

**FINAL ENVIRONMENTAL ASSESSMENT**  
**Ormat Technologies, Inc.**  
**Dixie Meadows Geothermal**  
**Exploration Project**

DOI-BLM-NV-C010-2011-0516-EA

U.S. Department of the Interior  
Bureau of Land Management  
Carson City District  
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## LIST OF ACRONYMS AND ABBREVIATIONS

<b>ARPA</b>	Archaeological Resources Protection Act
<b>BLM</b>	Bureau of Land Management
<b>BMPs</b>	best management practices
<b>BOPE</b>	blowout prevention equipment
<b>CFR</b>	Code of Federal Regulations
<b>CIAA</b>	cumulative impact assessment area
<b>COE</b>	U.S. Army Corps of Engineers
<b>DoN</b>	Department of the Navy
<b>EA</b>	Environmental Assessment
<b>FLPMA</b>	Federal Land Policy and Management Act
<b>H<sub>2</sub>S</b>	hydrogen sulfide
<b>MDBM</b>	Mount Diablo Base and Meridian
<b>NEPA</b>	National Environmental Policy Act of 1969
<b>NRCS</b>	Natural Resources Conservation Service
<b>PVC</b>	polyvinyl chloride
<b>USGS</b>	U.S. Geological Society

**ENVIRONMENTAL ASSESSMENT  
DIXIE MEADOWS GEOTHERMAL EXPLORATION PROJECT  
ORMAT TECHNOLOGIES, INC.**

**1.0 INTRODUCTION/PURPOSE AND NEED**

The Bureau of Land Management (BLM), Carson City District Office has prepared this Environmental Assessment (EA) to analyze potential impacts to the human and natural environment resulting from exploratory drilling for geothermal resources within the Ormat Technologies, Inc. (Ormat) Dixie Meadows Lease Area (Lease Area). The Lease Area is located in Dixie Valley, approximately 75 miles northeast of Fallon, in Churchill County, Nevada (Figure 1). The Lease Area consists of approximately 22,021 acres of public land collectively formed by eight individual federal geothermal leases (Table 1) held by Ormat. Primary access to the Lease Area would be east from Fallon for approximately 40 highway miles on U.S. Highway 50, then north about 35 highway miles on Dixie Valley Road, and then through the existing road network.

**Table 1 Dixie Meadows Federal Geothermal Leases**

<b>Lease Number</b>	<b>Acres in Lease</b>	<b>Legal Description (Mount Diablo Base and Median [MDBM])</b>
N-83934	2038.32	Township 22 North, Range 35 East (T22N, R35E), section 1, Lots 1-4, S2N2, S2; section 2, Lots 1-4, S2N2,S2; section 3, Lot 1, SENE, S2; section 4, E2SE, SWSE; section 8, SENE, E2SW, SWSW, E2SE
N-83935	2560	T22N, R35E, section 11; section 12; section 13; section 14
N-83936	2560	T22N, R35E, section 21; section 22; section 23; section 24
N-83937	2600	T22N, R35E, section 25;section 26; section 34, SESE; section 35; section 36
N-83939	2542.64	T22N, R36E, section 5, S2N2, S2, Lots 1-4; section 6, S2NE, SENW, E2SW, SE; Lots 1-7; section 7, E2, E2W2, Lots 1-4; section 8
N-83941	3802.8	T23N, R36E, section 4, S2N2, S2, Lots 1-4; section 17; section 19, E2, E2W2, Lots 1-4; section 20; section 30, E2, E2W2, Lots 1-4; section 31, E2, E2W2, Lots 1-4
N-83942	4480	T23N, R36E, section 15; section 16; section 21; section 22; section 28; section 29; section 32
N-86885	1436.76	T22N, R35E, section 29; section 30, E2, E2W2, Lots 1-4; T23N, R35E, section 27, E2E2

Ormat is seeking approval to drill temperature gradient wells and to drill and test observation wells and production wells at up to 20 specific locations, otherwise referred to as “well pads” (Figure 2). Table 2 shows the drill pad identification and well number for each well pad and the location of the approximate center of each proposed well pad. Ormat plans to drill up to one temperature gradient well, one observation well, and one production well at each well pad. Each well type may not necessarily be drilled on each well pad, no more than one well of each well type would be drilled on any single well pad, and not all well pads may be utilized or developed.

Nonetheless, each pad would be permitted to accommodate the maximum size necessary for the construction and operation of a production well, approximately 4.1 acres. An area of this size is more than sufficient for the drilling and operation of a temperature gradient well (which would disturb about 0.25 acre), an observation well (which would disturb about 2.4 acres), or all three well types. Drilling operations would be performed in accordance with BLM and Nevada Division of Minerals regulations and permit requirements. If well conditions warrant changes to the design for completion of a well, approval from the responsible regulatory agency or agencies would be obtained before making any changes.

**Table 2 Proposed Drill Pad and Geothermal Well Sites**

Well Pad Name	Modified Kettleman	Lease Number	Township, Range, Section	UTM Z11 North, Meters - Easting	UTM Z11 North, Meters - Northing
A	23-26	NVN-083937	T23N, R35E, 26	412819	4409998
B	11-35	NVN-083937	T23N, R35E, 35	412691	4408826
C	71-3	NVN-083934	T22N, R35E, 3	412266	4407189
D	14-2	NVN-083934	T22N, R35E, 2	412714	4406660
E	25-3	NVN-083934	T22N, R35E, 3	411218	4406454
F	75-4	NVN-083934	T22N, R35E, 4	410524	4406467
G	67-4	NVN-083934	T22N, R35E, 4	410306	4406077
H	17-8	NVN-083934	T22N, R35E, 8	407567	4404443
I	77-8	NVN-083939	T22N, R36E, 8	418789	4404147
J	42-24	NVN-083936	T22N, R35E, 24	414809	4402041
K	17-24	NVN-083936	T22N, R36E, 24	414125	4401129
L	31-22	NVN-083936	T22N, R35E, 22	411364	4402263
M	24-22	NVN-083936	T22N, R35E, 22	411178	4401815
N	17-22	NVN-083936	T22N, R35E, 22	410835	4401117
O	54-21	NVN-083936	T22N, R35E, 21	410090	4401800
P	22-21	NVN-083936	T22N, R35E, 21	409408	4402258
Q	28-29	NVN-086885	T22N, R35E, 29	407743	4399411
R	61-30	NVN-086885	T22N, R35E, 30	407039	4400767
S	41-30	NVN-086885	T22N, R35E, 30	406006	4400245
T	11-30	NVN-086885	T22N, R35E, 30	405969	4400767

Source: Ormat 2011

The Department of the Interior, consistent with Section 2 of the Mining and Mineral Policy Act of 1970 and Sections 102(a) (7), (8), and (12) of the Federal Land Policy and Management Act of 1976 (FLPMA), encourages the development of mineral resources, including geothermal resources, on federal lands. The Geothermal Steam Act of 1970 (30 United States Code [USC] §1001 et seq.) and its implementing regulations (43 Code of Federal Regulations [CFR] Part 3200) provide regulatory guidance for geothermal leasing, permitting, and oversight of operations by the BLM. These regulations identify four stages of geothermal resource development within a lease: (1) exploration, (2) development, (3) production, and (4) closeout. Each of the four stages under the lease requires compliance with the National Environmental Policy Act of 1969 (NEPA) and separate BLM authorization when ground-disturbing activities are proposed.

The eight individual geothermal leases that form the Lease Area were issued in 2007. Therefore, the primary term of the leases and of Ormat's access to the Lease Area is 10 years with several options for extension. The terms of geothermal leases require the lessee to demonstrate a certain level of diligence in developing the geothermal resources within the Lease Area to keep the lease from being terminated. If diligence in developing the geothermal resource is shown, BLM may extend the terms of the lease in 5-year increments. Once an area is developed for commercial production of geothermal energy, the lease terms provide the lessee use of the resource for 40 years, with a right of renewal for another 40 years with BLM approval. Geothermal exploration, development, and production on federal leases are subject to terms, stipulations, and permit conditions of approval and must comply with all applicable federal, state, and local laws and regulations pertaining to requirements for operations such as sanitation, water quality, wildlife, safety, and reclamation (Appendix A). Lease stipulations are derived from the resource management plan process. Site specific permit conditions of approval are developed through the environmental analysis process. This EA considers the potential environmental impacts of the Proposed Action and has been prepared in accordance with NEPA, the Council on Environmental Quality regulations implementing NEPA, and the FLPMA.

Ormat would limit geothermal exploration activities to a smaller area within the Lease Area, which is subsequently referred to as the "Project Area" in this EA. Generally, the Project Area consists of a 20-acre square-shaped area centered on or surrounding each proposed well pad location, a 400-foot-wide corridor centered on proposed access roads, and two 10-acre areas coinciding with the gravel source areas. Parts of the Project Area associated with the gravel sources and portions of the proposed access roads would occur on BLM-administered public land outside of the Lease Area (Figure 3).

## **1.1 PURPOSE AND NEED**

The need for the Proposed Action is to provide for the exercise of federal geothermal lease rights through exploratory drilling within the Project Area in order to assess the potential geothermal resources in the Lease Area identified in Table 1.

The Proposed Action is consistent with the National Energy Policy, which encourages the development of energy resources including geothermal resources on federally managed lands. Executive Order 13212, Actions to Expedite Energy-Related Projects, issued on May 18, 2001, states, "[T]he increased production and transmission of energy in a safe and environmentally sound manner is essential." The proposed project is consistent with State of Nevada and Churchill County ordinances, policies, and plans and the revised Secretarial Order 3285 dated February 22, 2010. In addition, Nevada law requires Nevada commercial power generators to produce 20 percent of power through renewable energy sources by 2015. Therefore, to achieve this goal, there is a need to increase the level of exploration for and development of renewable energy sources including geothermal resources.

## 1.2 LAND USE PLAN CONFORMANCE STATEMENT

The Proposed Action and alternatives described below are in conformance with the Carson City District Office Consolidated Resource Management Plan. The desired outcome for minerals and energy management is to “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” (BLM 2001). The Consolidated Resource Management Plan minerals and energy management applies the following restriction on geothermal leasing: “no surface occupancy within 500 feet of any water” (BLM 2001). The proposed well pads are not included in any of the excluded areas in the land allocation for minerals and are not subject to the other restrictions.

## 1.3 PLANS, STATUTES, AND OTHER REGULATIONS

The Proposed Action is consistent with federal laws and regulations; other plans, programs, and policies of affiliated Tribes; other federal agencies; and state and local government. Specific approvals, permits, and regulatory requirements would be required for constructing, testing, and maintaining the proposed geothermal exploratory wells. Table 3 lists federal, state, and local permits, policies, and actions that may be required as part of the Proposed Action.

**Table 3 Potential Regulatory Responsibilities**

Regulatory Agency	Authorizing Action
BLM	Notice of Intent to Conduct Geothermal Exploration Operations
BLM	Sundry Notice for construction-related activities
BLM	Geothermal Drilling Permit
BLM	Right-of-way authorization for off-lease access routes
U.S. Department of the Navy (DoN)	Authorization to use existing roads on DoN land for project access
Department of Conservation and Natural Resources, Nevada Division of Water Resources	Temporary consumptive water use permit
Nevada Division of Minerals	Geothermal exploration and production well permit
Nevada Division of Environmental Protection, Bureau of Air Pollution Control	Surface Area Disturbance Permit
Nevada Division of Environmental Protection, Bureau of Water Pollution Control	Stormwater Permit

## **2.0 PROPOSED ACTION AND ALTERNATIVES**

This chapter has been prepared to describe the Proposed Action and No Action Alternative. This chapter also provides a brief description of other alternatives that were considered but were eliminated from further analysis in this EA. Unless cited otherwise, the description of the Proposed Action provided in this chapter is based on information contained within the Operations Plan (Ormat 2011).

### **2.1 PROPOSED ACTION**

Ormat proposes to evaluate the geothermal resources that potentially exist within the Lease Area by constructing up to 20 well pads and drilling one of each of the three different types of geothermal exploration wells on each pad: temperature gradient wells, observation wells, and production wells. Therefore a total of 60 geothermal exploration wells may be drilled as part of the Proposed Action. Each well pad would be permitted to accommodate the maximum approximate size necessary for the construction and operation of a production well, the largest of the three types. The drilling of each well type may not necessarily occur on each well pad, only one well of each well type would be drilled on any single well pad, and not all well pads may be utilized or developed. While each pad site would be permitted to accommodate a production well, well pads would be constructed only to the extent necessary to accommodate the well type(s) situated on it. If Ormat initially drills a temperature gradient well or observation well on a well pad, that well pad would not be expanded to full permitted size unless a production well is later drilled on it. Under no circumstances would a well pad be expanded to a size greater than that needed for a production well. Specific details about the design and layout of well pads are provided in Section 2.1.2.1.

In support of the geothermal exploration drilling activities, Ormat also proposes to construct new gravel access roads and utilize and repair existing roads for access to the Project Area. Gravel would be obtained from an existing mineral material site that Ormat would expand and from a new mineral material site that Ormat would construct (Figure 2). Additionally, Ormat proposes to drill up to two groundwater wells on one or two of the proposed well pads or at the proposed new gravel source area. Therefore, a total of 62 wells may be drilled, including 60 geothermal exploration wells and 2 groundwater wells. Ormat would install an above-ground water distribution pipeline, within the project boundary as described in this EA, between the groundwater wells and well pads actively being drilled. The pipeline would be located along the sides of proposed access roads and on well pads, and would not require additional surface disturbance. The water distribution pipeline system would require prior BLM approval of a Sundry Notice to authorize construction of the pipeline. Ormat would also construct or install the necessary ancillary facilities in support of drilling activities, including a temporary personnel “camp” for active drilling crews. Details of the personnel camp would be submitted to BLM

pursuant to the geothermal regulations and the camp layout would be designed to minimize surface disturbance. The camp would be located on well pad "T", as shown on Figure 2. Because the camp would be limited to the area within the limits of a previously constructed well pad, no additional surface disturbance beyond that of the well pad would be required to create the camp. Please see Section 2.1.2.3 for more information regarding the personnel camp and other ancillary facilities.

All geothermal exploration activities would occur within the Project Area, including any disturbance necessary for construction and drilling operations. The Project Area is approximately 970 acres in size and consists of a 20-acre block centered on each proposed well pad location, a 10-acre area at the existing and proposed mineral material sites, and a 400-foot-wide corridor centered on all proposed access roads (Figure 2). The specific locations for individual wells would be identified in geothermal drilling permits submitted separately from this document. However, the specific locations would be limited to areas within the Project Area as identified in the document. The entire Project Area would not be disturbed; instead, only the areas where the existing and proposed gravel sources would be expanded or constructed and those areas ultimately developed with a well pad and associated access roads would be disturbed. Drilling operations would be conducted in accordance with BLM and Nevada Division of Minerals regulations and permit requirements.

### **2.1.1 Project Access**

Principal access to the Dixie Meadows Lease Area is via Dixie Valley Road, a county road which extends north from Highway 50 east of Fallon, approximately 35 highway miles south of the Lease Area. Other existing roads that would be used for access to parts of the Lease Area include East Valley Road, Dempsey Lane, and two unnamed roads. Segments of these existing roads cross land owned by the DoN. Ormat would obtain the necessary easements, rights-of-way, authorizations, or other required permission to use existing roads from the DoN. In addition, Ormat recently purchased federal geothermal leases from TGP Dixie Development Company LLC and is the new lessee and operator of the former TGP Dixie Meadows Geothermal Exploration Project (BLM 2010a). This project is located adjacent to the proposed Dixie Meadows project and has been renamed the Dixie Hope Exploration Project. Several of the roads approved for the Dixie Hope Exploration Project would be used to access parts of the proposed Dixie Meadows project after they are constructed. This would include a segment crossing DoN land that was recently proposed as an amendment to the Dixie Hope Exploration Project and is pending DoN approval (Figure 3).

While access to the general Lease Area is currently provided by existing and previously approved roads, access to the proposed well pads is not. In order to reach the proposed well pads from existing roads, Ormat would construct a maximum combined length of approximately



75,665 feet of all gravel roads (Figure 2). While it is the intent of Ormat to limit construction of new proposed access roads to within the Lease Area, some of the proposed access roads must cross unleased public land. Depending on which access roads are ultimately constructed and utilized, up to 33,895 feet of new access road may cross unleased public land administered by the BLM (Figure 3). Ormat has submitted the appropriate Title V of the Federal Land Policy and Management Act of 1976 right-of-way application to the Stillwater Field Office for approval of construction and use of access roads outside of the Lease Area. The Proposed Action would not require construction of any new roads on DoN land. Road construction and improvement activities are discussed in further detail in Section 2.1.4.

Daily operations would typically require a maximum of 18 vehicle trips per day on Dixie Valley Road and the other existing roads proposed for access, as well as roads that would be constructed as part of the adjacent Dixie Hope geothermal exploration project. This includes 10 trips associated with delivery trucks and 8 trips associated with passenger vehicles used to transport personnel. The trips made by passenger vehicles would generally be between Fallon and the Project Area. Trips made by delivery trucks would typically not occur between Fallon and the Project Area but would be made within the general vicinity of the Project Area instead. Such trips would be for transporting gravel from the proposed gravel source areas to the proposed access roads and well pads, or for transporting water from the two proposed groundwater wells in the Project Area or from a source on nearby private land. If purchased from a private source, Ormat would plan to negotiate with the owner of private land that is located closest to the Project Area. The nearest water source on private land is approximately 3 miles south of the Lease Area, in T21N, R35E, section 11, MDBM. Approximately 25 additional vehicle trips would be necessary to deliver the production well drill rig to the Project Area. These trips would be made by tractor-trailers and would occur prior to drilling the first production well at the Project Area, should one be scheduled for drilling. Another 25 tractor-trailer trips would be required to remove the drill rig from the site following completion of drilling of the last scheduled production well.

Public access within and through the Lease Area would continue to the extent practicable. Generally, public access is provided via existing unimproved two-track roads, some of which would be used by Ormat for access to well pads. Ormat would ensure that project vehicles and equipment are parked and stored in areas that do not block these roads. Personnel would be instructed to yield to public vehicles on project roads during operations. If the water distribution system is approved by BLM and utilized, polyvinyl chloride (PVC) piping used to transport water to active well pads would be buried beneath road surfaces in locations where a road crossing is necessary. This would prevent blockage of existing roads and maintain public accessibility. Equipment and operations on well pads may create unsafe conditions for the general public. Consequently, to protect the safety of the public, public access onto active well pads would not be permitted. Drill crew personnel are present 24 hours per day at active well pads during the duration of active drilling and would prevent public access onto the drill pad.

### **2.1.2 Exploration Operations Plan**

The Proposed Action includes constructing up to 20 well pads capable of accommodating the maximum size necessary for the construction and operation of a production well, 400 feet by 450 feet (4.1 acres). An area of this size is more than sufficient for drilling and operating a temperature gradient well (0.25 acre) or an observation well (2.4 acres), or all three well types. Assuming all 20 well pads were fully developed with a production well, total well pad disturbance would be approximately 82.0 acres. One of each of the three types of geothermal exploration wells may be drilled on each well pad. However, the drilling of each well type may not necessarily occur on each well pad, no more than one well of each well type would be drilled on any single well pad, and not all well pads may be utilized or developed. Additionally, a maximum total of two non-potable water wells could be drilled to provide water for drilling operations. The water wells would be located on any one of the 20 well pads or at the proposed gravel source area adjacent to East Valley Road, and would not result in additional surface disturbance.

Ormat would construct a maximum of approximately 75,665 feet of gravel access roads in order to reach the proposed well pad locations (Figure 2) if all the well pads are constructed. While it is the intent of Ormat to limit construction of proposed access roads to within the Lease Area, some of the proposed access roads must cross unleased public land. Depending on which access roads are ultimately utilized, up to 33,895 feet of new access road may cross unleased public land administered by the BLM (Figure 3). Proposed access roads would be constructed to a standard maximum width of 20 feet. The 20-foot road disturbance width would consist of a 15-foot-wide travel surface and a 2.5-foot-wide shoulder on both sides of the travel surface. It is estimated that two vehicle pullouts would be needed for adequate vehicle passage on the project access roads. Construction of new access roads, if all were constructed, would result in approximately 34.8 acres of new surface disturbance, and construction of vehicle pullouts would result in approximately 0.02 acre of disturbance (Ormat 2011).

Table 4 presents the maximum acreage of the area of disturbance attributed to construction of the well pads, access roads, vehicle pullouts, and gravel source areas. Detailed construction methods for well pads and access roads are provided in Section 2.1.2.1 and 2.1.4, respectively. Detailed drilling procedures are provided in Section 2.1.2.2.

**Table 4 Maximum Potential Surface Disturbance Attributed to Proposed Action**

<b>Disturbance Type</b>	<b>Length of Access Road (Approximate)</b>	<b>Maximum Number of Well Pad Locations</b>	<b>Aggregate Applied</b>	<b>Maximum Surface Disturbance (Approximate)</b>	<b>Total Disturbed Area (Approximate)</b>
Well Pads	Not Applicable	20	Yes	400 X 450 feet (4.1 acres each)	82.0 acres
New Access Roads	75,665 feet	Not Applicable	Yes	75,665 X 20 feet	34.8 acres
Access Road Pullouts*	Not Applicable	Not Applicable	Yes	150 X 25 feet (0.1 acre each)	0.2 acre (2 pullouts)
Expansion of Existing Mineral Material Site and Construction of New Site	Not Applicable	Not Applicable	No	660 X 660 feet (10 acres at each site)	20 acres
<b>Maximum Total Disturbance (Approximate):</b>					137 acres

\*It is estimated that two access road pullouts would be constructed. However, field conditions may warrant additional pullouts. The disturbance necessary for construction of additional pullouts would be subtracted from other disturbance associated with well pads and roads; total impacts would not exceed 137 acres.

### 2.1.2.1 Well Pad Design and Construction

Ormat proposes to construct and perform drilling on as many as 20 well pads permitted to accommodate the largest designed production well and therefore also accommodate the smaller designed temperature gradient well and observation well. Each well pad could be constructed to an approximate size of 400 feet by 450 feet if fully developed and would accommodate the drill rig, reserve pit, and all other support equipment and disturbance necessary for drilling. The exact dimensions and orientations of the well pads would be determined by engineers in the field prior to construction to best match the physical and environmental characteristics of the specific site and to minimize grading. Not all well pad sites may be utilized or developed, and drilling of each well type may not necessarily occur on each well pad. Pad sites would be constructed only to the extent necessary to accommodate the well type(s) situated on each. Under no circumstances would a well pad be expanded to a size greater than that prescribed for a production well. The well pad required for each of the three types of geothermal exploration wells is described in detail below. The approximate maximum sizes of well pads and reserve pits per well type are provided in Table 5. Well types would be detailed in subsequent permits that would be authorized by the BLM.

