwing saltbush (Atriplex canescens), squirreltail (Elymus elymoides), siberian wheatgrass (Agropyron fragile), desert needlegrass (Achnatherum speciosum) and small burnet (Sanguisorba minor). Nonnative seeds deemed appropriate by the BLM (based on site specific conditions and concerns) would also be considered.

Migratory Birds

- All surface disturbing activities should occur outside of the migratory bird nesting period (March 1 to July 31 for raptors and April 1 to July 31 for all other avian species). If surface disturbing activities are to occur during this period, pre-construction avian surveys would be conducted in appropriate habitats by qualified biologists (approved by the BLM) prior to surface disturbing activities commencing. The exact area to be surveyed would be based on the scope of the surface disturbing activities (as determined by the BLM). If ground disturbing activities do not take place within 14 days, the areas would be resurveyed. If nesting migratory birds are present, appropriate buffers determined by the BLM, in coordination with the NDOW/USFWS, would be applied until an approved biologist determines the young have fledged or the nest has failed.

The above mitigation measure also applies to Special Status Species.

Special Status Species

- Appropriate buffers would be placed around BLM sensitive plants (e.g. Lahontan beardtongue) and cacti (e.g. grizzlybear prickly pear) where reasonably possible to protect them from surface disturbing activities. In areas where avoidance is not reasonably possible, all BLM sensitive plant species and cacti must be replanted immediately in undisturbed locations containing suitable habitat that is adjacent to the project area. Unless otherwise directed by the BLM botanist, all replanted plants must be watered and otherwise maintained for a period of one year. The goal is to have at least 80% survival of all transplanted plants.

- Ormat would provide the funding necessary to install bat friendly gates over the entrances of all adits/shafts within the Unit Area that are used by bats for roosting. This would prevent humans from disturbing roosting bats. The construction of bat gates would occur during the spring and/or fall (dependent on bat usage of each structure).

- To reduce impacts to bats from project lighting, motion activated lighting, directed lighting, shielding methods, and or/reduced lumen intensity would be used.

- To reduce impacts to roosting bats during the critical hibernation and/or maternity periods, no construction activities or drilling operations would occur within 0.25 miles of structures used by bats during these critical periods. The hibernation period is generally from October 30 to March 30, and the maternity period is generally from May 15 to July 30. It must be stated that these dates would vary by species and are influenced by annual climatic conditions.

- If hydrologic monitoring indicates that project related activities are resulting in the desiccation of important bat foraging/drinking areas within and immediately adjacent to the Project Area, Ormat would maintain an artificial water source within the Unit Area that would provide water and foraging opportunities for bats. The artificial water source could also be used to deter bats from drinking/foraging around reserve pits (if reserve pits contain liquids that are harmful to bats).

Water Quality (Surface and Ground)

- A hydrologic monitoring program would be developed. Monitoring activities would include reporting the number of aquifers encountered, their quality and their saturated thickness. This information would be submitted to the BLM SFO in a timely manner.

- Lessee shall continue to monitor and collect the following hydrologic data from the spring located in the SE¼ of the SE¼ of Section 13:

  - Representative temperature, flow or stage, and basic thermal water chemistry – once immediately prior to the commencement of drilling and once immediately following the completion of drilling;

  - During the drilling or flow testing of well 57 13 – Representative temperature and flow or stage – once each week until drilling or flow testing is completed;

  - Each year following the drilling of the first well until all wells have been abandoned – Representative temperature, flow or stage, and basic thermal water chemistry – once per year.

- Collected data shall be reported to the BLM SFO Project Lead and Hydrologist in written form within one week of receipt by the lessee.

The above mitigation measures also apply to Special Status Species.

Visual Resource Management

- All drill rig and well test facility lights would be limited to those required to safely conduct the operations, and would be shielded and/or directed in a manner that focuses direct light to the immediate work area.

- To maintain dark sky conditions, and minimize visual disturbance, facility perimeter lighting, including lighting used to illuminate walkways, roadways, staging areas and parking areas, would be shielded so that the light would be cast in a downward direction. Low-pressure sodium lighting (or an improved technology, if readily available) would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

The above mitigation measures also apply to Migratory Birds, Special Status Species and General Wildlife.

Chapter 5. List of Preparers

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Table 5.1. List of Preparers

Name	Title	Responsible for the Following Section(s) of this Document
BLM Stillwater Field Office		
Linda Appel	Rangeland Management Specialist	Air Quality, Livestock Grazing, Wild Horse and Burros, Vegetation
Ken Depaoli	Geologist	Minerals
Chris Kula	Wildlife Biologist	Migratory Birds, Threatened or Endangered Species (animals), BLM sensitive species (animals), BLM sensitive species (plants), General Wildlife
Angelica Rose	Planning and Environmental Coordinator	NEPA Compliance, Socioeconomics
Matt Simons	Realty Specialist	Land Use Authorizations, Visual
Michelle Stropky	Hydrologist	Water Quality (Surface/Ground), Soils
Dan Westermeyer	Outdoor Recreation Planner	Wilderness/WSA, Visual
Jason Wright	Archaeologist	Project Manager, Cultural Resources, Native American Religious Concerns, Paleontology
Altman Environmental Consulting (AEC)		
Heather Altman	Principal	Project Manager, All Resource Sections
Environmental Management Associates (EMA)		
Dwight Carey	Principal	Project Principal
Erin Wielenga	Environmental Specialist	Air Quality, Technical Editing and Formatting
Doug Carey	GIS Analyst	Geographic Information Systems
Stantec Consulting Services Inc.		
Kristi Schaff	Project Manager	Biological Survey Report
Joshua Vittori	Biologist	Biological Survey Report
Cardno ENTRIX		
Benjamin Orcutt	Field Director	Cultural Resources Report
Kim Garcia	Crew Chief	Cultural Resources Report
Sophie Asbury	Field Crew	Cultural Resources Report
Tyrell Milliron	Field Crew	Cultural Resources Report
Christina Rathbone	Field Crew	Cultural Resources Report
Shaun Richey	Field Crew	Cultural Resources Report
Harold Brewer	Principle Investigator	Cultural Resources Report and Visual Simulations

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Chapter 6. Tribes, Individuals, Organizations, or Agencies Consulted:

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Table 6.1. List of Persons, Agencies and Organizations Consulted

Agency/Group	Name
Churchill County	County commissioners and county staff
Fallon Paiute-Shoshone Tribe	Chairman Len George, Alvin Moyle, Ray Strands, Donna Cossette and members of the Cultural Committee
Nevada Division of Wildlife	Jenni Jeffers
Nevada Natural Heritage Program	Eric S. Miskow
Nevada State Historic Preservation Office	

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Chapter 7. References

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