**Table 5 Well Pad and Reserve Pit Size per Exploratory Well Type**

<b>Exploratory Well Type</b>	<b>Maximum Well Pad Size (Approximate)*</b>	<b>Maximum Surface Disturbance per Pad (Approximate)*</b>	<b>Maximum Reserve Pit Size (Approximate)*</b>	<b>Maximum Reserve Pit Capacity (Approximate)*</b>
Temperature Gradient Well	100 feet X 100 feet	0.25 acre	12 feet X 4 feet X 4 feet	192 cubic feet (1,436 gallons)
Observation Well	300 feet X 350 feet	2.4 acres	15 feet X 100 feet X 10 feet	15,000 cubic feet (112,200 gallons)
Production Well	400 feet X 450 feet	4.1 acres	75 feet X 200 feet X 10 feet	150,000 cubic feet (1,122,000 gallons)

\*The exact orientation and configuration would be determined by engineers before construction. The maximum reserve pit size does not include a perimeter berm measuring approximately 4 feet wide and 2 feet high.

Temperature gradient well pads

Generally, the construction of a temperature gradient well pad requires very little vegetation clearing or earth-moving activities. A truck-mounted drilling rig similar to those used for drilling domestic water wells would be used to drill this type of well. This type of drilling rig can often be moved onto a site, leveled, and prepared for operations with very little grading of the site. However, the terrain and conditions specific to individual sites may require some grading and leveling of the well pad before drilling can be performed safely and effectively. Therefore, depending on the terrain and site conditions specific to each proposed well pad location in the Project Area, individual well pads could be graded, leveled, and constructed up to the maximum size of approximately 100 feet by 100 feet (Figure 4). Should Ormat decide to drill an observation well or production well on any site where a temperature gradient well was drilled, the existing pad would be incorporated into the larger pad and expanded as needed (Ormat 2011).

Some individual temperature gradient well pads may require the construction of a single, small reserve pit. The reserve pits would be constructed to a maximum size of 12 feet long and 4 feet wide, and excavated to a maximum depth of 4 feet below ground surface. A berm measuring approximately 4 feet wide and 2 feet high would be constructed around the perimeter of the reserve pits. Material used to construct the berm would consist primarily of material excavated from the construction of the reserve pit where the berm is located. Additional material from construction of the well pad where the berm and pit are located would also be used. The reserve pits and the berms would be compacted during construction. Settled bentonite clay originating from the drilling mud would accumulate on the bottom of the pit and act as an unconsolidated clay liner that minimizes percolation.

Reserve pits would be constructed to contain all anticipated drilling mud, cuttings, and fluids as well as any natural precipitation falling within the pit, while maintaining a minimum 2 feet of freeboard. If constructed to the maximum size described above, a single reserve pit would have the capacity to contain approximately 192 cubic feet, or 1,436 gallons, while providing for a minimum 2 feet of freeboard. The pit, equipment, and disturbance necessary for the development of the exploration well would not exceed the limits of the well pad.

#### Observation well pads and production well pads

Well pads accommodating an observation well could be graded, leveled, and constructed to a size of 300 feet by 350 feet (Figure 5). Disturbance may be less depending on conditions specific to a particular well pad location. Production well pads could be constructed to a maximum size of approximately 400 feet by 450 feet (Figure 6). The approximate maximum pad sizes and the associated surface disturbance are provided in Table 5. The well pad would accommodate the drilling rig, reserve pit, support equipment, and vehicles necessary during drilling. The exact orientation and configuration of the well pads would be determined by engineers before construction.

The proposed well pads would be located on relatively flat topography (1 to 4 percent slopes) that gently slopes toward the center of Dixie Valley, although some cut and fill may be necessary at individual well pads. Any fill slopes that may be constructed as a part of well pad grading would be no greater than 2 horizontal to 1 vertical and would be compacted and maintained to minimize erosion and provide slope stability. Each well pad would be graded to prevent the movement of stormwater off the constructed site. The well pads would be constructed to avoid ephemeral washes to the extent practicable. In addition, the pads would be designed to divert any upslope sheet wash or water in ephemeral washes around and away from the drill pad. Storm water runoff from undisturbed areas around the constructed drill pads would be directed into ditches surrounding the well pad and back onto undisturbed ground consistent with best management practices (BMPs) for storm water. Only well pads scheduled to be drilled would be cleared and graded. Surface disturbance would be kept to a minimum, to the extent necessary to accommodate drilling and operation of the scheduled well type.

After the well pad area has been graded and spoils from the well pad reserve pit excavation have been laid down for leveling, an average of 8 inches of gravel would be placed over the areas where the drilling work would be conducted. The drilling rig footprint would require additional stabilizing for heavier equipment and would receive an additional 10 inches (for a total average of 18 inches) of compacted aggregate.

A single reserve pit would be constructed on each well pad. Consistent with the Gold Book (BLM 2007d), reserve pits would be constructed to contain all anticipated drilling mud, cuttings, and fluids, as well as any natural precipitation falling within the pit, while maintaining a minimum 2 feet of freeboard. The size of the reserve pit would depend on whether an observation well or a production well was scheduled for drilling on the pad. A reserve pit constructed for drilling an observation well would be a maximum size of approximately 100 feet long and 15 feet wide and excavated to approximately 10 feet below ground surface. A reserve pit constructed for drilling a production well would be excavated to the same approximate depth but would be constructed to a maximum length of 200 feet and width of 75 feet (Table 5). A berm measuring approximately 4 feet wide and 2 feet high would be constructed around the perimeter of the reserve pits. Material used to construct the berm would consist primarily of material excavated during the construction of the reserve pit where the berm would be located. The reserve pits and the berms would be compacted during construction. Settled bentonite clay originating from the drilling mud would accumulate on the bottom of the pit and act as an unconsolidated clay liner that minimizes percolation. Reserve pits would be constructed and fenced in accordance with the BMPs identified in the Gold Book (BLM 2007d).

Constructed to the sizes described above, a reserve pit for drilling an observation well would have the capacity to contain approximately 15,000 cubic feet, or 112,200 gallons, while providing for a minimum 2 feet of freeboard. A reserve pit for drilling a production well would have the capacity to contain approximately 150,000 cubic feet, or 1,122,000 gallons, while providing for a minimum 2 feet of freeboard. The actual excavation depth of individual reserve pits would be determined based on the depth to groundwater at that location to ensure the bottom of the reserve pit is above the standing water level. Consequently, to maintain adequate storage capacity, the length and width of a reserve pit may be field adjusted should it be necessary that the depth be shallower than 10 feet. The pit, equipment, and disturbance necessary for the development of the exploration well would not exceed the limits of the well pad.

Upon completion of the drilling operations, clean-out and flow tests would be performed on the wells. Flow testing would typically run for an average of three days (24 hours per day) for each well, but the duration may vary depending on well characteristics. During these tests the flow of geothermal fluids would be routed to the reserve pit (Ormat 2011).

#### **2.1.2.2 Geothermal Well Drilling Plan**

Ormat proposes to drill as many as 20 temperature gradient wells, 20 observation wells, and 20 production wells. Typically, only one well would be actively drilled at any given time, but Ormat may elect to drill up to two wells simultaneously, which would require two drilling rigs be present. All wells regardless of well type would be drilled with air or a non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or clay-polymer-water mixture. The

drilling mud is used to lubricate and cool the drill bit, bring the rock cuttings to the surface for discharge into the mud tank, and prevent loss of drilling fluids into the rock. The drilling rig mud system would be supplemented with additional drilling mud as needed to maintain the required quantities of the drilling mud (Ormat 2011). Additives would be used as needed to prevent corrosion, increase mud weight, and prevent mud loss, in conformance with the submitted drilling mud program. The materials and additives commonly used during well drilling are provided in Table 6. The concentrations of additives used in drilling mud would vary depending on well conditions such as depth, pH levels, formation, mud weight, and so on. All materials and additives would be stored on active well pads or on equipment during drilling. Material would be stored away from the perimeter of well pads to prevent materials from leaving the pad in the event of an accidental spill. Secondary containment structures would be provided for all chemical and petroleum/oil storage areas during drilling operations.

When geothermal wells are drilled, subsurface groundwater aquifers are isolated and protected from the well bore and other aquifers by the placement of steel pipe referred to as “casing” in the well which lines the well bore and forms an impermeable barrier between the well bore and the surrounding rock. The casing is anchored by cementing it to the surrounding rock. The casing also prevents the rock formations from caving into the well bore, which can cause the drill bit and/or drill pipe to be stuck. Another important purpose for the casing is that it prevents fluids and gases under high pressure in rock formations from entering the well bore and causing what is called a “blowout,” or an uncontrolled flow of fluid from the well. There are several sections, or what are termed “strings,” of casing that are normally placed in a well, starting at the surface with the conductor casing, which has the largest diameter, generally 30 inches or less, and is set at a depth between 20 feet and 50 feet. Each subsequent casing string has a smaller diameter than the previous one, fits inside the preceding string, and goes deeper into the well bore than the previous string. Below the conductor casing is the surface casing, then the intermediate casing, and lastly the production casing. As a general rule of thumb, the surface string is set at a depth of about 10 percent of the projected total depth of the well, the intermediate string then extends to the top of the geothermal reservoir, and lastly the production string is set within the geothermal reservoir.

Following the cementing of the surface casing, “blowout” prevention equipment (BOPE) would be installed. The BOPE, which is typically inspected and approved by the BLM and/or the Nevada Division of Minerals, as applicable, would be installed, tested, and ready for use while drilling the observation well to ensure that any geothermal fluids encountered do not flow uncontrolled to the surface.

At the bottom of the well, where the well bore intersects the geothermal production reservoir, a special type of casing called a “liner” is placed. The liner has slots or perforations in it that allow the geothermal fluid to flow into the well bore from the rock formation. The geothermal fluid then travels up the inside of the cased well bore, isolated from any groundwater aquifers and rock formations, to the wellhead at the surface.

**Table 6 Common Materials and Additives Used During Drilling**

Product	Typical Quantity Used	Storage
Drilling mud gel (bentonite clay)	334,000 pounds	100-pound sacks on pallets
Salt	134,000 pounds	50-pound sacks
Barite	20,000 pounds	50-pound sacks
Tannathin (lignite)	4,200 pounds	50-pound sacks
Lime (calcium hydroxide)	3,400 pounds	50-pound sacks
Caustic soda (sodium hydroxide)	1,700 pounds	50-pound sacks
Soda ash (sodium bicarbonate)	1,700 pounds	50-pound sacks
Diesel fuel	54,000 gallons	6,000-gallon tank
Lubricants (motor oil, compressor oil)	1,700 gallons	55-gallon drums
Hydraulic fluid	400 gallons	55-gallon drums
Anti-freeze (ethylene glycol)	220 gallons	55-gallon drums
Liquid polymer emulsion (partially hydrolyzed polyacrylamide / polyacrylate)	170 gallons	5-gallon buckets
Defoamer	170 gallons	5-gallon buckets
Water loss control agent (Drispac)	20,000 pounds	50-pound sacks
Lost circulation fibers (vegetable and polymer fibers)	100,000 pounds	50-pound sacks

Temperature gradient wells

Each temperature gradient well would be drilled and completed to a nominal depth of approximately 1,000 feet (Figure 7) using a truck-mounted rotary drilling rig. The drilling rig would be equipped with diesel engines, fuel and drilling mud storage tanks, mud pumps, and other typical auxiliary equipment. During drilling the top of the drill rig derrick would extend to heights of 30 to 50 feet above the ground surface, depending on the rig used. An average of four to six small trucks/service vehicles/worker vehicles could be driven to the active well site each day throughout the typical 8-day drilling process. Difficulties encountered during the drilling process, including the need to re-drill the hole, could as much as double the time required to successfully complete each temperature gradient well. Drilling would be conducted 24 hours per day, 7 days per week by a crew of up to three workers. Other support personnel (geologists, suppliers, etc.) could bring the total number of workers on-site at one time to six or more persons (Ormat 2011).



### Observation wells

Each observation well would be drilled using a truck-mounted rig equipped with diesel engines, fuel and drilling mud storage tanks, mud pumps, and other typical auxiliary equipment. During drilling the top of the drill rig derrick would extend to heights of 30 to 70 feet above the ground surface, depending on the rig used. An average of four to six small trucks/service vehicles/worker vehicles would be driven to the active observation well site each day throughout the typical 15-day drilling process. Difficulties encountered during the drilling process, including the need to re-drill the observation well, could as much as double the time required to successfully complete each observation well. Drilling would be conducted 24 hours per day, 7 days per week by a crew of up to three workers. Other support personnel (geologists, suppliers, etc.) could bring the total number of workers on-site at one time to as many as ten or more persons.

Each observation well would be drilled and completed to a nominal depth of approximately 3,000 feet, or the depth selected by the project geologist (Figure 8). The lengths of the surface and production casings in each well would be lengthened or shortened as needed to accommodate a well depth deeper or shallower than 3,000 feet. Once drilled to the final depth, the drilling mud in the well would be circulated out of the well bore using water. The water and/or geothermal fluid in the well would be bailed from the well by either lifting with a mechanical bailer or lifting with air pumped into the well bore so that a clean sample of the geothermal fluid in the reservoir could be obtained for chemical analysis. Alternatively, if the well is capable of flowing, the well may be flowed to the surface through a steam separator/muffler to separate the steam (which is discharged into the air) from the geothermal water (which is discharged into steel tanks or the reserve pit) so that the geothermal fluid can be sampled (Ormat 2011).

### Production Wells

Each production well would be drilled with a rotary drill rig similar to those used to drill oil and gas wells. During drilling, the top of the drill rig mast could extend to heights as much as 170 feet above the ground surface. The typical drill rig and associated support equipment (rig floor and stands; draw works; mast; drill pipe; trailers; mud, fuel, and water tanks; diesel generators; air compressors; etc.) would be brought to the prepared well pad on 25 or more large tractor-trailer trucks. Additional equipment and supplies would be brought to the drill site during ongoing drilling and testing operations. As many as 10 or more tractor-trailer truck trips would be generated on the busiest day, although on average about 2 to 3 large tractor-trailer trucks (delivering drilling supplies and equipment) and about 8 small trucks/service vehicles/worker vehicles would be driven to an active well site each day throughout the typical 45-day drilling process. Difficulties encountered during the drilling process, including the need to work over or

to re-drill the hole, could double the time necessary to successfully complete a production well. Drilling would be conducted 24 hours per day, 7 days per week by a crew of 9 to 10 workers. During short periods, the number of workers on-site during drilling would be as high as 18.

The production wells would each be drilled and cased to a design depth of approximately 10,000 feet, or the depth selected by the project geologist (Figure 9). The surface and production casings in each well would be lengthened or shortened as needed to accommodate a well depth deeper or shallower than 10,000 feet. The BOPE would be utilized while drilling below the surface casing. During drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic barite (barium sulfate) would likely be stored at each well site for use in preventing uncontrolled well flow, as necessary.

The well would be drilled using non-toxic, temperature-stable drilling mud composed of a bentonite clay-water or polymer-water mix for all wells. Variable concentrations of additives would be added to the drilling mud as needed to prevent corrosion, increase mud weight, and prevent mud loss. Some of the mud additives may be hazardous substances, but they would only be used in low concentrations that would not render the drilling mud toxic or hazardous. The additives commonly used in drilling mud are provided in Table 6. In the event that very low pressure areas are encountered, compressed air may be added to the drilling mud, or used instead of drilling mud, to reduce the weight of the drilling fluids in the hole and assist in carrying the cuttings to the surface. The air, any drilling mud, rock cuttings, and any reservoir fluids brought to the surface would be diverted through a separator/muffler to separate and discharge the air and water vapor to the air and the drilling mud and cuttings to the reserve pit.

Each production well may need to be re-worked or re-drilled if problems encountered while drilling or setting casing prevent proper completion of the well in the targeted geothermal reservoir or if the well does not exhibit the anticipated permeability, productivity, or injectivity. Depending on the circumstances encountered, working over a well may consist of lifting the fluid in the well column with air or gas or stimulating the formation using dilute acid or rock-fracturing techniques. Well re-drilling may consist of re-entering and re-drilling the existing well, re-entering the existing well and drilling and casing a new well bore, or sliding the rig over a few feet on the same well pad and drilling a new well through a new casing.

Once a slotted liner has been set in the bottom of the well, and while the drill rig is still over the well, the residual drilling mud and cuttings would be flowed from the well and discharged to the reserve pit. This may be followed by one or more short-term flow test(s), each lasting from two to four hours and also conducted while the drill rig is over the well. Each test would consist of flowing the production well fluids into portable steel tanks brought onto the well site while monitoring geothermal fluid temperatures, pressures, flow rates, chemistry, and other

parameters. An “injectivity” test may also be conducted by pumping the produced geothermal fluid from the steel tanks back into the well and the geothermal reservoir. The drill rig would likely be moved from the well site following completion of these short-term tests.

Well stimulation operations to enhance the flow of geothermal reservoir fluid into the well bore may be necessary. These operations would involve placing a dilute mixture of hydrochloric (muriatic) acid down the well. The amount of dilute acid placed in the well bore is dependent upon the mineral being dissolved and can vary from 10,000 to 50,000 gallons or more. Concentrated hydrochloric acid (35 percent) would be trucked to the site per occurrence and mixed on-site with water by experienced contractors (hydrochloric acid would not be stored on-site). The dilute acid mixture would be placed in the cased well bore, followed by water to push the mixture into the geothermal reservoir to dissolve the minerals. After dissolving the minerals in the geothermal reservoir, the water and spent acids would be circulated back through the well to the surface, where they would be tested, neutralized if necessary (using sodium hydroxide, crushed limestone, or marble), and discharged to the well pad reserve pit.

One or more long-term flow test(s) of each production well drilled would likely be conducted following the short-term flow test(s) to more accurately determine long-term well and geothermal reservoir productivity. The long-term flow test(s), each lasting approximately five days or more, would be conducted by either pumping the geothermal fluids from the well through on-site test equipment closed to the atmosphere (using a line shaft turbine pump or electric submersible pump) or allowing the well to flow naturally to the surface, where the produced steam and non-condensable gases including any hydrogen sulfide (H<sub>2</sub>S) separated from the residual geothermal fluid would be discharged into the atmosphere. Ormat would install a BLM-required and -approved H<sub>2</sub>S monitoring and alarm system on the mud tanks to protect the drilling crew and public safety in the event H<sub>2</sub>S levels unexpectedly pose a health threat. In either case, a surface booster pump would then pump the residual produced geothermal water/fluid through a temporary 8- to 10-inch-diameter pipeline to either inject the fluid into one of the other geothermal wells drilled within the Project Area or to the reserve pit on another well pad. The temporary pipeline would be laid either “cross-country” or on the surface on the disturbed shoulders of the access roads connecting the geothermal production wells (as required, roads would be crossed by trenching and burying the temporary pipe in the trench). The water distribution pipeline system would require prior BLM approval of Sundry Notice. The on-site test equipment would include standard flow metering, recording, and sampling apparatus (Ormat 2011).

### **2.1.2.3 Ancillary Facilities and Equipment**

During drilling operations, a temporary “camp” would be provided for the drill crew/workers remaining on-site for the duration of drilling. Details of the personnel camp would be submitted to BLM pursuant to the geothermal regulations and the camp layout would be designed to

minimize surface disturbance. The camp would be located on previously constructed well pad T (see Figure 2). Because the camp would be limited to the area within the limits of the active well pad, no additional grading or surface disturbance would be required to create the camp. During drilling of any one of the three well types, members of the drilling crew may elect to stay on-site or commute, depending on their place of residency and transportation. The personnel permitted to remain on-site would be limited to members of the active workforce.

The camp would consist of self-contained trailers, motor homes, and/or prefabricated modules used for temporary living quarters. The drilling supervisor and mud logger would typically sleep in a self-contained trailer or motor home on the active drill site while the well is being drilled. The drilling contractor may also elect to have the drilling crew stay at the drilling site during the drilling operations to reduce the substantial hours and miles otherwise required for the crew to commute daily. If the crew would remain at the drilling site during the drilling operation, the drilling contractor would provide self-contained temporary quarters (sleeping area, galley, water tank, and septic tank) or portable trailers or motor homes which would be placed on one of the well pads not actively being drilled. Typically, a production well pad would hold a total of up to four trailers, motor homes, and/or prefabricated modules. Additionally, a separate trailer would be located on each active well pad to provide office space. The components would be brought to the site by trailer along the existing access roads and the proposed access roads. The non-potable water supply for the camp would be supplied from portable water tanks. Drinking water would be bottled water brought from off-site. A chemical toilet would be provided at each active well site, and the temporary living quarters may also contain individual toilet facilities. All septic and gray water holding tanks would be located above ground and would be cleaned/cleared by a local service company. No septic tanks would be buried, and all tanks would be removed from the Project Area upon completion of the project. Electricity would be provided by portable generators. The use of all ancillary facilities and equipment would be restricted to the active workforce, and the active workforce would be the only personnel members permitted to stay on-site. Any trash generated would be contained on-site in dumpsters and hauled by a local commercial disposal company, as needed, to an approved landfill. No trash would be buried on-site. Use of the project facilities would be restricted to drill crew personnel. Details of the personnel camp would be submitted to BLM pursuant to the geothermal regulations.

Communication among field operations, Ormat offices, the BLM offices, and Nevada Division of Minerals offices would be maintained with the use of radio and satellite telephones, and cellular phones when possible. Support facilities and equipment would be located on the same well pad as the camp utilizing such facilities and equipment.

Additional components and equipment that may be used during drilling activities include the following:

- As many as 20 reserve pits (one at each well pad site) with a maximum individual potential storage capacity of 150,000 cubic feet.
- A chemical toilet at each active well pad site.
- A water storage tank at each active well pad site capable of containing a combined volume of at least 10,000 gallons.
- Two groundwater wells located on one or two well pad sites (discussed in detail in Section 2.1.5).
- A pipe rack stored at each active well pad site.
- A fuel and chemical/drilling additives storage area with secondary containment located at each active well pad site.
- Mud storage, mud tank, and mud logger at each active well pad site.
- A diesel generator.
- Air compressors.
- Drilling crew/worker vehicles (six to eight typical ¾- to 1-ton pickup trucks).
- Up to two flatbed trucks or flatbed boom trucks.
- Up to two backhoes.
- One D8 bulldozer.
- One compactor.
- One crane.
- Up to two front-end loaders.
- One road grader.
- One water truck.
- Up to two belly dump trucks.
- One or two truck-mounted drill rigs.
- One production size drill rig (would require up to 40 semi-truck loads to deliver).
- Two mobile light plants.

All lighting resulting from implementation of the Proposed Action would be associated with the trailers in the personnel camp, on drill equipment, and on drill masts as required by Federal Aviation Administration regulations. BLM approval of one or more Sundry Notices and/or permits would be required for ancillary facilities. Details of ancillary facilities would be provided to BLM in applications for permits.

### **2.1.3 Actions Proposed on Private Lands**

Ormat may purchase and truck water needed for construction and drilling activities from nearby sources on private land. Ormat would plan to negotiate with the owner of private land that is located closest to the Project Area. The nearest water source on private land is approximately 3 miles south of the Lease Area, in T21N, R35E, section 11, MDBM. Ormat would file for a temporary permit from the Nevada Division of Water Resources if water were to be obtained from this alternative. The temporary permit would allow some portion of the existing water rights at the existing source to be temporarily allocated for geothermal exploration at the Project Area. The permit would be obtained prior to acquisition of the water. Water use is discussed further in Section 2.1.5.

### **2.1.4 Road Construction Activities**

Approximately 82,348 linear feet of existing roads, including segments of Dempsey Lane, East Valley Road, and two unnamed roads, would be utilized and maintained as necessary for access to parts of the Project Area (Figure 2). Maintaining the roads as necessary would include activities such as applying gravel to the road surface where needed. Road maintenance activities would be restricted to existing road disturbance and not result in new surface disturbance beyond the outer edge of either side of the roads. Several segments of the existing roads that would be used for access and maintained by Ormat as needed cross DoN land (Figure 3). Ormat would obtain the necessary easements, right-of-ways, authorizations, or other required permission to use existing roads from the DoN.

A new gravel access road would be constructed to each of the well pads from existing roads or from well pad to well pad as necessary. Road construction would occur incrementally as necessary to reach well pads; roads would not be constructed until access is needed. Depending on which well pads would be actually utilized, the chronological order in which they would be utilized, and the type of well drilled on them, a maximum length of approximately 75,665 feet of access road may be constructed, if all access roads were constructed. Construction of the approximately 75,665 linear feet of proposed access roads would result in approximately 34.8 acres of surface disturbance. Federal geothermal leases grant the right to the lessee to construct necessary roads within the lease to provide access for lease operations. Construction of access roads within the Lease Area requires prior BLM approval of a Sundry Notice. While it is the intent of Ormat to limit construction of proposed access roads to within the Lease Area, some of the proposed access roads must cross unleased public land. Depending on which access roads are ultimately utilized, up to 33,895 feet of new access road may cross unleased public land administered by the BLM. Ormat has submitted appropriate Title V of the FLPMA of 1976 right-of-way applications to the Stillwater Field Office for approval of construction and utilization of access roads outside of the Lease Area. All new access roads would remain within the limits of the proposed Project Area.

Proposed access roads would be constructed to a standard maximum width of 20 feet. The 20-foot road width would consist of a 15-foot-wide travel surface and a 2.5-foot-wide shoulder on both sides of the travel surface. A dozer and/or grader would be used to construct proposed access roads. Aggregate would be applied to the entire road width at an average base depth of 6 inches. Drilling would require vehicle pullouts to be constructed at a width of 25 feet and length of 150 feet. It is estimated that two vehicle pullouts would be necessary for adequate vehicle passage on project access roads. However, field conditions may warrant additional pullouts. The disturbance necessary for construction of additional pullouts would be subtracted from other disturbance associated with well pads and roads; total impacts would not exceed 137 acres. The exact location of proposed pullouts would be field verified and submitted to the BLM for approval prior to construction. The roads would be graded to follow existing topography and minimize cut-and-fill requirements. Rolling dips would be provided along new access roads in areas where low spots or existing ditches are crossed. The rolling dips would be designed to accommodate flows from at least a 25-year storm event. Exact locations of rolling dips have yet to be determined but would be provided to the BLM once the final design is complete. Culverts may be used wherever rolling dips are not feasible. Culvert installation would follow BLM design criteria and specifications applicable for temporary roads. Road designs and improvements, including road cross section and crowns, rolling dip designs and placement, and road plans and profiles, would be executed in accordance with Gold Book standards (BLM 2007d).

Reclamation would include grading to reshape preconstruction contours. Reclaimed areas would be planted with the BLM-specified seed mix presented in Section 2.1.8.2. Access roads in existence prior to commencement of the project would not be fully reclaimed; these roads would be returned as close as possible to their original condition prior to commencement of the project. Detailed specifications regarding the abandonment and reclamation of access roads are discussed in Section 2.1.8.

### **2.1.5 Water Required**

Water would be needed for drilling operations, construction and compaction of roads, pads, and reserve pits, and dust control. Project-related water would be obtained from no more than two non-potable groundwater wells. Each well would be temporary and located on any one of the 20 well pads, or one well may be located within the proposed 10-acre gravel source area adjacent to East Valley Road (Figure 2). Consequently, no additional surface disturbance would be associated with the drilling of the groundwater well(s). The wells would be permitted under a geothermal waiver by Nevada Division of Water Resources and approved by the BLM. Each well would be drilled by a licensed water well driller to a productive interval of sands, gravels, or fractures (estimated at approximately 500 feet). A submersible electric pump on a 4-inch column

would then be placed below the productive interval in each well. The wells would be constructed, plugged, and abandoned in accordance with Nevada Administrative Code Chapter 534.

Water required for observation and production well drilling could range up to 30,000 gallons per day. Water requirements for temperature gradient well drilling, grading, construction, and dust control would average substantially less. One or more portable water tanks capable of containing a combined total of at least 10,000 gallons, but not more than 60,000 gallons, would be maintained at each well pad during drilling operations. All storage containers would be located on the proposed well pads.

Water would be transported from the two proposed ground water wells to the proposed well pads either by above-ground, 8-inch, black PVC piping or by water trucks. If piping is used, the piping would rest on the ground along or near the edge of the proposed access roads. The water distribution pipeline system would require prior BLM approval of a Sundry Notice to authorize construction of the pipeline. In order to prevent the piping from becoming an obstruction to public access, the piping would be buried beneath the road surface at all road crossing locations. No additional surface disturbance would result from installation or removal of the piping.

As an alternative, water needed for construction and drilling operations could also be purchased and trucked from nearby sources on private land. Ormat would try to negotiate with the owner of private land that is located closest to the Project Area. The nearest water source on private land is approximately 3 miles south of the Lease Area, in T21N, R35E, section 11, MDBM. The source is located adjacent to the south side of East Valley Road, making the road the primary access route to and from the water source. Typical operations would require four water truck deliveries per day if purchased off-site and delivered via truck. Should Ormat acquire water through this alternative, Ormat would file for a temporary permit from the Nevada Division of Water Resources. The temporary permit would allow some portion of the existing water rights at the existing source to be temporarily allocated for geothermal exploration at the Project Area. The permit would be obtained prior to acquisition of the water. Ormat would provide the BLM with a copy of the purchase agreement and the temporary permit prior to utilization of the water. Ormat would utilize a small crane to place a pump in the well and then back water trucks to the well to pump water.

### **2.1.6 Aggregate Material Required**

Only well pads scheduled to be drilled would be cleared. Clearing would include removal of organic material, stumps, brush, and slash. Topsoil would be salvaged during the construction of all pads and access roads, and stockpiled on the pads for use during subsequent reclamation of the disturbed areas. The well pads would be graded so that cut and fill requirements would be



balanced to minimize the need for off-site fill material. If additional fill material is necessary at a particular well pad, the material would be obtained from the excavation of the reserve pit at that well pad. The excavated material would also be used to construct the perimeter berm around the reserve pit; therefore, any excavated material not used for construction of the berm would be available for use as fill on the well pad. Approximately 192 cubic feet of material would be removed from a reserve pit excavated for drilling a temperature gradient well. The perimeter berm would require approximately 270 cubic feet of material to construct, and therefore no fill material would be available as a result of excavating the reserve pit. No additional fill material would be necessary at well pads constructed for drilling a temperature gradient well due to the little if any grading that a temperature gradient pad would require. Approximately 15,000 cubic feet of material would be excavated at a single reserve pit on a well pad constructed for drilling an observation well. Approximately 1,360 cubic feet would be required for construction of the reserve pit berm, leaving about 13,640 cubic feet available for use as fill on the well pad. Excavation of a reserve pit for drilling a production well would produce approximately 150,000 cubic feet of material. Construction of the perimeter berm would consume approximately 3,120 cubic feet of this material, leaving about 146,880 cubic feet of material available for use as fill on the well pad.

Each well pad would be covered with up to 8 inches of aggregate (gravel). Gravel would be applied to the access roads, as necessary, at an average depth of 6 inches to create an all-weather surface. The volume of gravel necessary for all 20 proposed well pads would be approximately 81,481 cubic yards, assuming all are constructed to the maximum proposed size of 4.1 acres. Temperature gradient wells may not be covered with gravel or may be covered with less than 8 inches of gravel. An additional 10 inches (4,321 cubic yards) of gravel would be applied to well pads beneath the drill rig to provide extra support. The proposed access roads would require approximately 28,024 cubic yards of gravel. The total maximum volume of gravel needed for the Proposed Action is estimated at 113,965 cubic yards (Ormat 2011). The gravel needs specific to well pads, access roads, pullouts, and drill rig support are provided in Table 7.

**Table 7 Project Aggregate Requirements**

<b>Project Component</b>	<b>Aggregate Required (cubic yards)</b>
Well pads (20 production well pads)	81,481
Drill rig support (on all 20 well pads)	4,321
New access roads	28,024
Access road pullouts	139
<b>Total aggregate required</b>	<b>113,965</b>

Well pad and road-building gravel would be obtained from one or two proposed gravel source areas located within the general proximity of the Lease Area. One of the proposed gravel source areas would be a new mineral material site that would be constructed on BLM-administered land adjacent to the north side of East Valley Road, in T22N, R36E, section 32, MDBM. The mineral material site would be constructed to a maximum size of approximately 660 feet by 660 feet, forming a roughly 10-acre, square-shaped area. Ormat would enter into a mineral material sale contract with the BLM to obtain gravel from this proposed area. The other proposed gravel source area would be located east of Dixie Valley Road, at an existing and partially developed mineral material pit in T22N, R35E, sections 7 and 8, MDBM. The existing site has an authorized negotiated sale contract, with Ormat Nevada Inc., for sand and gravel material (BLM Serial Number NVN-89405). There was a prior Free Use Permit (BLM Serial Number NVN-59757) which expired on April 20, 2000. A trench was previously constructed at the perimeter of the Free Use Permit area to form an approximately 660-foot by 660-foot (10-acre) area. Ormat would expand the portion of the site already excavated incrementally as the demand for gravel dictates but would not expand it beyond the perimeter trench.

Construction of the gravel sources would occur incrementally as the gravel demands of the project dictate. Construction would not expand beyond the trench previously constructed at the perimeter of the prior Free Use Permit area and would be restricted to an equally sized 10-acre area at the other proposed source area. Construction of the gravel source areas would require as many as four to five persons, a front-end loader, a bulldozer, and a dump truck. During construction, vegetation would be removed and topsoil would be salvaged where possible and stockpiled for use during reclamation. Excavation of gravel source areas would reach depths no greater than 10 feet below ground surface. A safety fence would be installed along the perimeter of the gravel source areas once excavation reached depths greater than or equal to 3 feet below ground surface. The proposed gravel source areas are accessible from existing Dixie Valley Road and East Valley Road, respectively, and would not require construction of new roads. One to two persons would be required to operate the gravel source area after construction is completed. Ormat would not locate any exploratory geothermal well within the gravel source areas but may drill one of the two potential groundwater wells in the gravel source area adjacent to the north side of East Valley Road.

### **2.1.7 Workforce and Schedule**

Ormat proposes to initiate the Proposed Action immediately following BLM approval and issuance of required local, state, and federal permits and approvals for the project, most likely during fall 2011. The project activities would be performed over the next one to five years, depending on the types and quantity of wells drilled. After well operations have ceased the reclamation activities described in Section 2.1.8 would be performed.

Typically, drilling a temperature gradient well or observation well requires a drill crew of 3 people. Drilling a production well generally requires a larger drill crew of about 10 people, with occasional periods requiring up to 18 people. Additional personnel may periodically visit active drill sites, including support geologists, suppliers, and agency officials. Drilling crews would operate drill rigs 7 days a week, 24 hours a day regardless of the well type actively being drilled. Approximately 8 days would be required to complete the drilling of a temperature gradient well, 15 days would be required for an observation well, and approximately 45 days would be required for a production well. Difficulties encountered during the drilling process, including the need to work over or to re-drill the well, could double the time necessary to successfully complete any one of the three well types.

### **2.1.8 Project Reclamation**

If Ormat determines that a well has commercial viability, well operations would likely be suspended pending application for, and receipt of, regulatory approvals to place the well and associated access roads and other components required to operate the well into commercial service as required by regulation. The well would likely be monitored and exploration activities would continue in accordance with these plans while the application is processed. Interim reclamation activities would be implemented as described below. Ormat would routinely assess the usefulness of wells, and if Ormat were to judge certain wells to be unsuitable for commercial use or monitoring, upon BLM approval, the wells would be plugged and abandoned in conformance with the procedures for final reclamation outlined below.

Interim and final reclamation activities proposed in this section are consistent with BLM and Nevada State Regulatory requirements, including recommendations provided in the Gold Book (BLM 2007d). The Operations Plan submitted to and approved by BLM in March 2011 has additional detail for interim and final reclamation procedures.

#### **2.1.8.1 Interim Reclamation**

Disturbed areas not needed for active support of operations would undergo interim reclamation as soon as practical. Any liquids in the reserve pits would be evaporated. Solids remaining in the pit, which typically consist of non-hazardous, non-toxic drilling mud and rock cuttings, would be sampled for pH, metals, and total petroleum hydrocarbons. If analysis confirms the material to be non-hazardous and non-toxic, the solids would then be mixed with excavated material and buried under backfill in the reserve pit. Any material that is determined to be hazardous or toxic would be excavated and disposed of at an approved landfill.

During the construction and drilling process, topsoil would be salvaged and stockpiled for use during reclamation. Following completion of exploratory well testing, drilling and testing equipment would be removed from the site. With the exception of an area required to access

maintained wellheads, cut and fill slopes would be graded to a final or intermediate contour that blends with the surrounding topography, and erosion control measures would be implemented. Ormat would maintain healthy, biologically active topsoil and minimize habitat and forage loss during the life of the wells by stockpiling and/or spreading any extra salvageable topsoil over the area of interim reclamation whenever possible. The area would be reseeded to within a few feet of the area required for wellhead access. Areas of playa disturbed by the proposed project would not be seeded. These areas are not currently vegetated due to the natural conditions of the playa.

Surface facilities remaining on-site for observation wells would consist of a wellhead, potential monitoring equipment, and the access roads necessary to access the observation wells. The temporary new access roads created for the project would be reclaimed by removing gravel, grading to achieve preconstruction contours, and then planting with the BLM-provided seed mix presented in Table 8 once they are deemed not necessary for access. Churchill County has agreed to take any project gravel removed during reclamation. Seeding would not be performed within the playa areas where vegetation was absent prior to commencement of the project. Following completion of testing activities, the well would be fenced, chained, and locked. Wells could be shut in with a mineral oil cap as applicable. Pressure and temperature sensors could be installed in the well at fixed depths to monitor any changes in these parameters over time. The well pads and access roads would be left in place and subject to regular inspection and maintenance by Ormat personnel, until such time that Ormat deems the well to be unnecessary. Final reclamation activities for those sites would then be engaged.

Temporary groundwater wells would either be abandoned following completion of exploration activities in accordance with Nevada State Regulatory requirements or, if exploratory data provide evidence of a productive reservoir, wells could be converted to permanent use to support water needs of future geothermal energy production operations. If a well is suitable for long-term use, Ormat would obtain the necessary permits from the Nevada State Engineer prior to such use.

#### **2.1.8.2 Final Reclamation**

In the event that Ormat fails to discover a geothermal resource that can be produced in commercial quantities and determines that further exploration drilling is not warranted, after all well operations have ceased, Ormat would reclaim remaining disturbance related to the proposed project. Ormat would restore all disturbed areas to preconstruction contours or to contours similar to those of surrounding landforms where restoration of preconstruction contours is not feasible. Disturbed areas would be reseeded with the BLM-specified seed mix presented in Table 8, and invasive, non-native plants and noxious weeds would be controlled in accordance with BLM guidelines and lease stipulations. Seeding would not be performed within the playa areas where vegetation was absent prior to commencement of the project. Ormat would implement erosion-control measures and BMPs during reclamation. Project-related equipment and

machinery would be decommissioned and, where possible, reused or sold as salvage. Equipment with no resale value would be sold or given as scrap. The BLM may provide additional reclamation guidance or direction during reclamation to improve success.

Ormat would plug and abandon all wells compliant with BLM and Nevada State Regulatory regulations. A detailed plan for well plugging and abandonment would be addressed in Ormat’s Application to Drill (Form 3260-3) and Drilling Program. Following the abandonment of wells, gravel surfacing material would be removed from well pads and the well pads would be disked and graded to loosen compacted soils and reshaped as close as possible to preconstruction grades. The reserve pits would be backfilled after liquids in them are evaporated and tests indicate pit solids are non-hazardous and non-toxic. Well pads would be surfaced with stockpiled topsoil where available and planted with a seed mix specified by BLM and free of noxious weeds at the time of reclamation. Unless BLM requests otherwise, all roads constructed for project access would be reclaimed by grading to restore preconstruction contours, disked, and then planted with the BLM-specified seed mix presented in Table 8. Gravel applied to roads and drill pads during construction and operation would be removed during reclamation. Project gravel removed during reclamation would be donated by Ormat to Churchill County for use in County road projects. Access roads in existence prior to commencement of the project would not be reclaimed; these roads would be returned as close as possible to their original condition prior to commencement of the project. Areas of playa disturbed by the proposed project would not be seeded. These areas are not currently vegetated due to the natural conditions of the playa.

**Table 8 Reclamation Seed Mix\***

<b>Species</b>	<b>Pounds Pure Live Seed /Acre</b>
Indian ricegrass, variant Nezpar	4.00
Desert saltgrass	3.00
Black greasewood	2.00
Fourwing saltbush	2.00
Shadscale (saltbush)	0.50
Iodine bush	0.50
<b>Total</b>	<b>12.00 pounds/acre pure live seed</b>

\*Seed mix subject to modification by BLM at time of reclamation.

### **2.1.9 Environmental Protection Measures**

In addition to complying with the lease stipulations attached to leases NVN-083934, NVN-083935, NVN-083936, NVN-083937, NVN-083939, NVN-083941, NVN-083942, and NVN-086885 (Appendix A), Ormat would implement environmental protection measures and comply

with drilling permit conditions of approval to mitigate the potential adverse impacts of the project. As required by 43 CFR 3261.12(g), the following subsections provide a description of the environmental protection measures that would be implemented as part of the Proposed Action to reduce or eliminate environmental impacts.

### **Air Quality**

All applicable state and federal air quality standards would be met through the use of the best available technology to control emissions. The following environmental protection measures would be implemented by Ormat to protect air quality:

- Surface access roads with aggregate materials, wherever appropriate;
- Use dust abatement techniques such as watering on unpaved, unvegetated surfaces to minimize airborne dust, as needed;
- Apply dust abatement techniques (such as watering, requiring loader buckets to be emptied slowly, and minimizing drop heights) to earthmoving, excavating, trenching, grading, and aggregate-crushing and -processing activities;
- Minimize equipment and vehicle idling times to 15 minutes during construction activities;
- Observe prudent speed limits on unpaved roads throughout the Project Area in order to reduce dust emissions; and,
- Maintain access roads, Project Area roads, and other traffic areas on a regular basis to minimize dust and provide for safe travel conditions.

### **Cultural Resources and Native American Religious Concerns**

The following environmental protection measures would be implemented by Ormat for cultural resources:

- Ormat would avoid cultural resource sites that are known to be eligible or potentially eligible for inclusion in the National Register of Historic Places through design, construction, and operation of the project.
- An approximately 100-foot buffer zone would be established and identified by placing flagging around eligible and potentially eligible cultural resource sites to help provide protection to the sites. Project equipment and facilities would not encroach into the established 100-foot buffer zone;
- The project facilities would be operated in a manner consistent with the engineered design to prevent problems associated with the run-off that could affect adjacent cultural sites. This includes the use of BMPs to minimize off-site erosion and sedimentation.
- Where the installation of project facilities could impact eligible or potentially eligible cultural sites(s), Ormat would retain a qualified archaeologist to serve as a cultural

monitor during construction of the facility in order to avoid potential effects to the cultural site(s). The BLM would decide when cultural monitors would be necessary.

- Ormat would limit vehicle and equipment travel to existing and proposed access roads, well pads, construction areas, and gravel source areas.
- Any unplanned discovery of cultural resources, items of cultural patrimony, sacred objects, or funerary items would require that all activity in the vicinity of the find ceases, and the Field Manager, Stillwater Field Office, 5665 Morgan Mill Road, Carson City, Nevada 89701, be notified immediately by phone (775-885-6000) with written confirmation to follow. The location of the find would not be publicly disclosed, and any human remains must be secured and preserved in the place until a Notice to Proceed is issued by the authorized officer.

### **Wildlife**

Ormat would implement the following measures to minimize potential impacts to wildlife in the Project Area:

- Trash and other waste products would be properly managed, and Ormat would control garbage that could attract wildlife. All trash would be removed from the Project Area and disposed of at an authorized landfill.
- Speed limits would be posted, and if necessary speeds would be reduced, especially when wildlife is active near access and service roads.
- Employees and contractors are strictly prohibited from carrying firearms on the job site to discourage illegal hunting and harassment of wildlife.
- Reclamation of the disturbed areas, as described in Section 2.1.8, would be completed in order to return these areas to the condition required in the drilling permit Conditions of Approval.
- Areas that become infested with invasive species/noxious weeds during construction would be mapped and treated using a certified weed-free seed mix and mulching materials in accordance with lease stipulations.
- Weed infestations would be avoided or treated before disturbance.

### **Noxious Weeds and Invasive and Non-Native Species**

To minimize the introduction and establishment of noxious weeds and invasive and non-native species in the disturbed areas, the following measures and the Noxious Weed Management Plan in Appendix B would be incorporated into the proposed project:

- Ormat would use a certified weed-free seed mix during reclamation of disturbed areas;
- Ormat would follow standards outlined in Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development, The Gold Book (BLM 2007d) for well site reclamation;

- Areas that become infested with invasive species/noxious weeds during construction would be mapped and treated using a certified weed-free seed mix and mulching materials in accordance with lease stipulations.
- Ormat would complete concurrent reclamation when feasible in order to minimize disturbed areas where weed species could establish;
- Ormat would implement a weed management plan for noxious weeds during the life of the project (Appendix B);
- Ormat would apply a weed-free seed mix to growth medium and overburden stockpiles as soon as possible following stockpile completion;
- Vehicle traffic would be restricted to access roads, well pads, and gravel pits to reduce potential mechanical transport of noxious weed seeds; and
- Existing noxious weed infestations (*Tamarix* sp.) would be treated before any disturbance within the Project Area occurs.

## **Water Resources**

Environmental protection measures that would be implemented for the protection of groundwater and surface water resources are as follows:

### Surface Water

Several topographical drainages exist within the Lease Area, and it is possible that impacts to surface water could occur during significant storm events as a result. Potential releases of materials used during construction activities, primarily hydrocarbon releases from construction equipment, could potentially impact storm water. Prior to construction, Ormat would develop a spill and discharge contingency plan that details specific containment, cleanup and abatement, and notification procedures that would be implemented in the event of a spill or discharge. Ormat would implement BMPs during construction to prevent the contamination of storm water runoff. Some of the BMPs would likely include, but are not limited to, the following:

- When proposed new access roads must cross ephemeral washes, rolling dips would be installed. The rolling dips would be designed to accommodate flows from at least a 25-year storm event. Culverts may be used wherever rolling dips are not feasible.
- Ormat would routinely inspect the integrity of the berm around each reserve pit to ensure it provides an effective barrier between surface waters outside of the berm and drilling/geothermal fluids inside the berm. This would be particularly beneficial at well pads within playa areas where the playa surface may become seasonally and temporarily inundated with surface water.
- Temperature gradient well operations for individual wells within playa areas would not be initiated when standing water is present on the well pad location or its associated access route. If standing water encroaches on existing temperature gradient operations



within playa areas, Ormat would work with BLM and evaluate the specific situation to determine if operations need be suspended until the water recedes or if operations can continue.

- Construction of access roads and well pads for individual observation or production wells located within the playa areas would not be initiated if there is standing water within the well pad's access route or on the well pad location. Ormat would work with BLM to evaluate the specific circumstances and determine the conditions under which construction activities can be initiated.
- Silt fences and/or straw bales would be used in areas requiring sediment control.
- Roads and well pads not required for further geothermal exploration purposes would be re-contoured to preconstruction conditions and seeded to prevent erosion.
- Access roads would follow existing contours to the maximum extent possible. In areas where new access roads must be constructed across slopes, erosion control measures such as silt fences, surface roughening of slopes, and slope stabilization would be provided as necessary.
- Erosion control measures, including but not limited to silt fencing, diversion ditches, water bars, temporary mulching and seeding, and application of gravel or rip rap, would be installed, where necessary, immediately after completion of construction activities to avoid erosion and runoff.
- Drilling activities would be kept to a minimum distance of 650 feet from any drainage, seep, or spring, unless approved by BLM;

### Groundwater

Ormat would implement various BMPs to ensure that groundwater quality is not impacted from exploration drilling activities. Some of the BMPs would include but are not limited to the following:

- Excavation into native soil during construction of well pad reserve pits would be minimized to the maximum extent possible.
- Drill pad reserve pits would be compacted during construction, and settled bentonite clay from drilling mud would accumulate on the bottom of the drill pad reserve pits to act as an unconsolidated clay liner, reducing the potential for drilling fluid to percolate to groundwater.
- A BLM-approved cementing and casing program for the drilling of all wells would be implemented to prevent water quality effects on groundwater during or after completion of the wells.
- Borehole geophysics analyses (cement bond logs) would be conducted to document that well casing cementing activities provide an effective seal isolating the geothermal aquifer from shallow alluvial aquifers, therefore minimizing potential impacts on surface springs or streams.

- The project would use BMPs to ensure that any geothermal fluid encountered during the drilling does not flow uncontrolled to the surface. These include the use of BOPE during drilling and the installation of well casing cemented into the ground.
- Any well on the leased land that is not in use or demonstrated to be potentially useful would be promptly plugged and abandoned in accordance with lease stipulations. No well would be abandoned until it has been demonstrated to the satisfaction of the BLM that it is no longer capable of producing in commercial quantities and would not serve any other useful purpose such as for injection of geothermal fluids or monitoring of the geothermal reservoir or groundwater.

### **Hazardous and Solid Waste, Public Safety, and Sanitation**

Environmental protection measures that would be implemented for hazardous and solid waste, sanitation, and public safety are as follows:

- Prior to initiating operations, a project hazardous material spill and disposal contingency plan would be prepared and submitted for approval to BLM that would describe the methods for cleanup and abatement of any petroleum hydrocarbon or other hazardous material spill. The hazardous material spill and disposal contingency plan would be made readily available on-site before operations begin.
- Secondary containment structures would be provided for all chemical and petroleum/oil storage areas during drilling operations. Additionally, absorbent pads or sheets would be placed under likely spill sources and spill kits would be maintained on-site during construction and drilling activities to provide prompt response to accidental leaks or spills of chemicals and petroleum products.
- Handling, storage, and disposal of hazardous materials, hazardous wastes, and solid wastes would be conducted in conformance with federal and state regulations to prevent soil, groundwater, or surface water contamination and associated adverse effects on the environment or worker health and safety.
- H<sub>2</sub>S monitoring and alarm equipment would be installed and operated on the mud tanks of observation and production wells during drilling below the surface casing.
- Portable sanitary facilities would be available and used by all personnel during exploration activities. These facilities would be serviced by a local contractor, and human waste would be disposed of at an approved facility.
- Noise suppression devices would be used on all compressors.
- Any herbicide selection and application would be in conformance with Final Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement (BLM 2007a) and Record of Decision (BLM 2007c).

## **Prevention and Control of Fires**

Ormat would implement the following fire contingency plan in the event of any fire started on or near the Project Area:

- The BLM Stillwater Field Office (775.885.6000) would be notified immediately of any wildland fire, even if the available personnel can handle the situation or the fire poses no threat to the surrounding area.
- A roster of emergency phone numbers would be available at the project site so that the appropriate firefighting agency can be contacted in case of a fire.
- All vehicles would carry, at a minimum, a shovel, five gallons of water (preferably in a backpack pump), and a conventional fire extinguisher.
- Adequate fire-fighting equipment (a shovel, a Pulaski, standard fire extinguisher(s), and an ample water supply) would be kept readily available at each active drill site. Water that is used for construction and dust control would be available for fire suppression.
- Vehicle catalytic converters (on vehicles that would enter and leave the drill site on a regular basis) would be inspected often and cleaned of all flammable debris.
- All cutting/welding torch use, electric-arc welding, and grinding operations would be conducted in an area free, or mostly free, from vegetation. An ample water supply and shovel would be on hand to extinguish any fires created from sparks. At least one person in addition to the cutter/welder/grinder would be at the work site to promptly detect fires created by sparks.
- Personnel would be responsible for being aware of and complying with the requirements of any fire restrictions or closures issued by the BLM Carson City District, as publicized in the local media or posted at various sites throughout the field office district.
- Personnel would be allowed to smoke only in designated areas and would be required to follow applicable BLM regulations regarding smoking.
- Any small fires which occur around the well pad during drilling and/or testing operations should be able to be controlled by rig personnel utilizing on-site firefighting equipment.
- Spark arresters would be used on all equipment that has the potential to emit sparks.

## **Soil Erosion**

Based on the average annual precipitation of about 6 inches per year (Western Regional Climate Center 2010) and relatively flat terrain within the Project Area (Figure 3), the potential for soil erosion should be minimal. However, Ormat would implement environmental protection measures to minimize watershed and other resource damage, including the following:

- Topsoil would be salvaged, stockpiled, and reused whenever possible and in a timely manner.
- Temporarily disturbed areas would be reseeded where previously vegetated using a BLM-approved seed mixture.

- Erosion control measures, including but not limited to silt fencing, diversion ditches, water bars, temporary mulching and seeding, and application of gravel or rip rap, would be installed, where necessary, immediately after completion of construction activities to avoid erosion and runoff.
- Access roads would follow existing contours to the maximum extent possible. In areas where new access roads must be constructed across slopes, erosion control measures such as silt fence, surface roughening, and slope stabilization would be provided as necessary.
- An average of 6 inches of gravel would be used as road surface where appropriate because roads would be used during all seasons.
- Gravel would be laid down when ground conditions are wet enough to cause rutting or other noticeable surface deformation and severe compaction. As a general rule, if vehicles or other project equipment create ruts in excess of 4 inches deep when traveling cross-country over wet soils, a gravel surface would be added prior to additional vehicle use.
- In areas of very soft soils, up to 3 feet of aggregate would be used during construction.

## **Visual Resources**

To minimize temporary and permanent visual resource impacts from construction of access roads, well pads, and gravel source areas and from drilling of wells, Ormat would take the following actions:

- Water would be periodically applied on soil surfaces during construction and grading to control dust.
- Cut and fill areas would be minimized by proper placement of roads and well pads.
- Equipment placed at the well pads after drilling and testing would be removed so that only the wellhead extends above the well pad.
- 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.
- Disturbances would be reclaimed to pre-construction conditions or equivalent.

## **2.2 ALTERNATIVE ACTIONS**

### **2.2.1 No Action Alternative**

Under the No Action Alternative, no exploration would occur and no additional information on potential geothermal resources within the Lease Area would be obtained. Implementation of the No Action Alternative would not meet Ormat's purpose and need for the project and would not meet national policy objectives to facilitate appropriate renewable energy development. Selection of the No Action Alternative may also impair geothermal lease development rights granted to Ormat through the issuance of the federal geothermal leases.

## **2.2.2 Alternatives Considered But Eliminated From Detailed Analysis**

### **Selective Access Roads**

Under the Proposed Action, several of the proposed well pads are accessible only from a single road proposed between it and a neighboring proposed well pad. Generally, this has allowed for the shortest, most direct route between pads within close proximity to one another. However, not all pads may be developed under the Proposed Action, and those that are would be developed in order based on exploration data, not proximity to one another. As a result, Ormat would possibly be required to construct an access road that first passes through proposed but undeveloped well pads before reaching the well pad targeted for development. This would result in a lengthier road than would be required to reach the same target well pad directly from an existing road. To avoid this situation, Ormat originally proposed access roads between many neighboring well pads and also between those well pads and existing roads. While Ormat did not intend to construct all of the proposed roads, construction of any number of them would have been authorized under this alternative. Consequently, the total authorized surface disturbance would have been substantially greater than the Proposed Action, and the roads proposed under the Proposed Action would still allow access to all proposed well pads. It was determined that the substantially greater surface disturbance was not necessary to perform the project and this alternative was eliminated from further analysis.

### **Independent Project Access**

Ormat initially proposed to access all of the proposed well pads from existing roads or temporary roads that it would construct. However, a segment of the proposed access road through T22N, R35E, section 20, MDBM, closely paralleled an access road proposed for construction by Terra-Gen for its geothermal exploration project adjacent to the Lease Area. It was determined that two access roads within the same section that roughly paralleled one another would result in unnecessary surface disturbance and that Ormat should utilize the access road proposed by Terra-Gen. This road is now part of the Dixie Hope Project that Ormat purchased from Terra-Gen. Accordingly, this alternative was eliminated from detailed analysis.

### **Alternate Well Pad Locations**

Originally, Ormat had proposed constructing three well pads in T22N, R35E, section 8, MDBM, near Dixie Hot Springs, which occur just outside of the Lease Area limits. The springs are surrounded by riparian vegetation that extends onto the Lease Area. According to lease stipulations (Appendix A), Ormat must maintain a 650-foot buffer around riparian zones while performing surface disturbance. The two easternmost proposed well pads in section 8 would have been very difficult to construct without infringing into the required buffer. As a result these two pads were dropped from further analysis, as were the access roads to each. The other proposed well pad in section 8 was moved further west, away from the springs and riparian vegetation, and is included in the Proposed Action as proposed well pad “H” (Figure 3).

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

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 or Alternatives and the environmental consequences of effects of the action(s). The Lease Area is located in Dixie Valley, east to southeast of the Stillwater Mountains and west to northwest of the Clan Alpine Mountains in Churchill County, Nevada. It is situated approximately 35 miles north of the Highway 50 intersection with Dixie Valley Road and east of Dixie Valley Road (Figure 1). The elevation varies between 3,445 and 3,550 feet above mean sea level.

#### **3.1 SCOPING AND ISSUES**

Internal scoping was performed by an interdisciplinary team of BLM resource specialists in March and April 2011 to analyze the resources that may potentially be impacted by implementation of the Proposed Action. While many potential impacts to various environmental resources may arise during scoping, not all impacts warrant analysis. The potential effects to environmental resources identified during internal scoping were carried forward for detailed analysis if:

- analysis of the effect was necessary to make a reasoned choice between alternatives;
- the effect was likely to have a noticeable or measurable impact to a resource value or values;
- analysis of the effect was necessary to determine whether or not it would have direct or indirect impacts and, if so, the magnitude of those impacts;
- the effect had the potential to violate a law imposed to protect the environment, or any other law or regulation, without mitigation imposed; or,
- an issue would add a measurable incremental impact to past, present, and reasonably foreseeable actions and therefore have a possible cumulatively substantial impact.

External scoping was performed with the Fallon Paiute-Shoshone Tribe 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 3.2.12.

The potential impacts to the resources listed in Table 9 and Table 10 were evaluated in accordance with criteria listed above to determine if detailed analysis was required. Through this process, the interdisciplinary team determined that the following resources are present and that the potential impacts to them warrant detailed analysis in the EA:

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

- Wildlife and Key Habitat;
- Vegetation;
- Special Status Species (Wildlife and Vegetation);
- Visual Resources;
- Water Quality (Surface/Ground);
- Wetlands and Riparian Areas;
- Floodplains;
- Land Use Authorizations; and,
- Soils; and,
- Invasive, Nonnative Species.

Rationale is provided in Table 9 and Table 10 for resources that are present but whose impacts do not warrant detailed analysis based on the criteria listed above. Appendix 1 of BLM’s NEPA Handbook (H-1790-1) (2008b) identifies Supplemental Authorities that are subject to requirements specified by statute or executive order and must be considered in all BLM environmental documents. Table 9 lists the Supplemental Authorities and their status in the Project Area. Supplemental Authorities that may be affected by the Proposed Action are further described in this EA.

**Table 9 Supplemental Authority Elements**

Supplemental Authority Element*	Not Present**	Present/Not Affected**	Present/May Be Affected***	Rationale and/or Section Found
Air Quality		X		The Project Area is located in a very sparsely populated area with minimal sources of potential impacts to regional air quality, and the area is in attainment for air quality standards. The proposed project would be short term and temporary, and would utilize a relatively small fleet of equipment. With implementation of the protection measures described in Section 2.1.9, measureable impacts to air quality are not anticipated.
Areas of Critical Environmental Concern	X			
Cultural Resources			X	Please see Section 3.2.11.
Environmental Justice	X			
Farm Lands (prime or unique)	X			

Supplemental Authority Element*	Not Present**	Present/Not Affected**	Present/May Be Affected***	Rationale and/or Section Found
Forests and Rangelands (Healthy Forest Restoration Act Projects Only)	X			
Human Health and Safety (Herbicide Projects)		X		
Floodplains			X	Please see Section 3.2.7.
Invasive, Nonnative Species			X	Please see Section 3.2.13 and 4.2.6.
Migratory Birds			X	Please see Sections 3.2.8 and 4.2.4.
Native American Religious Concerns			X	Please see Section 3.2.12.
Threatened or Endangered Species	X			
Wastes, Hazardous or Solid	X			
Water Quality (Surface/Ground)			X	Please see Section 3.2.5.
Wetlands/Riparian Zones			X	Please see Section 3.2.6
Wild and Scenic Rivers	X			
Wilderness		X		There are no designated Wilderness Areas within or near the Lease Area. The Stillwater Wilderness Study Area is located across Dixie Valley Road, opposite of the Lease Area. No part of the Lease Area of Project Area occurs within the Wilderness Study Area. There would be no impact. Additionally, the Lease Area included past disturbance in the form of existing roads and overhead transmission lines. Wilderness characteristics are not present.

\*See H-1790 (BLM 2008b) Appendix I Supplemental Authorities to be Considered

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

\*\*\*Supplemental Authority elements determined to be Present/May Be Affected *must* be carried forward in the document.

The following resources or uses, which are not Supplemental Authorities as defined by BLM's Handbook H-1790-1, are present in the area. BLM specialists have evaluated the potential impact of the Proposed Action on these resources and documented their findings in the table below. Resources or uses that may be affected by the Proposed Action are further described in this EA.



**Table 10 Resources or Uses Other Than Supplemental Authority Elements**

Resource or Issue	Present/Not Affected*	Present/May Be Affected**	Rationale and/or Section Found
Land Use Authorizations		X	Please see Section 3.2.1.
Soils		X	Please see Sections 3.2.3 and 4.2.2.
Vegetation		X	Please see Sections 3.2.4 and 4.2.3.
Wildlife and Key Habitat		X	Please see Sections 3.2.9 and 4.2.5.
Special Status Species - BLM Sensitive		X	Please see Sections 3.2.10 and 4.2.5.
Grazing	X		Proposed Action would not result in reduction of grazing capacity within present allotments. Reclamation of proposed disturbance within two years of project completion would ensure that impacts are temporary.
Geology and Minerals		X	Please see Sections 3.2.14.
Recreation	X		Numerous access roads in the vicinity allow for dispersed recreation to continue. Exploration drilling is temporary in nature; recreation access restrictions would only take place on active drill pads.
Visual Resources		X	Please see Sections 3.2.2 and 4.2.1.
Wild Horses and Burros	X		There are no herd management areas that overlap or occur within the Lease Area. Wild horses do move through Dixie Valley and utilize some springs in the valley for water. The proposed project would be short term and temporary and would not be anticipated to impact horses utilizing the valley. There are no wild burros present.

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

\*\*Resources or Issues determined to be Present/May Be Affected *must* be carried forward in the document.

### 3.2 PROPOSED ACTION

The Proposed Action would result in up to 137 acres of surface disturbance, as listed in Table 4, and would have potential impacts beyond those attributed strictly to surface disturbance, such as groundwater quality impacts. As described in Section 2.1.9, Ormat would implement environmental protection measures to minimize or eliminate impacts to the extent practicable. The potential impacts presented below account for implementation of the environmental protection measures.

#### 3.2.1 Land Use Authorizations

##### Affected Environment

There are several land use authorizations granted on public lands that are near, or cross, the Lease Area. These include linear rights-of-ways for roads and a power transmission line, and a right-of-way for a water testing facilities. Details of the authorizations are provided in Table 11.

**Table 11 Land Use Authorizations**

Holder	Serial Number	Case Type	Authority
TGP Dixie Valley, LLC	NVN 040324	Power Transmission Line	The Act of October 21, 1976
Churchill County	NVN 049742	County Road	The Act of October 21, 1976
U.S. Geological Society	NVN 086736	Water Testing Facilities	The Act of October 21, 1976
ORNI 32, LLC	NVN 088170	Access Road	The Act of October 21, 1976

The DoN owns numerous, relatively large tracts of land in Dixie Valley, including two tracts near the Lease Area. One of these areas is the former Dixie Valley Settlement, south of the Lease Area, and the other is adjacent to the Lease Area in T22N, R35E, section 4; 5; 8; and 17, MDBM (Figure 3). Several existing roads, including Dempsey Lane and East Valley Road, cross these tracts and would be utilized and maintained as access roads to the Lease Area. In addition, the DoN performs low-level supersonic flights as part of training activities in Dixie Valley.

#### Environmental Consequences

The DoN performs training activities that includes operating aircraft under low-level and supersonic conditions in the Dixie Valley region. Potential impacts to the DoN activities in Dixie Valley are reviewed by the Federal Aviation Administration if the impact exceeds or conflicts with flight obstruction specifications found in 14 CFR 77.13. The Proposed Action would not exceed or conflict with the flight obstruction specifications.

Ormat and BLM have discussed the Proposed Action with the DoN personnel managing the Dixie Valley activities. The discussion focused on the utilization of existing roads crossing DoN land in order to access the proposed Project Area. The DoN requested that Ormat perform maintenance on the proposed access road sections that cross DoN land, including portions of Dempsey Lane and East Valley Road. As described in Section 2.1.5, the necessary maintenance of these road segments on DoN land would be performed by Ormat.

The Proposed Action would not conflict with existing rights-of-way or uses granted within them. The BLM would notify all right-of-way holders in the area of the proposed project and ensure that the proposed project does not negate rights granted to them. Because the project would not impact existing rights-of-way, exceed or conflict with flight obstruction specifications, or result in degradation of existing roads or access to public and DoN lands, impacts to land use authorizations or DoN training activities would not be anticipated.

### **3.2.2 Visual Resources**

#### Affected Environment

Based on information contained in the Consolidated Resource Management Plan (BLM 2001), the Lease Area is located within a Class III Visual Resource Management area. The objective for this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities in a Class III category may attract attention but should not dominate the view of the casual observer. Every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repetition of basic landscape elements.

Sensitive receptors in the Lease Area include people recreating in the area. Recreational activities can include hiking, hunting, sightseeing, nature photography, mountain biking, and off-highway vehicle use. The closest major transportation route is Dixie Valley Road, which is designated State Route 121 and runs through the western part of the Lease Area. Current motorized travel in the Dixie Valley area is authorized on existing roads, and cross-country travel is prohibited.

The closest urban sensitive receptor (park, church, residence, school, or hospital) is located in Lovelock, Nevada, approximately 27 miles northwest of the Lease Area. The Stillwater Range, with peaks higher than 8,500 feet, is located between the Lease Area and Lovelock. The closest receptor would be a single residence on private land that is located approximately 3 miles south of the Lease Area (Figure 3).

#### Environmental Consequences

During drilling operations, a drill rig mast would be the most visibly apparent component of the proposed project. The drill rig used to drill production wells would have a mast that extends up to 170 feet above the ground surface, depending on the type of drill rig used. The drill rig mast would be shorter on drill rigs used to drill temperature gradient wells and observations wells but would still extend higher than the existing ground cover and be readily visible. Drilling operations would be performed 24 hours per day, 7 days per week, for a period of what is typically 45 days for each production well. Lights used on the drill rig, including the drill rig mast, would increase rig visibility during night hours. Ormat would implement the environmental protection measures described in Section 2.2 to reduce lighting impacts and degradation of dark sky resources. These measures include limiting lighting to where needed for safe operations and shielding or directing lights to the immediate work area.

Impacts to visual resources would result from approximately 137 acres of new surface disturbance from the construction of the proposed well pads, access roads, and gravel source areas. The surface disturbance would occur at ground level and would not be readily visible in

the landscape. There are existing unpaved roads within the Lease Area and surrounding area, and the proposed disturbance would contribute only similar elements to the existing landscape. Impacts to visual resources would also occur during construction activities as a result of the presence of drill rigs, drill crew vehicles and camps, and accessory construction equipment.

The Proposed Action would be consistent with the Class III Visual Resource Management area objectives. Surface disturbance would be reclaimed, which would include seeding disturbed areas as described in Section 2.1.8. Impacts would be further reduced by implementing the environmental protection measures identified in Section 2.1.9. The Stillwater Range, with peaks higher than 8,500 feet, is between the Lease Area and Lovelock. The Proposed Action is, therefore, not visible from the Lovelock area. No adverse affects to visual resources are expected.

### **3.2.3 Soils**

#### 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). As shown on Figure 10, there are nine soils or soil associations mapped in the Project Area (NRCS 2001). Descriptions of the soils and associations found in the Project Area are provided below.

#### *Slaw-Trocken-Chuckles Association*

Soil unit 343 is the Slaw-Trocken-Chuckles association. Slaw soils occur on 0-4 percent slopes, are well drained, occasionally flood but never pond, and are moderately to strongly saline. The typical profile is composed of silt loam underlain by stratified very fine sandy loam to silty clay. Trocken soils occur on 0-2 percent slopes, are well drained, occasionally flood but never pond, and are moderately to strongly saline. The typical profile includes very gravelly loam and gravelly loamy coarse sand. Chuckles soils occur on 0-2 percent slopes, are moderately well drained, never flood or pond, and are moderately to strongly saline. The typical profile is composed of loam and silt loam underlain by stratified very fine sandy loam to silty clay. Soil unit 343 has a slight hazard of off-road or off-trail erosion and is poorly to moderately suited for natural surface road construction, primarily due to flooding potential and low strength (NRCS 2001).

#### *Bluewing-Pineval Association*

Soil unit 184 is the Bluewing-Pineval association. Bluewing soils occur on 4-8 percent sloping fans or washes, are excessively drained, and flood rarely to occasionally but never pond. The soil profile typically consists of very gravelly loamy sand underlain by stratified very gravelly sand to extremely loamy coarse sand. Pineval soils occur on 4-8 percent slopes, are well drained,

rarely flood, and never pond. The typical soil profile includes very cobbly loam and very gravelly sandy clay loam underlain by stratified extremely gravelly sand to gravelly sandy loam. Soil unit 184 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, due to flooding potential, sandiness, and slope (NRCS 2001).

#### *Bango-Stumble Association*

Soil unit 220 is the Bango-Stumble association. Bango soils are found on lake terraces and bolsons and occur on 2 to 4 percent slopes. The natural drainage class is well drained, and water movement in the most restrictive layer is moderately high. This soil is not flooded nor is it ponded. The soil profile typically consists of sandy and clay loams underlain by stratified gravelly loamy coarse sand to silty clay loam. Stumble soils occur on 0 to 4 percent slopes. The soil is found on sand sheets, and the parent material consists of eolian sands. The natural drainage class is somewhat excessively drained, and water movement in the most restrictive layer is high. The shrink-swell potential of the Stumble soil is low, and the soil is not flooded or ponded. The soil profile typically consists of loamy sand underlain by gravelly loamy sand. Soil unit 220 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, primarily due to low strength (NRCS 2001).

#### *Rednik-Trocken-Genegraf Association*

Soil unit 311 is the Rednik-Trocken-Genegraf association. Rednik soils occur on 2 to 8 percent slopes, are well drained, never flood or pond, and are very slightly saline to slightly saline. The typical soil profile includes very gravelly sandy loam, very gravelly sandy clay loam, and very gravelly sand. Trocken soils occur on 0 to 2 percent slopes, are well drained, occasionally flood but never pond, and are moderately to strongly saline. The typical profile includes very gravelly loam and gravelly loamy coarse sand. Genegraf soils occur on 2 to 8 percent slopes, are well drained, never flood or pond, and are slightly saline to moderately saline. The typical soil profile consists of very gravelly very fine sandy loam underlain by sandy clay loam and at greater depths, very gravelly fine sandy loam. Soil unit 311 has a slight hazard of off-road or off-trail erosion and is well suited for natural surface road construction (NRCS 2001).

#### *Settlement-Louderback-Rustigate Association*

Soil unit 330 is the Settlement-Louderback-Rustigate association. Settlement soils occur on 0-2 percent slopes, are poorly drained, have a water table depth of 12 to 36 inches, rarely flood and never pond, and are slightly to moderately saline. The typical soil profile consists of silty clay and clay. Louderback soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, are very slightly or slightly saline, and support saline meadow vegetation. The typical soil profile is composed of sand underlain by stratified sand to loam. Rustigate soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, and support a saline meadow

vegetation community. The profile is typically silt loam underlain by loam. Soil unit 330 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, primarily due to low strength and sandiness (NRCS 2001).

#### *Chuckles-Playas-Slaw Association*

Soil unit 402 is the Chuckles-Playas-Slaw association. Chuckles soils are found on lake terraces that range in slope from 2 to 4 percent. The natural drainage class is moderately well drained, and the soil is not flooded or ponded. The soil profile is typically loam to silt loam underlain by stratified very fine sandy loam to silty clay. Playas occur on 0-1 percent slopes, are poorly drained, have a water table at the surface, rarely flood but have frequent ponding, and are moderately or strongly saline. The typical soil profile is silty clay loam underlain by silty clay. Slaw soils occur on 0-4 percent slopes, are well drained, occasionally flood but never pond, and are moderately to strongly saline. The typical profile is composed of silt loam underlain by stratified very fine sandy loam to silty clay. Soil unit 402 has a slight hazard of off-road or off-trail erosion and is poorly suited for natural surface road construction due to low strength (NRCS 2001).

#### *Louderback-Rustigate-Isolde Association*

Soil unit 500 is the Louderback-Rustigate-Isolde association. Louderback soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, are very slightly or slightly saline, and support saline meadow vegetation. The typical soil profile is composed of sand underlain by stratified sand to loam. Rustigate soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 36 to 40 inches, rarely flood and never pond, and support a saline meadow vegetation community. The profile is typically silt loam underlain by loam. Isolde soils occur on 2 to 8 percent slopes, are excessively drained, have a water table found at depths greater than 80 inches, never flood or pond, and are very slightly or slightly saline. The typical soil profile is composed of fine sand throughout. Soil unit 500 has a slight hazard of off-road or off-trail erosion and is moderately suited for natural surface road construction, primarily due to sandiness and low strength (NRCS 2001).

#### *Playa*

Soil unit 900 is composed entirely of playa. Playas occur on 0-1 percent slopes, are poorly drained, have a water table at the surface, rarely flood but have frequent ponding, and are moderately or strongly saline. The typical soil profile is silty clay loam underlain by silty clay. Soil unit 900 has a slight hazard of off-road or off-trail erosion and is poorly suited for natural surface road construction, primarily due to frequent ponding, wetness, and low strength (NRCS 2001).

### *Kolda-Umberland Association*

Soil unit 960 is the Kolda-Umberland association. Kolda soils occur on 0-2 percent slopes, are very poorly drained, have a water table at the surface, never flood but frequently pond, are very slightly or slightly saline, and typically support wetland vegetation. The soil profile is typically silt loam, underlain by silty clay and clay. Umberland soils occur on 0-2 percent slopes, are somewhat poorly drained, have a water table at 18 to 30 inches, rarely flood but never pond, are moderate to strongly saline, and support wet meadow vegetation. The soil profile is typically a silty clay loam underlain by silty clay. Soil unit 960 has a slight hazard of off-road or off-trail erosion and is poorly to moderately suited for natural surface road construction, primarily due to frequent ponding, wetness, and low strength (NRCS 2001).

### *Genegraf-Trocken-Bluewing Association*

Soil unit 1231 is the Genegraf-Trocken-Bluewing association. Genegraf soils occur on 2 to 8 percent slopes, are well drained, never flood or pond, and are slightly saline to moderately saline. The typical soil profile consists of very gravelly very fine sandy loam underlain by sandy clay loam and at deeper depths, very gravelly fine sandy loam. Trocken soils occur on 0-2 percent slopes, are well drained, occasionally flood but never pond, and are moderately to strongly saline. The typical profile includes very gravelly loam and gravelly loamy coarse sand. Bluewing soils occur on 4-8 percent sloping fans or washes, are excessively drained, and flood rarely to occasionally but never pond. The soil profile typically consists of very gravelly loamy sand underlain by stratified very gravelly sand to extremely loamy coarse sand. Soil unit 1231 has a slight hazard of off-road or off-trail erosion and is well suited for natural surface road construction (NRCS 2001).

### Environmental Consequences

A maximum of 137 acres of surface disturbance would result from the implementation of the Proposed Action. This surface disturbance may impact any or all of the soil associations described above, depending on which access roads and wells are finally constructed within the Project Area. Available growth medium would be salvaged for use in reclamation activities when new drill pads and roads are constructed. In general, removal of vegetation and disturbance to the soil surface resulting from the proposed project would increase the potential for erosion of soils. Soils would be compacted by heavy equipment and gravel placement, and soil microbial activity and soil productivity would decrease in areas of soil disturbance. In locations where gravel has been placed on roads or pads, material would be mixed with the soil during reclamation, changing the texture and structure of the soil.

The soil disturbance would be dispersed spatially as drill sites and roads are developed during exploration. Existing roads would be used whenever possible to avoid additional disturbance. With the implementation of environmental protection measures as discussed in Section 2.1.9 and successful reclamation described in Section 2.1.8, impacts to soil resources would be minimal.

### 3.2.4 Vegetation

#### Affected Environment

Land cover types have been mapped as part of the U.S. Geological Survey (USGS) Southwest Regional Gap Analysis Project (USGS National Gap Analysis Program 2004). As shown on Figure 11, four land cover types occur within the Project Area:

- Inter-Mountain Basins Big Sagebrush Shrubland;
- Inter-Mountain Basins Greasewood Flat;
- Inter-Mountain Basins Mixed Salt Desert Scrub; and,
- Inter-Mountain Basins Playa.

The number of acres within the Project Area and the Lease Area that each cover type occupies is provided in Table 12. Within the Project Area, the Inter-Mountain Basins Big Sagebrush Shrubland cover type occurs only in areas where access roads are proposed across lands outside of the Lease Area limits. Therefore this cover type occurs in the Project Area but does not occur within the Lease Area.

**Table 12 Land Cover Types Within the Project Area and Lease Area**

Land Cover Type	Acres in Project Area	Acres in Lease Area
Inter-Mountain Basins Big Sagebrush Shrubland	2	0
Inter-Mountain Basins Greasewood Flat	332	1,944
Inter-Mountain Basins Mixed Salt Desert Scrub	296	682
Inter-Mountain Basins Playa	350	20,152

#### *Inter-Mountain Basins Big Sagebrush Shrubland*

This ecological system typically occurs in broad basins between mountain ranges, plains, and foothills between elevations of 4,900 and 7,550 feet throughout much of the western U.S. Soils are typically deep, well-drained, and non-saline. The shrublands are dominated by basin big sagebrush (*Artemisia tridentata* ssp. *tridentata*) and/or Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*). Scattered juniper (*Juniperus* spp.), greasewood (*Sarcobatus vermiculatus*), and saltbush (*Atriplex* spp.) may be present in some areas. Rubber rabbitbrush (*Ericameria nauseosa*), yellow rabbitbrush (*Chrysothamnus viscidiflorus*), antelope bitterbrush (*Purshia tridentata*), or mountain snowberry (*Symphoricarpos oreophilus*) may co-dominate disturbed stands. Perennial herbaceous components typically contribute less than 25 percent of



the total vegetative cover. Common graminoid species include Indian ricegrass (*Achnatherum hymenoides*), blue grama (*Bouteloua gracilis*), thickspike wheatgrass (*Elymus lanceolatus*), Idaho fescue (*Festuca idahoensis*), needle and thread grass (*Hesperostipa comata*), basin wildrye (*Leymus cinereus*), James' galleta (*Pleuraphis jamesii*), western wheatgrass (*Pascopyrum smithii*), Sandberg bluegrass (*Poa secunda*), or bluebunch wheatgrass (*Pseudoroegneria spicata*) (USGS National Gap Analysis Program 2005).

#### *Inter-Mountain Basins Greasewood Flat*

This ecological system occurs throughout much of the western U.S. in inter-mountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils and a shallow water table. They flood intermittently but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or co-dominated by greasewood. Fourwing saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia*), or winterfat (*Krascheninnikovia lanata*) may be present to co-dominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of alkali sacaton grass (*Sporobolus airoides*), desert saltgrass (*Distichlis spicata*) (where water remains ponded the longest), or common spikerush (*Eleocharis palustris*) herbaceous types (USGS National Gap Analysis Program 2005).

#### *Inter-Mountain Basins Mixed Salt Desert Scrub Community*

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the inter-mountain western U.S. This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species such as shadscale saltbush, fourwing saltbush, cattle saltbush (*Atriplex polycarpa*), or spinescale saltbush (*Atriplex spinifera*). Other co-dominant shrubs present may include Wyoming big sagebrush, yellow rabbitbrush, rubber rabbitbrush, Mormon tea (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), winterfat, desert-thorn (*Lycium* spp.), bud sagebrush (*Picrothamnus desertorum*), or horsebrush (*Tetradymia* spp.). Greasewood is generally absent but if present does not co-dominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as Indian ricegrass, blue grama, thickspike wheatgrass, western wheatgrass, James' galleta, big galleta (*Pleuraphis rigida*), Sandberg bluegrass, or alkali sacaton grass. Various forbs are also present (USGS National Gap Analysis Program 2005).

### *Inter-Mountain Basins Playa*

This ecological system is composed of barren and sparsely vegetated playas (generally <10 percent plant cover) found in the inter-mountain western U.S. Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil sub-horizon and stays on the surface until it evaporates. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include iodinebush (*Allenrolfea occidentalis*), greasewood, fourwing saltbrush, Lemmon's alkaligrass (*Puccinellia lemmonii*), basin wildrye, desert saltgrass, and/or various saltbrush species (USGS National Gap Analysis Program 2005).

### Environmental Consequences

The Proposed Action would result in a maximum of approximately 137 acres of surface disturbance. Approximately 57 acres of the disturbance would occur in areas of Inter-Mountain Basins Playa, where vegetation cover is generally absent. The rest of the of the surface disturbance would directly impact vegetation cover on 80 acres, which represents about 14 percent of the total vegetation cover in the Project Area. The majority of the impacted vegetation cover is Inter-Mountain Basins Greasewood Flat (32 acres) and Inter-Mountain Basins Mixed Salt Desert Scrub (56 acres). Approximately 0.1 acre of Inter-Mountain Basins Big Sagebrush Shrubland would be impacted. Direct impacts to vegetation would result from constructing new access roads and well pads, expanding the existing mineral material site and constructing the other mineral material site, and repairing existing access roads. Drilling rigs, construction equipment, and vehicles could crush or damage vegetation. Similar vegetation types surround the Project Area, including an additional 1,944 acres of Inter-Mountain Basins Greasewood Flat and 682 acres of Inter-Mountain Basins Mixed Salt Desert Scrub within the Lease Area.

Vegetation could be indirectly affected by soil compaction resulting from site grading, clearing, and other ground-disturbing activities during operation of the project. Additionally, cleared areas would be susceptible to establishment of invasive vegetation which could potentially out-compete native vegetation. Ormat would comply with the lease stipulations and implement the environmental protection measures described in Section 2.1.9. These stipulations and measures include salvage of topsoil, which would reduce the effects of soil compaction during reclamation and requirements for "certified" weed-free seed mixes during reclamation.

Ormat would implement environmental protection measures (Section 2.1.9) that would minimize impacts to vegetation cover. According to the lease stipulations (Appendix A), reclamation of project disturbance would be implemented within two years of the completion of the proposed project. Reclamation would include seeding disturbed areas with the seed mix provided in Table 8. Surface disturbance within the playa area would not be reseeded, however, as the playa

currently lacks vegetation cover in its natural state. The potential disturbance to 80 acres of vegetation is relatively minor considering that it represents only 14 percent of the total 630 acres of vegetation cover in the Project Area and similar vegetation is nearby within the Lease Area. No decrease in any plant population or community below self-sustaining levels would occur as a result of implementing the Proposed Action.

### **3.2.5 Water Quality (Surface and Ground)**

#### Affected Environment

##### *Surface Water*

The USGS Dixie Valley, Nevada, 7.5 Minute Series topographic quadrangle (quad) shows numerous ephemeral washes present within the Lease Area and Project Area. Most of the mapped washes originate outside of the Lease Area, at higher elevations in the Stillwater Range and Clan Alpine Mountains. The washes drain surface flow toward the center of Dixie Valley, and most terminate at or near the Humboldt Salt Marsh (Figure 3). All drainages in Dixie Valley are considered ephemeral and flow only as a result of substantial rainfall or snowmelt events (Cohen and Everett 1963). Dixie Valley Wash, a complex network of braided ephemeral drainages, flows northeast across the southeastern parts of the Lease Area and Project Area. Dixie Valley Wash, based on the USGS topographic quad, drains a substantially larger watershed than many of the nearby drainages. There are no springs or seeps within the Project Area, but several springs and seeps are located in the Lease Area and are particularly abundant in areas adjacent to the eastern parts of the Lease Area. Many of these springs and seeps support wetlands and riparian vegetation, as discussed in detail in Section 3.2.6. Several springs and flowing wells are mapped in the Dixie Valley Wash on the USGS topographic quad as well as other ephemeral drainages. Although all washes in the area are ephemeral, springs present in some washes create perennial flow for short distances (Cohen and Everett 1963).

The prevalent concentration of dissolved minerals in the surface water of the area is estimated between 1,200 to 1,800 parts per million. According to the U.S. Army Corps of Engineers (COE), the prevalent chemical types in the water consist of sodium, potassium, carbonate, and bicarbonate. The data are based on chemical analysis of water in streams during periods of low flow, when the water is derived chiefly from groundwater (COE 2002).

Dixie Valley is an internally drained basin, that is, surface flows terminate in the basin rather than escaping the basin and flowing west to the Pacific Ocean (COE 2002). In a report prepared by the USGS, Dixie Valley is described as a closed hydrologic unit (Cohen and Everett 1963). These descriptions are indicative that the basin lacks any hydrologic connectivity to rivers or other waters bodies outside of the basin. Consequently, it is expected that there are no navigable waters of the United States within Rivers and Harbors Act jurisdiction (as defined by 33 CFR part 329) and no waters of the United States within Clean Water Act jurisdiction (as defined by 33 CFR 328) in the Lease Area.

## ***Groundwater***

The Lease Area is located within internally drained Hydrographic Area 128, Dixie Valley, in Hydrographic Region 10, Central Region (NDWR 2010). The Dixie Valley Hydrographic Area has an area of 1,303 square miles and a perennial yield of 15,000 acre feet per year (Nevada Division of Water Resources 2011). Six neighboring basins are hydrologically connected to the Dixie Valley Hydrographic Area: Pleasant Valley, Jersey Valley, Fairview Valley, Stingaree Valley, Cowkick Valley, and Eastgate Valley. The Dixie Valley Hydrographic Area serves as the terminus of the flow system for all of these basins (USGS 2010a). The Dixie Valley Hydrographic Area has committed underground water rights of approximately 18,301 acre feet per year and geothermal water rights of approximately 12,704 acre feet per year (Nevada Division of Water Resources 2011). By Order 715, dated June 6, 1978, the Nevada State Engineer officially established the Dixie Valley Hydrographic Area as “designated.” This indicates that the permitted groundwater rights approach or exceed the estimated average annual recharge and groundwater is being depleted or requires additional administration (NRS 534.120).

Groundwater in Dixie Valley occurs in an unknown number of aquifers (Nimz 1999). For purposes of this analysis, groundwater resources in Dixie Valley can be divided into two broad categories: (1) shallow groundwater aquifers and (2) a deeper, complex thermal groundwater system.

Shallow groundwater aquifers are basin-fill aquifer systems formed by the erosion of the surrounding Stillwater Range and Clan Alpine Mountains filling Dixie Valley with unconsolidated alluvial deposits (USGS 2010a). With the exception of geothermal activities in Dixie Valley, most if not all groundwater pumping is from the basin-fill aquifer system (USGS 2010a). Due to varying layers of fairly permeable sand and gravel interbedded in places with comparatively impermeable layers of silt and clay, groundwater in the Dixie Valley basin-fill aquifer system is under both unconfined and confined conditions (USGS 2010a). A shallow unconfined aquifer exists near the center of the valley. The Dixie settlement wells, which are located 3 to 4 miles south of the Lease Area, are under artesian head, implying their water source is from a confined aquifer (Nimz 1999).

Groundwater recharge to the shallower aquifers occurs from precipitation and ephemeral stream flows that result from snowmelt in the Stillwater Range and Clan Alpine Mountains (COE 2002). Harrill (1995) estimates groundwater recharge occurs at an approximate rate of 23,000 acre feet per year. Prior to Harrill’s estimate in 1995, Dixie Valley groundwater recharge rates were estimated at approximately 18,000 acre feet per year (Cohen and Everett 1963). Movement of shallow, non-thermal groundwater in Dixie Valley is from the margins of the valley toward a playa, the Humboldt Salt Marsh, located in the center of the valley (Harrill 1995). In the center

of the valley, groundwater moves vertically upward in response to hydraulic gradients and discharges to the Humboldt Salt Marsh, where it is then lost to evaporation and transpiration (Cohen and Everett 1963).

The Dixie Valley geothermal system underlies the shallow groundwater aquifers and is a complex and intricate flow system with attributes from normal Basin and Range faulting and permeability of the surrounding rocks (Blackwell 2007). The system is much deeper than the shallow groundwater aquifers and has been partially delineated by many production, injection, and exploration wells and was generally encountered at depths of 8,200 to 11,485 feet below ground surface (Blackwell 2007). Most of these wells, including wells at the existing Dixie Valley Power Plant, have been drilled along the eastern front of the Stillwater Range at the western margin of Dixie Valley, specifically in areas near the Stillwater Fault. This fault is the basin-bounding fault that has lifted the Stillwater Range with respect to Dixie Valley for the past 10 million years (Zoback 2007). Zoback indicates that the Dixie Valley geothermal reservoir is the fault and fracture system associated with the Stillwater Fault. Benoit (1992) describes the Stillwater Fault as a major range-bounding normal fault that dips moderately to the east-southeast and forms the predominant geothermal aquifer in the region. Benoit goes on to state that most of the geothermal heat and mass transport encountered in Dixie Valley occurs within this fault zone. Despite more than 40 years of research and numerous wells drilled, considerable uncertainty and legitimate debate about the basic structure of the Stillwater range-front fault still remains (Benoit 1999).

Campbell (1983) describes the geothermal reservoir as being recharged from groundwater descending along the Stillwater Fault and associated minor faults. Campbell also states that other notable areas of recharge include groundwater movement from the northeast and southwest through the Cenozoic sediments of the valley fill and from the east through both the valley fill and fractures in bedrock. The permeability of the Dixie Valley geothermal system seemingly depends on two opposing forces: (1) creation of permeability by brecciation associated with movement along the Stillwater Fault and minor associated faults and (2) loss of permeability caused by precipitation of quartz in the fault zone (Zoback 2007). Water entering into the fault zone at depths of 9,845 feet is saturated with silica (Hickman, Barton, Zoback, et al. 1997). As the water is heated it begins to rise along permeable fault zones and fractures associated with the Stillwater Fault, and as it cools the silica precipitates on the walls of the fractures, reducing the permeability (Zoback 2007). Upwelling continues until the heated water reaches the ground surface. If the thermal water meets a barrier to vertical migration before reaching the surface, the water then moves laterally through highly fractured rock or is trapped by permeability barriers such as the lateral pinch-out of fractured rock. A probable barrier to vertical migration in Dixie Valley consists of altered “red clay” at the base of the valley fill (Campbell 1983). Likewise, without periodic movement along the Stillwater Fault, precipitated silica would cause the fault to eventually seal up and essentially become a quartz vein (Zoback 2007).

The degree of mixing that occurs between shallow groundwater aquifers and the underlying thermal groundwater system is not known (Blackwell 2007). Some thermal waters are lost to piedmont faults directly into Dixie Valley alluvial fill (Blackwell 2007) and would be anticipated to mix with shallow groundwater in the unconfined basin-fill aquifers. Most springs in the valley exhibit evidence of shallow groundwater mixing with thermal water before discharging at the ground surface. The Dixie Hot Springs are an exception to this and appear to be unaffected by shallow groundwater but instead connected directly to the deeper geothermal system (Blackwell 2007). The water in these springs has a reported temperature of approximately 162 degrees Fahrenheit (Mariner 1974). A number of flowing wells are found in the central part of southern Dixie Valley, approximately 6 to 9 miles south of Dixie Hot Springs. These wells, with slightly anomalous temperatures of approximately 70 to 76 degrees Fahrenheit, may be related to the same thermal system active elsewhere along the west side of Dixie Valley (Great Basin Center for Geothermal Energy 2004). Springs located along the eastern margins of Dixie Valley are associated primarily with the Buckbrush Fault System and bring cold, fresh water from artesian aquifers at depth to the surface (Smith, Wisian, & Blackwell 2001).

#### Environmental Consequences

Implementation of the Proposed Action would permit Ormat to construct 20 well pads and approximately 75,665 linear feet of access roads to reach the well pads. Ephemeral washes and drainages would be avoided to the extent possible during construction of the proposed project, and rolling dips would be used where drainages must be crossed by access roads. Culverts would be used wherever rolling dips are not feasible. Construction of new access roads crossing Dixie Valley Wash would be required to reach proposed well pads “L” through “P” (Figure 3). These crossings would occur very close to the Humboldt Salt Marsh, where Dixie Valley Wash terminates. According to Cohen and Everett (1963), all washes in the area are ephemeral, but springs present in some washes create short distances of perennial flow within the drainage. According to the USGS topographic quad, the nearest springs and flowing wells in Dixie Wash are approximately 2.3 miles up-gradient from the proposed crossing. Therefore, the crossing would not result in surface disturbance within perennial waters. Ormat would implement additional BMPs and environmental protection measures during construction, as described in Section 2.1.9. The protection measures and utilization of rolling dips or culverts would be anticipated to minimize, if not eliminate, potential impacts to surface water resulting from disturbance of ephemeral washes.

Construction of the proposed project may have potential indirect impacts on surface waters. Soils would be disturbed during construction of access roads, well pads, and gravel source areas and would be susceptible to erosion. Erosion would carry suspended soil particles to surface water and, in effect, result in sedimentation. Ormat would implement the BMPs and environmental protection measures described in Section 2.1.9 to ensure erosion is minimized and sedimentation of surface water is avoided.

Drilling and well flow testing activities may potentially impact both surface water and groundwater. Accidental release of geothermal and drilling fluids, well “blowout,” and disturbance and/or alteration of the subsurface aquifers system are the potential sources of impacts to water quality associated with drilling and testing.

Different types of drilling additives, such as caustic soda, bentonite, barite, lime, salt, and soda ash, would be stored on well pads and added to the drilling mud as needed during drilling. Although some of the mud additives may be hazardous substances, they would only be used in low concentrations and diluted to the extent that the drilling mud remains non-toxic and not hazardous. Equipment used for drilling, as well as for construction, would contain normal operating amounts of diesel fuel, hydraulic fluid, and other critical operational fluids. Supplies of these fluids would also be stored on one or more of the drill pads in order to promptly replenish vehicle reservoirs. A discharge of drilling mud additives, in their pure undiluted state, or spill of vehicle fluids could contaminate surface waters, shallow groundwater aquifers, or both. Prior to construction, and therefore drilling too, Ormat would develop a BLM-approved spill and discharge contingency plan that details specific containment, cleanup and abatement, and notification procedures that would be implemented in the event of a spill or discharge. Secondary containment designed to contain releases would be provided where drilling additives and vehicles fluids are stored. Environmental protection measures and BMPs designed and implemented to prevent erosion and storm water runoff would also be anticipated to prevent spilled substances from reaching surface waters.

While actively drilling, the above-mentioned additives are among some of the chemicals that may be added to the drilling mud to form the drilling fluid. The drilling fluid is used to lubricate the drill bit, stabilize the drill hole, seal permeable zones, and remove the drill cuttings from the hole. As drilling progresses downward through the earth, layers of permeable rocks are likely to be encountered in the well bore. If the permeability and porosity of a particular zone or rock formation is extremely high, the drilling fluids may be potentially lost into the rock formations from the well bore through what is known as “lost circulation.” Excessive loss of fluids could result in localized alteration of water quality. Excessive loss of fluids is not anticipated, however, because Ormat would manage drilling mud density and weight to minimize entry of natural fluids into the well bore. If a lost circulation zone is encountered during drilling, drilling mud additives such as natural walnut hulls are typically used to plug the porous zone. The drilling medium could also be changed to air drilling, which would eliminate the loss of drilling mud into the zone. An important requirement of the BLM-approved drilling program is that the entire length of each exploratory drill hole be lined, or “cased,” with steel pipe (casing) which is cemented to the surrounding rock formations. The gap between the casing and the well bore, also called the annulus, would be filled with cement from top to bottom, completely surrounding the

casing. Special wellbore geophysical tests called cement bond logs would be used to evaluate the completeness of the cement filling the annulus. If any cement gaps are found, the casing could be selectively perforated and cement squeezed through the perforations to fill such gaps. Casing would permanently and effectively seal off any potential flow of fluids from the well bore into surrounding rock formations or from the formations into the wellbore. Lost circulation zones would also be cased off. Any minimal loss of fluids to the surrounding rock formations would therefore be temporary until the casing is in place. Additionally, the drilling mud would be maintained as a non-toxic substance that is not hazardous.

During drilling, drilling fluids are returned to the surface from the drill column and include water, drilling mud, drill cuttings, and any mud additives. The drilling mud is separated from the returned drilling fluids and re-circulated back down the well bore. The remaining wastes would be discharged to the reserve pit on the well pad where drilling is actively occurring. A release of these wastes from the reserve pit could infiltrate shallow groundwater aquifers or flow overland and reach surface waters. Water quality could be adversely impacted if these wastes are released or discharged from the reserve pit. The liquid waste could infiltrate shallow groundwater aquifers, flow overland, and reach surface waters or be intercepted by drainages and washes. Ormat would utilize bentonite as a primary component of the drill mud. The bentonite would settle to the bottom of the reserve pit and form an essentially impermeable layer that would contain the fluid within the pit. Percolation through the bottom or sides of the pit to the level of groundwater aquifer contamination would not be anticipated as a result. To prevent an accidental release of fluids on the ground surface, the reserve pit would be constructed with a perimeter earthen berm and would be operated to maintain at least 2 feet of freeboard at all times. Ormat would routinely inspect the structural integrity of the berm.

Likewise, if during drilling a high pressure zone, also known as a formation “kick,” is encountered, drilling fluid, rock cuttings, and drilling additives could flow back up the well bore. If the flow is uncontrolled as would be the case in a blowout, the fluids from the well could spill onto the ground surface, thus having the same impact on groundwater aquifers and surface water as a surface spill from the reserve pit. Ormat would implement a BLM-approved drilling program for the drilling of all wells which would specify the type, test rating, and test frequency of the BOPE to be utilized on the wells. There are three basic types of BOPE: (1) an annular blowout preventer, or a hydraulically inflated bladder that envelopes the drill pipe, seals the annulus between the drill pipe and the casing, and allows heavy mud to be pumped down the inside of the drill pipe to overcome the pressure in the drill pipe coming from the subsurface; (2) the “pipe rams,” which are solid metal plates that are hydraulically activated to come together from opposite sides of the drill pipe and fit tightly around the drill pipe, like the annular preventer, sealing the annulus between the drill pipe and the well casing wall; and (3) the “shear rams,” which are also hydraulically operated solid metal plates that come together from opposite



sides of the drill pipe with tremendous force and actually cut off the drill pipe and seal the well completely. In addition, as would be required in the BLM-approved drilling program, each exploratory drill hole would be cased with steel pipe which is cemented to the surrounding rock formations. The annulus would be filled with cement from top to bottom, completely surrounding the casing. Special wellbore geophysical tests called cement bond logs would be used to evaluate the completeness of the cement filling the annulus. If any cement gaps are found, the casing could be selectively perforated and cement squeezed through the perforations to fill such gaps. For these reasons, water quality degradation resulting from drilling fluids would be minimal or negligible.

Thermal groundwater would be flowed under natural artesian pressure or pumped as necessary from the geothermal aquifer and discharged to the drill pad reserve pit during well testing. It is anticipated that the largest flow of thermal groundwater would occur during testing of production wells. The anticipated test flow rates (approximately 155 gallons per minute) and test durations (average of 5 days per well) would result in approximately 1.1 million gallons of thermal groundwater being extracted from the geothermal aquifer during testing at each production well. Similar to drilling wastes, thermal water may potentially impact surface and groundwater if released from the reserve pit. The same measures anticipated to prevent releases of drilling fluids would be anticipated to prevent release of thermal water.

The withdrawal of high-temperature groundwater from the geothermal reservoir during well testing could potentially reduce the thermal inflow component of the shallow aquifers and thereby lower the water temperature as well as potentially reduce the volume of water at groundwater discharge points such as springs and seeps. Well testing of a single production well would withdraw up to approximately 1.1 million gallons of thermal groundwater from the geothermal reservoir over an average period of five days. The volume of fluid withdrawn during these relatively short duration well tests would be minor compared with the volume of fluid naturally available in aquifers. The impact from removal of geothermal fluids during testing would be anticipated to have only a minor impact if any at all and if so, would be short term for the duration of testing and groundwater recharge. To minimize or avoid these impacts, environmental protection measures for well installation and testing would be implemented as described in Section 2.1.9.

With implementation of the BLM-approved drilling program, environmental protection measures described in Section 2.1.9, and BLM-recommended mitigation measures listed below, impacts to water quality would be negligible.

### ***Water Consumption Impacts***

Project-related water would be obtained from no more than two non-potable shallow groundwater wells. Each well would be temporary and located on any one of the 20 pad sites; therefore, no additional surface disturbance would be associated with the drilling of the groundwater well(s). The well(s) would be permitted under a geothermal waiver by the Nevada Division of Water Resources and approved by the BLM. The wells would be drilled down to a productive interval of sands, gravels, or fractures (estimated at approximately 500 feet). While the groundwater basin has been “designated” by the State Engineer, Ormat’s proposed water wells would qualify for a “designated” exemption.

As an alternative, water needed for construction and drilling operations could also be purchased and trucked from nearby agricultural ranches and sources on private land. Should Ormat acquire water through this alternative, a purchase agreement from the water rights owner and a temporary use permit from the Nevada Division of Water Resources would be obtained prior to acquisition of the water. Assuming a typical 2,500-gallon capacity water truck is used to transport water, as many as 12 trips per day would be required during drilling of an observation or production well. If two wells are actively drilled simultaneously, as many as 24 trips per day could occur. Water trucks would remain on existing roads and would be maintained to prevent oil and petroleum leaks. Water trucks would typically travel slower than posted speed limits, which would reduce fugitive dust emissions from the unpaved road surface. Additionally, water trucks would be used to apply water to access roads and well pads to control fugitive dust. Aggregate would be applied to proposed access roads as needed and would further serve to reduce fugitive dust. The remote nature of the Project Area and lack of existing traffic on Dixie Valley Road, East Valley Road, and other nearby roads limit the potential impacts resulting from 24 additional trips per day. Other impacts from transporting water would be minimal to unnoticeable and temporary for the duration of drilling, which is anticipated to be less than 5 years. These impacts may include noise emissions from truck engines and travel, and localized vibration during travel when weighed down with water.

### **Aquifer Monitoring Plan**

As the boreholes for geothermal exploration wells and groundwater wells, should they be drilled, are advanced below ground, Ormat would perform standard aquifer testing procedures at targeted depth intervals. The vertical boundaries of the aquifers, the depth of aquifers (non-thermal and thermal) penetrated during drilling, would be noted from the drilling log. The horizontal boundaries would be noted if any are reflected on time-drawdown plots produced during aquifer testing. Borehole geophysics analysis would be conducted from the ground surface to the total depth of the borehole. Aquifer testing would be used to determine drawdown associated with pumping. If possible, an assessment of whether aquifers are confined or unconfined would be made, as well as estimating their thickness and relative productivity. The

temperature of penetrated aquifers would be noted, and when feasible, the quality of the aquifers would be tested. The information collected would be incorporated into the hydrologic evaluation plan.

#### BLM-Recommended Mitigation Measures

A hydrologic evaluation plan would be developed and implemented to determine the nature and extent of potential impacts to water quality, quantity, and/or temperature and ensure that unacceptable impacts do not occur as a result of the Proposed Action. The plan would be subject to BLM approval prior to commencement of the Proposed Action and would be implemented in conjunction with the aquifer monitoring plan that Ormat proposes as part of the project operations.

At a minimum, the hydrologic evaluation plan would include drilling the appropriate number of groundwater monitoring wells needed to determine whether shallow aquifers are impacted during and, possibly, after project operations. The number and locations of the wells would be determined by BLM and Ormat based on existing geophysical data. If possible, wells would be located on approved drill pads and/or immediately adjacent to existing roads or other disturbances proposed as part of the project. The wells would be drilled by a licensed well driller in accordance with state and BLM regulations. Ormat would coordinate with BLM to determine the monitoring frequency at each well.

Additionally, the hydrologic evaluation plan would include monitoring surface water quality, flow, and temperature at two seasonal ponds located in T22N, R35E, section 9, MDBM (Figure 12). These parameters would be monitored prior to commencement of the project to establish baseline conditions and then continue through the life of the project. The monitoring frequency would be developed by Ormat in close coordination with and approved by BLM. Surface water monitoring at the ponds would be suspended when the ponds are dry, which typically occurs during summer months. The ponds are habitat for, and known to be occupied by, the western toad (*Bufo boreas*).

### **3.2.6 Wetlands and Riparian Areas**

#### Affected Environment

Lease Stipulations (Appendix A) prohibit occupancy within 650 feet of riparian areas, wetlands, and other similar sensitive or unique areas dependent on hydrology. Accordingly, there are no wetlands or areas of riparian vegetation within the limits of the Project Area. There are no springs or seeps within the Project Area, but numerous springs and seeps are located within the limits of the Lease Area, particularly in the western extent of the Lease Area. Although they do not occur within the limits of the Lease Area, the Dixie Hot Springs are located immediately adjacent to the western edge of the Lease Area (Figure 12). The Dixie Hot Springs are not

believed to be affected by shallow groundwater, but rather connected directly to deeper aquifers of thermal water (Blackwell 2007). Several springs are also located in the eastern half of the Lease Area and are associated primarily with the Buckbrush Fault System (Smith 2001). Many of the springs and seeps support areas of open water and/or palustrine emergent wetlands. Based on aerial photography, the Dixie Hot Springs appear to support the most extensive area of emergent wetlands and open water. These wetlands support marsh vegetation adapted to saturated soil conditions, including spikerush (*Eleocharis* spp.), knotweed (*Polygonum* spp.), canarygrass (*Phalaris* spp.), duckweed (*Lemna* sp.), various species of rush (*Juncus* sp.), common reed (*Phragmites australis*), and cattail (*Typha* spp.) (BLM 2010a).

The Humboldt Salt Marsh, a playa, is located in the center of Dixie Valley and occurs within the limits of the proposed Project Area. The playa is subject to inundation from seasonal runoff associated with snowmelt in surrounding mountain ranges during winter (Bryce, Woods, Morefield, et al. 2003). Consequently, the Humboldt Salt Marsh is considered an ephemeral wetland. While the COE may take jurisdiction over playas in general as “special aquatic sites,” the COE is not expected to take jurisdiction over the Humboldt Salt Marsh, which does not abut and has no surface connection to waters of the U.S. A salt crust covers most of the playa, and vegetation, hydrophytic or otherwise, is not present.

### Environmental Consequences

Direct impacts to wetlands and riparian areas would not occur because these areas are not present within the Project Area or within 650 feet of the Project Area. Ormat initially proposed to construct several well pads and the roads necessary to access them within 650 feet of wetlands and riparian vegetation during preliminary planning stages of the proposed project. The location of these well pads and access roads were later revised by Ormat in order to maintain at least a 650-foot separation between the project area and wetlands and riparian vegetation. The revised locations are the locations proposed in the Operations Plan; therefore, direct impacts on wetlands and riparian vegetation would not occur from implementation of the Proposed Action.

Ephemeral washes and drainages would be avoided to the extent possible, and rolling dips would be used when drainages must be crossed by access roads. Culverts would be used wherever rolling dips are not feasible. Currently Dempsey Lane crosses Dixie Valley Wash, and as discussed in Section 3.2.5, Ormat would limit operations to the width of the existing road on Dempsey Lane. Proposed access roads leading to well pads “L” through “M,” in T22N, R35E, sections 21 and 22, MDBM, cross several drainages associated with the Dixie Valley Wash. These crossings are close to the Humboldt Salt Marsh where the Dixie Valley Wash terminates. However, these crossings would not occur within any riparian areas associated with the wash. Environmental protection measures (Section 2.1.9) and rolling dips would ensure impacts to these drainages are minimal.

Several of the proposed well pads and access roads to them would be located within the Humboldt Salt Marsh playa, as delineated from interpretation of 2010 aerial photography produced by the National Agriculture Imagery Program. Specifically, proposed well pad "D", "E", and "G", and well pads "I" through "S" would be located within the Humboldt Salt Marsh playa, as would the access roads to each (Figure 2). Because the playa is subject to temporary seasonal inundation (Bryce, et. al. 2003), Ormat has incorporated environmental protection measures into the Operations Plan that would be anticipated to prevent adverse direct impacts to surface waters on the playa. Environmental protection measures Ormat has developed for activities within playa include the following:

- Temperature gradient well operations for individual wells within playa area would not be initiated when standing water is present on the well pad location or its associated access route. If standing water encroaches on existing temperature gradient operations within playa area, Ormat would coordinate with BLM to evaluate the specific situation and conditions to determine if operations need to be suspended until the water recedes or if operations can continue;
- Construction of access roads and well pads for individual observation or production wells located within the playa areas would not be initiated if there is standing water within the well pad's access route or on the well pad location. Ormat would work with BLM to evaluate the specific circumstances and determine the conditions under which construction activities can be initiated;
- Ormat would routinely inspect the integrity of the berm around each reserve pit to ensure it provides an effective barrier between surface waters outside of the berm and drilling/geothermal fluids inside the berm. This would be particularly beneficial at well pads within playa area where the surface may become seasonally and temporarily inundated with surface water; and,
- Prior to construction, Ormat would develop a spill and discharge contingency plan that details specific containment, cleanup and abatement, and notification procedures that would be implemented in the event of a spill or discharge. The plan would be particularly advantageous within the playa during periods of seasonal inundation, when a spill or discharge left untreated would be more likely to reach and contaminate surface waters.

These measures, specifically those pertaining to activities within the playa, would be implemented during construction and operation of proposed well pads D, E, and G, and well pads I through S, and the access roads associated with each of these well pads. These well pads and access roads were determined to occur within the playa as delineated from interpretation of National Agriculture Imagery Program aerial photography from 2010. If BLM determines that

any of the other proposed well pads or their associated access roads occur within the Humboldt Salt Marsh playa, the protection measures listed above would be implemented during construction and operation of those well pads and access roads. These measures, and additional environmental protection measures listed in Section 2.1.9, would be anticipated to prevent direct adverse impacts to surface waters on the playa surface. A salt crust covers most of the playa and vegetation is absent, including riparian and hydrophytic vegetation. In addition, as described above, the well pad and access road locations included in the proposed action have been located by Ormat at a distance greater than 650 feet from the closest riparian vegetation as required in the Wetlands and Riparian Areas lease stipulation. Consequently, proposed project activities occurring within the Humboldt Salt Marsh playa would not impact riparian vegetation.

Construction and drilling activities may have potential indirect impacts on wetlands and riparian areas. During construction, recently exposed soils would be subject to increased erosion rates and thus represent potential sources of sedimentation of surface waters. Ormat would implement the BMPs and environmental protection measures described in Section 2.1.9 and above to ensure erosion is minimized and does not affect wetlands or surface waters, including surface water on the Humboldt Salt Marsh playa that may be present during temporary and seasonal periods of inundation.

Thermal groundwater would be flowed or pumped as necessary from the geothermal aquifer and discharged to the drill pad reserve pit(s) during well testing. It is anticipated that the largest flow of thermal groundwater would occur during testing of production wells. The anticipated test flow rates (approximately 155 gallons per minute) and test durations (average of 5 days per well) would result in approximately 1.1 million gallons of thermal groundwater being extracted from the geothermal aquifer during testing at each production well. The testing activities have the potential to impact wetlands and open water through accidental release of geothermal fluids to surface water features. To prevent an accidental release of fluids, the reserve pit would include an earthen overflow-prevention berm, and the flow test would be operated to maintain at least 2 feet of freeboard at all times.

Ormat would also implement a BLM-approved drilling program to ensure that any geothermal fluid encountered during the drilling process does not flow uncontrolled to the surface, or blowout, and cause a spill into wetlands and open waters. The approved drilling program would specify the type, test rating, and test frequency of the BOPE to be utilized on the wells. There are three basic types of BOPE: (1) an annular blowout preventer, or a hydraulically inflated bladder that envelops the drill pipe, seals the annulus between the drill pipe and the casing and allows heavy mud to be pumped down the inside of the drill pipe to overcome the pressure in the drill pipe coming from the subsurface; (2) the “pipe rams,” which are solid metal plates that are hydraulically activated to come together from opposite sides of the drill pipe and fit tightly

around the drill pipe, like the annular preventer, sealing the annulus between the drill pipe and the well casing wall; and (3) the “shear rams,” which are also hydraulically operated to come together from opposite sides of the drill pipe with tremendous force and actually cut off the drill pipe and seal the well completely. In addition, during drilling, the column of drilling mud in the well bore creates hydrostatic pressure that prevents fluids contained in the rock formations from entering the well bore. The drilling mud weight and density would be managed by including additives such as barite so as to exceed the expected pressures in the formations being drilled. The mud pressure allows drilling mud to enter the formations and deposit a filter cake of mud on the wellbore wall. This filter cake seals the well bore during the actual drilling operation, preventing any further infiltration of drilling mud into the rock formations and also preventing fluids in the rock formations from flowing out into the well bore. Therefore, with the implementation of the BLM-approved BOPE and drilling mud program, the potential for wetland and surface water quality degradation resulting from the blowout of drilling fluids would be minimal or negligible.

Direct impacts to wetlands and riparian vegetation resulting from the Proposed Action would not be anticipated. Direct impacts to surface water quality within wetlands and riparian areas, and on the Humboldt Salt Marsh playa during temporary and seasonal periods of inundation would not be expected to occur. Implementation of the environmental protection measures described in Section 2.1.9, in conjunction with implementation of the BLM-approved drilling program, which includes the well casing programs and utilization of BOPE, would be expected to prevent indirect impacts to wetlands, riparian vegetation, or surface waters. The mitigation measures listed below would confirm the expectation that no impacts to wetlands or riparian areas resulting from water quality, quantity, or temperature alterations occurs.

#### BLM-Recommended Mitigation Measures

A hydrologic evaluation plan would be implemented to determine the nature and extent of potential impacts to quality, quantity, or temperature of surface water as a result of exploration well drilling and testing. The plan would be approved by BLM and required before the drilling permit is issued. The hydrologic evaluation plan would also include measures to monitor groundwater quality, quantity, and possibly temperature. Please see Section 3.2.5 for a detailed description of the hydrologic evaluation plan.

### **3.2.7 Floodplains**

#### Affected Environment

The Federal Emergency Management Agency has mapped the 100-year floodplain in the Lease Area on Flood Insurance Rate Map panels 32001C1200F, 32001C0825F, 32001C0850F, and 32001C0475F. The floodplain is associated with the Humboldt Salt Marsh in the center of Dixie Valley and the Dixie Valley Wash that drains into the playa. The floodplain has been designated

by the Federal Emergency Management Agency as Zone A. This designation means that these areas are subject to inundation by the 1-percent-annual-chance flood event (100-year floodplain) generally determined using approximation methodologies. Based on the aforementioned Flood Insurance Rate Map panels, there are approximately 7,600 acres of 100-year floodplain in the Lease Area, approximately 146 acres of which occur within the limits of the Project Area (Figure 13).

### Environmental Consequences

Implementation of the Proposed Action would result in approximately 24.2 acres of surface disturbance within the limits of the 100-year floodplain. The disturbance would result from the construction of five well pads and approximately 8,120 linear feet of access road. According to lease stipulations (Appendix A), surface occupancy within 650 feet of the 100-year floodplain is not permitted. However, the stipulations provide for exceptions if the BLM determines specific conditions apply, including determining that proposed development ensures adequate protection of the resource. Ormat would implement the environmental protection measures described in Section 2.1.9, and thus the 100-year floodplain would be protected from adverse effects.

The berm that would be constructed around the reserve pit on each well pad would provide an effective barrier between drilling and geothermal fluids and floodwater. Ormat would implement environmental protection measures that include inspecting the berm to ensure its structural integrity is not compromised. Because floodwater could not collect within the bermed area, the reserve pits would represent temporary losses to the floodwater storage capacity of the floodplain, as would pieces of project equipment that occupy physical space in the floodplain area. Considering the vast extent of the 100-year floodplain area, the lack of residences or structures that could be damaged by rising floodwater, and the minor floodwater displacement anticipated from the proposed project, the Proposed Action would not be anticipated to have any measureable effect on the 100-year floodplain.

### **3.2.8 Migratory Birds**

#### Affected Environment

On January 10, 2001, President Bill Clinton signed Executive Order 13186, placing emphasis on the conservation and management of migratory birds. Migratory birds are protected under the Migratory Bird Treaty Act of 1918, and the Executive Order addresses the responsibilities of federal agencies to protect migratory birds by taking actions to implement the Migratory Bird Treaty Act. BLM management for migratory bird species on BLM-administered lands is based on Instruction Memorandum No. 2008-050 (BLM 2007b). Based on this Instruction Memorandum, migratory bird species of conservation concern include “Species of Conservation Concern” and “Game Birds Below Desired Conditions.” These lists were updated in 2008 (U.S. Fish and Wildlife Service 2008).



### Golden Eagle

The Bald and Golden Eagle Protection Act (1940 as amended 1959, 1962, 1972, 1978) prohibits the take or possession of bald and golden eagles with limited exceptions. “Take,” as defined in the Eagle Act, includes “to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.” “Disturb” means “to agitate or bother a bald or golden eagle to a degree that causes or is likely to cause, based on the best scientific information available:

- injury to an eagle;
- a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or,
- nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior.”

“Important eagle-use area” is defined in the Eagle Act as “an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site are essential for the continued viability of the site for breeding, feeding, or sheltering eagles.”

BLM requires consideration and NEPA analysis of potential impacts on golden eagles and their habitat for all renewable energy projects (BLM Instruction Memorandum No. 2010-156). Golden eagles use Dixie Valley for foraging and the nearby mountain ranges for nesting, but no documented nests are within approximately 6 miles of the Lease Area (Nevada Department of Wildlife 2010).

Key habitats found within the Project Area that support life requisites of migratory birds are described in detail in Section 3.2.9, Wildlife. Table 13 lists migratory bird species potentially present at the Lease Area.

**Table 13 Migratory Bird Species, Habitat Association, and Presence/Absence of Suitable Habitat within the Lease Area**

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
<b>Game Birds of Conservation Concern</b>			
Canvasback	<i>Aythya valisineria</i>	Marshes, ponds, lakes, rivers, and bays. <sup>1</sup>	Present
Dove, Mourning	<i>Zenaida macroura</i>	Open woodland, forest edge, cultivated lands with scattered trees and bushes, parks and suburban areas, arid and desert country and second growth. <sup>1</sup>	Present

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Duck, Ring-Necked	<i>Aythya collaris</i>	Marshes, lakes, rivers, swamps, especially in wooded areas. <sup>1</sup>	Present
Duck, Wood	<i>Aix sponsa</i>	Quiet inland waters near woodland swamps, flooded forest, greentree reservoirs, ponds, marshes and along streams. <sup>1</sup>	Present
Mallard	<i>Anas platyrhynchos</i>	Primarily shallow waters such as ponds, lakes, marshes, and flooded fields. <sup>1</sup>	Present
Pintail, Northern	<i>Anas acuta</i>	Lakes, rivers, marshes, and ponds in grasslands, barrens, dry tundra, open boreal forest, or cultivated fields. <sup>1</sup>	Present
Lesser Scaup	<i>Aythya affinis</i>	Lakes and ponds. Winters in fresh or brackish water. <sup>3</sup>	Present
American wigeon	<i>Anas americana</i>	Shallow freshwater wetlands, including ponds, marshes, and rivers. <sup>3</sup>	Present
<b>Bird Species of Conservation Concern<sup>2</sup></b>			
Curlew, Long-billed	<i>Numenius americanus</i>	Short-grass grasslands and sometimes wheat fields or fallow fields; nests usually close to standing water. <sup>1</sup>	May be present
Eared grebe	<i>Podiceps nigricollis</i>	Breeds in shallow lakes and ponds. In migration and in winter prefers salt water. Occurs in super salty habitats, where fish are absent. <sup>3</sup>	Present
Eagle, Golden	<i>Aquila chrysaetos</i>	Generally open country, prairies, arctic and alpine tundra, open wooded country, and barren area, especially in hilly or mountainous regions. <sup>1</sup>	Present; observed at existing Dixie Valley geothermal facility
Peregrine falcon	<i>Falco peregrinus</i>	Breeds in open landscapes with cliffs for nest sites. They can be found along rivers and coastlines or in mountains up to 12,000 feet in elevation. During migration and winter, they can occur in nearly any open habitat, but with a greater likelihood along mudflats, coastlines, lake edges, and mountain chains. <sup>3</sup>	Present
Yellow rail	<i>Coturnicops noveboracensis</i>	Shallow marshes, and wet meadows; in winter, drier fresh-water and brackish marshes, as well as dense, deep grass and rice fields. <sup>3</sup>	Present
Marbled godwit	<i>Limosa fedoa</i>	Breeds in marshes and flooded plains, also on mudflats and beaches during migration and winter. <sup>3</sup>	May be present but not likely.
Hawk, Ferruginous	<i>Buteo regalis</i>	Grasslands and semi-desert shrublands; nest in isolated trees, on rock outcrops, or ground. <sup>1</sup>	Present
Calliope hummingbird	<i>Stellula calliope</i>	Open montane forest, mountain meadows, and willow and alder thickets. Also in chaparral, lowland brushy areas, deserts and semi-desert regions during migration and winter. <sup>3</sup>	May be Present but Not Likely

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Sage thrasher	<i>Oreoscoptes montanus</i>	Sagebrush plains. Also arid scrub, brush and thickets during winter and migration, primarily in arid or semi-arid situations; rarely around towns. <sup>3</sup>	Present
Green-tailed towhee	<i>Pipilo chlorurus</i>	Dry, shrubby hillsides; breeds in areas with a high diversity of shrub species providing dense, low cover. During migration and winter, it is found in similar habitats, often near streams. <sup>3</sup>	Present
Plover, Snowy	<i>Charadrius alexandrinus</i>	Beaches, dry mud or salt flats, sandy shores of rivers, lakes, and ponds. <sup>1</sup>	Present
Shrike, Loggerhead	<i>Lanius ludovicianus</i>	Open county with scattered trees and shrubs, savanna, desert scrub, and occasionally open woodland. <sup>1</sup>	Present; observed in Lease Area
Sparrow, Brewer's	<i>Spizella breweri</i>	Strongly associated with sagebrush over most of range, in areas with scattered shrubs and short grass. <sup>1</sup>	Present
Sparrow, Sage	<i>Amphispiza belli</i>	Strongly associated with sagebrush for breeding; also found in saltbush brushland, shadscale, antelope brush, rabbitbrush, black greasewood, mesquite, and chaparral. <sup>1</sup>	Present; observed in Lease Area
Black rosy-finch	<i>Leucosticte atrata</i>	Breeds in alpine areas, usually near rock piles, and cliffs. Winters in open country, including mountain meadows, high deserts, valleys, and plains. Forages on insects and seeds on surface of snow or mud. <sup>3</sup>	May be Present but Not Likely

<sup>1</sup>Source: BLM 2010b.

<sup>2</sup>Species list based on U.S. Fish and Wildlife list for Bird Conservation Region 9, Great Basin (U.S. Fish and Wildlife Service 2008). Species with no potential habitat in or near the Lease Area are not included.

<sup>3</sup>Source: Cornell University 2011

### Environmental Consequences

Implementation of the Proposed Action would result in permanent, direct loss of approximately 80 acres of cold desert scrub habitat that sage thrasher, sage sparrow, Brewer's sparrow, and other sagebrush breeders utilize. The drilling rig derrick could cause direct mortality as the result of bird strikes, particularly among night-migrating birds. Preliminary research suggests red lights may cause disorientation among birds that migrate at night. Red lights on towers seem to disorient migrating birds more than white or green lights (Rich and Longcore 2006). Due to the height of the largest production drill rig derricks (170 feet), Federal Aviation Administration regulations require Ormat to utilize red lights. The lights on the drill rig derricks would pulse at the minimum intensity and minimum number of flashes per minute allowable by the Federal Aviation Administration. All other lights on the Project Area would be down-lit to prevent

disorientation among birds. Indirect temporary effects from noise, human presence, and heavy equipment present during construction and drilling activities may lead to reduced nesting success for individuals that are not displaced but are affected by the fragmentation and/or overall footprint of the project, or to individuals being displaced into surrounding areas. This in turn may affect foraging opportunities for species that prey on adults, nestlings, or eggs. Raptor species, such as prairie falcon, that prey on rodents and lizards also may be affected by these activities.

The 80 acres of loss habitat would be small relative to the hundreds of thousands of acres of cold desert scrub habitat available in Dixie Valley. Population viability for any one species would not be expected to be in jeopardy as a result of the habitat loss resulting from implementation of the Proposed Action. Migratory birds nesting surveys required prior to ground disturbance during the nesting season would prevent impacts to species. The impacts resulting from noise, human presence, and presence of heavy equipment would be expected to be temporary and short term for the duration of the proposed construction and drilling activities, and not expected to jeopardize the viability of migratory bird populations. Additionally, because no known golden eagle nests are within 6 miles of the Project Area and there are hundreds of thousands of acres of available cold desert scrub habitat for foraging in Dixie Valley and negligible prey impacts, no “take” or disturbance to “Important Eagle Use Areas” is reasonably expected.

### **3.2.9 Wildlife and Key Habitat**

#### Affected Environment

Based on the Southwest Regional GAP Analysis Project, the Nevada Department of Wildlife’s Wildlife Action Plan (2006) characterized Nevada’s vegetative land cover into eight broad Ecological System groups and linked those with key habitat types, which are further refined into Ecological Systems characterized by plant communities or associations (USGS National Gap Analysis Program 2005). Along with survey data, key habitats can be used to infer likely occurrences of wildlife species assemblages. Key habitat types that potentially would be affected directly or indirectly by the Proposed Action are Cold Desert Scrub and Desert Playas and Ephemeral Pools. When playas contain water for extended periods of time, lush vegetation can grow in addition to producing many aquatic invertebrates that provide forage for shorebirds, waterfowl, and small water birds. Permanent water sources that drain onto the playa area within and near the Lease Area include the Dixie Hot Springs and another spring south of Dixie Hot Springs. The volume of water discharged from these sources does not provide for complete inundation of the playa. A topographically depressed area between the water sources and the playa intercepts some of the water discharged from the springs, and is consistently full of water, essentially forming a perennial pond. Another topographically depressed area adjacent to this pond is irregularly filled with water, forming an ephemeral pond. These ponds and the water sources that feed them support riparian vegetation and provide yearly habitat for migratory waterfowl. Areas adjacent to the consistently filled pond and areas south of it support unique

breeding habitat for the Dixie Valley toad (*Bufo boreas*), a Nevada BLM Sensitive Species. BLM Sensitive Species, including the Dixie Valley toad, are discussed in Section 3.2.10. Seasonal inundation of the playa area, generally during spring when snowmelt runoff is greatest, would provide additional open water habitat for herons, egrets, bitterns, ducks, geese, and other birds associated with open water. The ponds are located outside of the Lease Area, but springs and associated riparian areas do occur within the Lease Area. Springs and riparian areas are not located within the Project Area.

Biologists from JBR Environmental Consultants, Inc. (JBR) visited the Project Area in March 2011. Wildlife or wildlife sign (burrows, scat, tracks) observed during the site visit include antelope (*Antilocapra americana*), coyote (*Canis latrans*), black-tailed jackrabbit (*Lepus californicus*), cottontail (*Sylvilagus* spp.), sage sparrow (*Amphispiza belli*), horned lark (*Eremophila alpestris*), loggerhead shrike (*Lanius ludovicianus*), northern harrier (*Circus cyaneus*), common raven (*Corvus corax*), and a lizard believed to be a sagebrush lizard (*Sceloporus graciosus*). This list includes only species or signs of species observed by JBR biologists; additional wildlife species would be expected to occur in the Project Area and surrounding vicinity. Various bird species, including those listed in Section 3.2.8, Migratory Birds, would be anticipated to occur, as would various species of small mammals and reptiles. Although no bat roosting habitat is found in the Lease Area, habitat is found in mines, caves, and rock crevices of the Stillwater Range, and bats may use the Project Area for foraging.

### *Big Game*

Big game species that may travel from the Stillwater Range to the west through the Lease Area to the Clan Alpine Mountains to the east largely consist of mule deer (*Odocoileus hemionus*), mountain lion (*Felis concolor*), and desert bighorn sheep (*Ovis canadensis nelsoni*). Pronghorn antelope also travel through the Lease Area.

### Environmental Consequences

Construction of the proposed well pads, access roads, and gravel source areas would result in direct loss of approximately 137 acres of wildlife habitat within the Project Area. Approximately 80 acres of the disturbance would occur within the cold desert scrub habitat and 57 acres within the desert playas and ephemeral pools habitat. The 137 acres of loss habitat would be small relative to the hundreds of thousands of acres of cold desert scrub habitat and tens of thousands of acres of desert playas and ephemeral pools habitat available in Dixie Valley. Population viability for any one species would not be expected to be in jeopardy as a result of the habitat loss resulting from implementation of the Proposed Action.

Springs and surface waters in Dixie Valley provide habitat for migratory waterfowl, and support the growth of aquatic invertebrates and riparian vegetation. As described in Section 3.2.6, springs, wetlands, and surface waters occur within the Lease Area, but not within the Project

Area or any area within 650 feet of the Project Area. Because all proposed surface disturbance would be limited to the Project Area, direct impacts to springs, surface waters, and riparian vegetation would not be anticipated. Ephemeral washes and drainages would be avoided to the extent possible. Environmental protection measures (Section 2.1.9) would minimize impacts where proposed roads must cross ephemeral drainages that would potentially convey runoff to wetlands, ponds, or other downstream aquatic habitat. Similarly, environmental protection measures listed in Section 2.1.9 would prevent erosion and sedimentation of wetlands, ponds, streams, or any other water resource. Please see Section 3.2.6 for a detailed analysis of the potential impacts to wetlands and riparian resources.

Indirect impacts wildlife dependent on the water resources in the area could be affected by any alteration of the existing water quality, chemistry, or quantity, either directly on the surface, or as discharged from springs. As described in Section 3.2.5, a BLM-approved drilling program would be implemented that include a well casing program and use of BOPE. The use of BOPE would prevent geothermal fluids from flowing uncontrollably up the well column to the ground surface. The well casing would essentially seal the well column, segregating it from aquifers and preventing aquifers from mixing along the length of the well bore. As described in Section 3.2.5, impacts to springs are not anticipated. Mitigation measures listed in Section 3.2.5 would require a hydrologic monitoring plan that would confirm impacts to water quality, quantity, or temperature do not occur. No impacts to wildlife dependent on riparian vegetation, springs, or open water would be anticipated.

Direct and indirect effects from noise, human presence, and heavy equipment present during construction and drilling activities would also be expected to impact wildlife. Operation of construction equipment would have potential to cause mortality of lizards and small mammals that forage and/or have burrow complexes within the cold desert scrub habitat. Indirect effects from noise, human presence, and heavy equipment present during construction and drilling activities may lead to reduced breeding success for individuals that are not displaced but are affected by the fragmentation of the project disturbance or to individuals being displaced into surrounding areas. This in turn may affect distribution of large mammals and raptors that forage on rodents and small mammals. Big game species may avoid the area when traveling between mountain ranges, which would not reasonably cause additional physiological stress leading to decreased survival. The impacts resulting from noise, human presence, and presence of heavy equipment would be expected to be temporary and short term for the duration of the proposed construction and drilling activities.

No population level impacts to wildlife species are expected as a result of the implementation of the Proposed Action. Because wildlife would likely return to the Project Area after the project is completed and because similar habitat is available near the Project Area, impacts to wildlife resulting from implementation of the Proposed Action are expected to be minor.

### 3.2.10 Special Status Species

#### Affected Environment

BLM Manual 6840 – Special Status Species Management establishes policy for management of BLM sensitive species that are found on BLM-administered lands (BLM 2008c). Species designated as BLM sensitive must be native species found on BLM-administered lands for which the BLM has the capability to significantly affect the conservation status of the species through management and either:

- there is information that a species has recently undergone, is undergoing, or is predicted to undergo a downward trend such that the viability of the species or a distinct population segment of the species is at risk across all or a significant portion of the species range; or,
- the species depends on ecological refugia or specialized or unique habitats on BLM-administered lands, and there is evidence that such areas are threatened with alteration such that the continued viability of the species in that area would be at risk.

BLM mapping confirmed that no greater sage-grouse (*Centrocercus urophasianus*) habitat is present within the Lease Area. Biologists from JBR Environmental Consultants, Inc. visited the Project Area in March 2011 and verified that no greater sage-grouse habitat is present within the Project Area. Table 14 below presents BLM sensitive species, their habitat association, and presence or absence of habitat within the Lease Area.

**Table 14 Nevada BLM Sensitive Species, Habitat Association, and Presence/Absence of Suitable Habitat in the Lease Area**

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Dixie Valley toad	<i>Bufo boreas</i> spp.	Springs, seeps, streams, and similar inundated areas. Presently thought to be endemic to Dixie Valley.	Present
Northern leopard frog	<i>Rana pipiens</i>	Springs, slow streams, marshes, bogs, ponds, canals, floodplains, reservoirs, and lakes; usually permanent water with rooted aquatic vegetation.(BLM 2010b)	Present
Northern goshawk	<i>Accipiter gentilis</i>	Various types of forest cover, especially mature-aged forests. (Cornell University 2011)	Absent
Greater sage-grouse	<i>Centrocercus urophasianus</i>	Mountains, foothills, and plains where sagebrush is present. Dependent on sagebrush. (Cornell University 2011)	Absent
Western snowy plover	<i>Charadrius alexandrinus nivosus</i>	Beaches, dry mud or salt flats, sandy shores of rivers, lakes and ponds. (BLM 2010b)	Present; migrant

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Lewis woodpecker	<i>Melanerpes lewis</i>	Open woodlands. Forages on insects present on surface of tree trunks. (Cornell University 2011)	Absent
Sage thrasher	<i>Oreoscoptes montanus</i>	Sagebrush plains. Also arid scrub, brush and thickets during winter and migration, primarily in arid or semi-arid situations; rarely around towns. (Cornell University 2011)	Present; migrant
Cui-ui	<i>Chasmistes cujus</i>	Endemic to Pyramid Lake. Migrate up the lower reaches of the Truckee River to spawn and return to lake afterwards. (U.S. Fish and Wildlife Service 2010a)	Absent
Wall Canyon Sucker	<i>Catostomus</i> sp. 1	Known only to occur in Wall Canyon Creek in Washoe County, Nevada. (U.S. Geological Survey 2010b)	Absent
Railroad Valley springfish	<i>Crenichthys nevadae</i>	Limited to several specific thermal springs in Nevada, including Little Warm Spring on the Duckwater Shoshone Indian Reservation, and Big, Reynolds, Hay Corral, and North Springs near Lockes Ranch, Nevada. Additionally, they have been introduced outside of their historical range a spring in Hot Creek Canyon and at Chimney Spring near Lockes. (U.S. Fish and Wildlife Service 2010b)	Absent
Lahontan cutthroat trout	<i>Oncorhynchus clarki henshawi</i>	Cool flowing water with vegetated streambanks, large terminal alkaline lakes such as Pyramid Lake or Walker Lake, alpine lakes such as Lake Tahoe. (U.S. Fish and Wildlife Service 2010c)	Absent
Spotted bat	<i>Euderma maculatum</i>	Found in various habitats from desert to montane coniferous stands, including open ponderosa pine, pinyon-juniper woodland, canyon bottoms, open pastures, and hayfields. (BLM 2010b)	May forage in Lease Area
Western red bat	<i>Lasiurus blossevillii</i>	Roosts in cottonwoods in riparian areas below 6,500 feet in elevation. Feed along forest edges, small clearings, and near street lights.	Absent
California myotis	<i>Myotis californicus</i>	Western lowlands; sea coast to desert, oak-juniper, canyons, riparian woodlands, desert scrub, and grasslands (BLM 2010b)	May forage in Lease Area



Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Little brown myotis	<i>Myotis lucifugus</i>	Adapted to using human-made structures for resting and maternity sites, also uses caves and hollow trees; foraging habitat is generalized, usually in woodlands near water (BLM 2010b)	May forage in Lease Area
Yuma myotis	<i>Myotis yumanensis</i>	Desert regions, most commonly in lowland habitats near open water, where it prefers to forage. Roosts in caves, abandoned mine tunnels, and buildings.	May forage in Lease Area
Pygmy rabbit	<i>Brachylagus idahorensis</i>	Tall, dense sagebrush; dependent on sagebrush. (U.S. Fish and Wildlife Service 2011)	Absent
Pale kangaroo mouse	<i>Mircodipodops pallidus</i>	Fine sand around scattered desert brush. Occur in the upper Sonoran Desert of western Nevada and adjacent Mono and Inyo counties, California.	Absent
Pika	<i>Ochotona princeps</i>	It inhabits talus and talus-like formations in cool microclimates.	Absent
Hardy's aegialian scarab	<i>Aegialia hardyi</i>	Known to occur at Sand Mountain. Possibly occurs at Blow Sand Mountain.	Absent
Bee	<i>Anthophora</i> sp. nov. 1	Unknown	Unknown
Sand Mountain aphodius scarab	<i>Aphodius</i> sp. 3	Sand Mountain and Blow Sand Mountain.	Absent
Click beetle	<i>Cardiophorus</i> ssp. nov.	No data. Click beetles in general live in soil, decaying bark and logs, under fallen trees, or similar areas.	Unknown
Sand Mountain pygmy scarab beetle	<i>Coenonycha pygmaea</i>	Sand Mountain and Blow Sand Mountain.	Absent
Early blue	<i>Euphilotes enoptes primavera</i>	Butterflies in the blues subfamily stay near their host plants, which are various species of buckwheat. Historical range is reported as Mineral County, Nevada by the Nevada Natural Heritage Program.	Potentially present; not known to occur in Dixie Valley or Churchill County
Sand Mountain blue	<i>Euphilotes pallescens arenamontana</i>	No data	Present; known to occur within Dixie Valley
bee	<i>Hesperapis</i> sp. nov. 2	No data	Unknown
Mono Basin skipper	<i>Hesperia uncas giulianii</i>	Known only from the Adobe Hills in Mono County, California. Gently rolling hills with sandy substrate.	Absent
Bee	<i>Perdita haigi</i>	No data	Unknown
Bee	<i>Perdita</i> sp. nov. 3	No data	Unknown

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Great Basin small blue	<i>Philotiella speciosa septentrionalis</i>	No data	Unknown
Carson wandering skipper	<i>Pseudocopaeodes eunus obscurus</i>	Isolated patches of saltgrass habitat in Carson Valley.	Absent
Carson Valley silverspot	<i>Speyeria nokomis carsonensis</i>	Wet meadows along the eastern base of the Carson Range from southern Washoe County, Nevada south to northern Alpine County, California, in the Pine Nut Mountains, Douglas County, Nevada and into the Sweetwater Mountains, Lyon County, Nevada. Occurs in association with its host plant, northern bog violet ( <i>Viola nephrophylla</i> ).	Absent
Wongs pyrg	<i>Pyrgulopsis wongi</i>	Widely distributed in the Owens River drainage, also ranges among basins to the north, south, and east, including Mono Lake basin, Adobe Valley, Owens Valley, and Rose Valley.	Absent
Ovate Cain Spring pyrg	<i>Pyrgulopsis pictilis</i>	No data. Historic range is reported as Lander County, Nevada by the Nevada Natural Heritage Program.	Unknown; not known to occur in Dixie Valley or Churchill County
Eastwood milkweed	<i>Asclepias eastwoodiana</i>	In open areas on a wide variety of basic (pH usually 8 or higher) soils, including calcareous clay knolls, sand, carbonate or basaltic gravels, or shale outcrops, generally barren and lacking competition, frequently in small washes or other moisture-accumulating microsites, in the shadscale, mixed-shrub, sagebrush, and lower pinyon-juniper zones.	Absent
Margaret rushy milkvetch	<i>Astragalus convallarius</i> var. <i>margaretiae</i>	Rocky slopes and flats among sagebrush in the pinyon-juniper and sagebrush zones. Endemic to the Pine Nut and Virginia Ranges.	Absent
Sodaville milkvetch	<i>Astragalus lentiginosus</i> var. <i>sesquimetralis</i>	Moist, open, alkaline hummocks and drainages near cool springs with <i>Distichlis spicata</i> , <i>Sarcobatus vermiculatus</i> , <i>Sporobolus airoides</i> , etc. Aquatic or wetland-dependent in Nevada. Near exhaustive surveys of habitat have revealed only two populations in Nevada; one in Mineral County and the other in Nye County.	Potentially present; not known to occur in Dixie Valley or Churchill County

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Lavin eggvetch	<i>Astragalus oophorus</i> <i>var. lavinii</i>	Open, dry, relatively barren gravelly clay slopes, knolls, badlands, or outcrops, derived from volcanic ash or carbonate, usually northeast to southeast aspects, openings in pinyon-juniper or sagebrush zones.	Absent
Tonopah milkvetch	<i>Astragalus pseudiodanthus</i>	Deep loose sandy soils of stabilized and active dune margins, old beaches, valley floors, or drainages, with <i>Sarcobatus vermiculatus</i> and other salt desert shrub taxa. Dependent on sand dunes or deep sand in Nevada.	Unlikely
Ames milkvetch	<i>Astragalus pulsiferae</i> <i>var. pulsiferae</i>	No data. Only recorded population is in Washoe County, Nevada.	Unknown; not known to occur in Dixie Valley or Churchill County
Bodie Hills rockcress	<i>Boechera bodiensis</i>	Dry, open, rocky, high or north-facing slopes or exposed summits of granitic or rhyolitic material, on moisture-accumulating microsites in sagebrush associations within the pinyon-juniper and mountain sagebrush zones.	Absent
Brodie Hills draba	<i>Cusickiella quadricostata</i>	Great Basin scrub, pinyon and juniper woodland; clay or rocky soils; elevations from 6,200 to 8,500 feet above sea level.	Absent
Windloving buckwheat	<i>Eriogonum anemophilum</i>	At high elevations on dry, exposed, relatively barren and undisturbed, gravelly, limestone or volcanic ridges and ridgeline knolls, on outcrops or shallow rocky soils over bedrock. At low elevations on dry, relatively barren and undisturbed knolls and slopes of light-colored, platy volcanic tuff weathered to form stiff clay soils.	Absent
Beatley buckwheat	<i>Eriogonum beatleyae</i>	Dry, volcanic outcrops	Absent
Churchill Narrows buckwheat	<i>Eriogonum diatomaceum</i>	Dry, relatively barren and undisturbed, white to yellowish tan, clay to silty diatomaceous deposits of the Coal Valley Formation, with a variable volcanic cobble overburden, on rounded knolls, low ridges, slopes, and especially small drainages on all aspects.	Absent

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Steamboat buckwheat	<i>Eriogonum ovalifolium</i> <i>var. williamsiae</i>	Young, shallow, poorly-developed, dry soils derived from siliceous opaline sinter precipitated by past thermal spring flows, but not currently near surface water, in open areas.	Absent
Altered andesite buckwheat	<i>Eriogonum robustum</i>	Dry, shallow, highly acidic, gravelly clay soils mainly of the Smallcone Series, derived from weathering of hydrothermal sulfide deposits formed in andesite, or sometimes in rhyolitic or granitoid rocks, forming mostly barren yellowish to orange brown patches on ridges, knolls, and steep slopes.	Absent
Smooth dwarf greasebush	<i>Glossopetalon pungens</i> <i>var. glabrum</i>	Crevices of carbonate cliffs and outcrops.	Absent
Rough dwarf greasebush	<i>Glossopetalon pungens</i> <i>var. pungens</i>	Crevices of carbonate cliffs and outcrops.	Absent
Sand cholla	<i>Grusonia pulchella</i>	Sand of dunes, dry-lake borders, river bottoms, washes, valleys, and plains in the desert." Dependent on sand dunes or deep sand in Nevada.	May be present but not likely
Sierra Valley mousetails	<i>Ivesia aperta</i> <i>var. aperta</i>	Shallow, vernaly saturated, slowly draining, sandy to rocky clay soils derived from mostly andesitic volcanic rock or alluvium on benches and flats in meadows, seeps, intermittent drainages, etc., in the yellowpine, mountain sagebrush, and mountain mahogany zones. Dependent on wetland margin areas in Nevada.	Absent
Pine Nut Mountains mousetails	<i>Ivesia pityocharis</i>	Seasonally or periodically wet, otherwise moist to dry decomposed granite soils or sod of meadow margins with shallow underlying water table and/or bedrock, associated with springs, moist drainages, or ephemeral ponds, typically on flats or gentle northwest to northeast exposures, but found on all aspects with slopes up to about 20 degrees. Endemic to Pine Nut Mountains.	Absent

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Webber ivesia	<i>Ivesia webberi</i>	Shallow shrink-swell clay soils with a gravelly surface layer over volcanic, generally andesitic bedrock, on mid-elevation benches and flats. Known in Nevada from the Pine Nut and Carson ranges and Peavine Mountain.	Unlikely
Sagebrush pygmyleaf	<i>Loeflingia squarrosa</i> <i>ssp. artemisiarum</i>	Sandy soils of desert dunes and flats in Great Basin sagebrush scrub and Mojave desert scrub. It occurs at elevations of 2,300 to 4,000 feet.	Potentially present, not known to occur within Dixie Valley or Churchill County
Tiehm blazingstar	<i>Mentzelia tiehmii</i>	No data	Unknown
Shevock bristle moss	<i>Orthotrichum shevockii</i>	Pinyon-juniper woodland, on granitic rocks,	Absent
Oryctes	<i>Oryctes nevadensis</i>	Deep loose sand of stabilized dunes, washes, and valley flats, on various slopes and aspects.	Potentially present, not known to occur within Dixie Valley but does occur in Churchill County
Nevada dune beardtongue	<i>Penstemon arenarius</i>	Deep, volcanic, sandy soils at elevations of 3,940 to 4,430 feet above mean sea level; common associates include fourwing saltbush, littleleaf horsebrush, and greasewood. (BLM 2010b)	Potentially present; not known to occur within Dixie Valley
Lahontan beardtongue	<i>Penstemon palmeri</i> <i>var. macranthus</i>	Along washes, roadsides, and canyon floors, particularly on carbonate-containing substrates, usually where subsurface moisture is available throughout most of the summer; unknown if restricted to calcareous substrates. (BLM 2010b)	Present; known to occur within Dixie Valley
Wassuk beardtongue	<i>Penstemon rubicundus</i>	Open, rocky to gravelly soils on perched tufa shores, steep decomposed granite slopes, rocky drainage bottoms, and roadsides or other recovering disturbances with enhanced runoff, locally abundant on recent burns, in the pinyon-juniper, sagebrush, and upper mixed-shrub and shadscale zones	Unlikely
Playa phacelia	<i>Phacelia inundata</i>	This species grows in alkali playas and seasonally inundated areas with clay soils. Aquatic or wetland-dependent in Nevada.	Potentially present; not known to occur in Dixie Valley or Churchill County

Common Name	Scientific Name	Habitat Association	Presence/Absence of Suitable Habitat
Mono County Phacelia	<i>Phacelia monoensis</i>	Alkaline, barren or sparsely vegetated grayish, brownish, or reddish shrink-swell clays of mostly andesitic origin, on various slopes and aspects, mostly on stabilized or low-intensity artificial or natural disturbances, most abundant on road berms that cross such soils, less frequently on naturally eroding badlands or apparently undisturbed soil, in the pinyon-juniper and mountain sagebrush zones	Unlikely
Washoe pine	<i>Pinus ponderosa</i> ssp. <i>washoensis</i>	Mountain slopes with lodgepole pine, western white pine, ponderosa pine, and California red fir.	Absent
Altered andesite popcornflower	<i>Plagiobothrys glomeratus</i>	Dry, shallow, highly acidic (pH 3.3-5.5) gravelly clay soils mainly of the Smallcone Series, derived from weathering of hydrothermal sulfide deposits formed in andesite, or sometimes in rhyolitic or granitoid rocks, forming mostly barren yellowish to orange brown patches on ridges, knolls, and steep slopes on all aspects, on all but the most xeric sites supporting a sparse, stunted relict woodland of yellow pines and pinyon pine.	Absent
Williams combleaf	<i>Polyctenium williamsiae</i>	Relatively barren sandy to sandy-clay or mud margins and bottoms of non-alkaline seasonal lakes perched over volcanic bedrock in the sagebrush, pinyon-juniper, and mountain sagebrush zones.	Absent
Masonic Mountain jewelflower	<i>Streptanthus oliganthus</i>	Rocky sites and talus, from 6,890 to 9,190 feet above sea level.	Absent
Tiehm peppergrass	<i>Stroganowia tiehmii</i>	Dry, open, very rocky clay soils or soil pockets in or near scree, talus, or boulder fields derived from basalt, other volcanic rocks, and/or fluviolacustrine sediments, on gentle to steep slopes of all aspects and topographic positions, but best developed on northeasterly aspects, in the sagebrush, upper shadscale, and lower juniper woodland zones.	Absent

### Environmental Consequences

The consequences of implementing the Proposed Action would be very similar for BLM-designated Sensitive Species to those described for migratory birds and wildlife in Sections 3.2.8 and 3.2.9, respectively. Surface disturbance from construction of the proposed project would result in the direct loss of approximately 80 acres of foraging and nesting habitat, and sensitive bird and bat species may experience mortality from collisions with the drill rig derrick. Indirect effects from noise, human presence, and heavy equipment present during construction activities may lead to reduced breeding success for individuals that are not displaced but are affected by the fragmentation of the overall footprint of the project or to individuals being displaced into surrounding areas. This in turn may affect distribution of raptors that forage on rodents and small mammals.

Springs and surface waters in Dixie Valley provide habitat for and support a population of the Dixie Valley toad. As described in Section 3.2.6, springs, wetlands, and surface waters occur within the Lease Area, but not within the Project Area or any area within 650 feet of the Project Area. Because all proposed surface disturbance would be limited to the Project Area, direct impacts to the toad or its habitat would not be anticipated. Ephemeral washes and drainages would be avoided to the extent possible. Environmental protection measures (Section 2.1.9) would minimize impacts where proposed roads must cross ephemeral drainages that would potentially convey runoff to wetlands, ponds, or other downstream habitat supporting the toad. Similarly, environmental protection measures listed in Section 2.1.9 would prevent erosion and sedimentation of wetlands, ponds, streams, or any other potential toad habitat. Please see Section 3.2.6 for a detailed analysis of the potential impacts to wetlands and riparian resources.

Indirect impacts to the toad or its habitat associated with changes in water quality, chemistry, or quantity would not be anticipated. As described in Section 3.2.5, a BLM-approved drilling program would be implemented that include a well casing program and use of BOPE. The use of BOPE would prevent geothermal fluids from flowing uncontrollably up the well column to the ground surface. The well casing would essentially seal the well column, segregating it from aquifers and preventing aquifers from mixing along the length of the well bore. Mitigation measures listed in Section 3.2.5 would require a hydrologic monitoring plan that would confirm impacts to water quality, quantity, or temperature do not occur. No impacts to the Dixie Valley toad or its habitat would be anticipated.

Direct and indirect effects from noise associated with operation of the construction and drilling equipment would affect species differently. For example, bats (e.g., pallid bat) that find their prey from noise that the prey makes instead of echolocation have been shown to avoid noisy areas. Bats using echolocation were unaffected because those ultrasonic signals are above the

spectrum of human noise. Rodents that use chirps to warn of predators may be susceptible to increased predation because these chirps may be masked from the project noise (Barber et al. 2010). Equipment noise would not be anticipated to affect the Dixie Valley toad. Desert bighorn sheep may avoid the area when traveling between mountain ranges.

No population level impacts to sensitive species are expected as a result of the implementation of the Proposed Action. The 80 acres of loss of foraging and nesting habitat would be small relative to the hundreds of thousands of acres of cold desert scrub habitat available in Dixie Valley. Population viability for any one species would not be expected to be in jeopardy as a result of the habitat loss resulting from implementation of the Proposed Action. Migratory birds nesting surveys required prior to ground disturbance during the nesting season would prevent impacts to breeding of sensitive avian species. No sensitive bat roosting habitat is expected to be disturbed due to implementation of the Proposed Action. Bat species in the area are insectivorous, and insect populations would not be expected to be adversely impacted by construction activities. Consequently, no impacts to sensitive bat species would be anticipated. The impacts resulting from noise, human presence, and presence of heavy equipment would be expected to be temporary and short term for the duration of the proposed construction and drilling activities and not expected to jeopardize the viability of sensitive species populations. Desert bighorn sheep may avoid the area when traveling between mountain ranges but would not reasonably incur additional physiological stress leading to decreased survival by the avoidance.

Lahontan beardtongue is commonly found next to roadsides. Ormat would limit disturbance to the current road surface on any existing road proposed for utilization as an access road. Additionally, proposed access roads that must be constructed would be placed outside of washes and drainages to the extent possible. Impacts to Lahontan beardtongue would not be expected. Surface disturbance would not occur any closer than 650 feet of wetland or riparian areas (see Section 3.2.6). This would prevent impacts to wetland dependent sensitive vegetation species. There are no sand dunes or exceptionally deep, sandy soils in the project area. Sensitive vegetation dependent on deep sand would not be impacted.

### **3.2.11 Cultural Resources**

#### 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 activity, including evidences of the effects of that activity on the environment. What makes a cultural resource significant is its identity, age, location, and context in conjunction with its capacity to reveal information through the investigatory research designs, methods, and techniques used by archeologists.” Ethnographic resources are defined as any “site, structure,



object, landscape, 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, as amended, and the Archaeological Resources Protection Act of 1979 (ARPA) are the primary laws regulating preservation of cultural resources. Section 106 of the National Historic Preservation Act as amended (16 United States Code 40 et seq.) 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 (archaeological, cultural, and historic) 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.

A Class III cultural resource inventory of the entire Project Area was performed by Cardno ENTRIX during February 2011. The survey area also included segments of existing Dempsey Lane, East Valley Road, and several unnamed roads that Ormat would use for access and possibly require occasional maintenance and repair of the road surface. The results of the survey have been disclosed in the inventory report submitted separately to the BLM (Peabody 2011). Below is a brief summary of the survey findings.

Cardno ENTRIX identified two new cultural resource sites (CrNV-03-8062 and CrNV-03-8063) and updated one site that was previously recorded by Far Western Anthropological Research Group (CrNV-03-7320). The two new sites consist of prehistoric-era lithic scatters and are not recommended as eligible for listing in the National Register of Historic Places. The updated site consists of a group of historic-era material, including fragments of bottle glass, ammunition casings, and a fence post. A sparse prehistoric-era lithic scatter was also identified in the group. It is recommended that CrNV-03-7320 remain not eligible for listing in the National Register of Historic Places. All recommendations for site eligibility for listing on the National Register of Historic Places are based on preliminary field recommendations and are subject to review and possible changes during BLM and State Historic Preservation Office consultations.

The interpretation of archaeological finds recorded by Cardno ENTIRX in the survey area is consistent with the archaeological patterns observed in the Carson Desert region, including Dixie Valley. Though they parallel and occasionally diverge from those over much of the western

Great Basin, the cultural landscape is best understood with reference to a regional framework. A number of authoritative overviews and reports (e.g., Bloomer et al. 1999; Delacorte 1997; Elston 1982, 1986; Grayson 1993; Kelly 1985, 2001; McGuire 2002; Pendleton et al. 1982; Raven and Elston 1988, 1989, 1991; Thomas 1985; Zeanah et al. 1995) summarize the history of archaeological research in western Nevada in general, and the Carson Desert region in particular. These reports provide a chronological discussion and synthesis. The vast contextual information resulting from studies in the Carson Desert provides a useful foundation for the studies in Dixie Valley.

Cultural historical frameworks for the Carson Desert area vary considerably, and reliance is typically placed on the framework developed by Raven and Elston (1988). Thomas's phases derived from his work in Monitor Valley are also used throughout the Carson Desert; in fact, he applied them to components at Hidden Cave (Thomas 1982, 1985). The data imply a relatively stable ancestral Paiute settlement pattern that routinely incorporated the Dixie Valley and Edwards Creek Valley area. These data argue for an expanded, eastward presence of Paiute groups during the Late Archaic. The recovery of direct subsistence remains from project sites during the recent investigations could shed further light on Late Prehistoric settlement patterns.

#### Environmental Consequences

A Class III cultural resource inventory has been performed in all areas where surface disturbance is proposed, and no observed sites were recommended as eligible for listing on the National Register of Historic Places. Consultation with the State Historic Preservation Office on Determinations of Eligibility and Finding of Effect for cultural resources located within the Proposed Action area is ongoing. However, the determinations have been made final by the BLM, and construction and operation of the proposed project would avoid all known resources identified during the survey in accordance with the State Protocol Agreement between the BLM and the State Historic Preservation Office for Implementing the National Historic Preservation Act, 2009, Appendix G, Sections A and B (BLM and State Historic Preservation Office 2009). Ormat would establish a 100-foot buffer zone around cultural sites where construction would be avoided. In the event that construction must encroach on this buffer, an archaeological monitor would be present while those construction activities are performed.

Based on the avoidance of known sites and the established protocol for the discovery of any new site described in Section 2.1.9, there would be no impact on cultural resources discovered during operation of the proposed project.

Accordingly, implementation of the Proposed Action would not be anticipated to impact sites eligible for listing on the National Register of Historic Places.

### **3.2.12 Native American Religious Concerns**

#### Affected Environment

Consultation with the Fallon Paiute-Shoshone Tribe was initiated through a face-to-face meeting between Ms. Terri Knutson, BLM Stillwater Field Manager, and the Fallon Paiute-Shoshone Tribal Council, including Alvin Moyle, Tribal Chairman, on August 25, 2010. A consultation initiation letter was provided to tribal staff. The letter included a description of the proposed project, a map of the project location, and an invitation for comments or feedback regarding the project. Subsequent face-to-face consultation meetings between Ms. Knutson and Fallon Paiute-Shoshone Tribal Council were held October 26, 2010, April 27, 2011, and July 28, 2011. Additional in-person meetings between BLM and tribal staff were held on September 15, 2010, December 22, 2010, and May 25, 2011. A field trip to the project location was attended by BLM Fluid Minerals Archaeologist, Jason Wright, and Fallon Paiute-Shoshone Tribe Cultural Coordinator, Ray Stands.

The Fallon Paiute-Shoshone Tribe has expressed concerns regarding the Dixie Hot Springs during the ongoing consultation process. The Dixie Hot Springs have and continue to be used by tribal members for healing and ceremonial purposes (BLM 2010b). The Fallon Paiute-Shoshone Tribe currently has uninterrupted access to the Dixie Hot Springs and has indicated that they wish for their access to remain uninterrupted by the proposed project. Additionally, the Fallon Paiute-Shoshone Tribe would also like assurance that the springs would not be impacted by implementation of the Proposed Action. Consultation is ongoing.

#### Environmental Consequences

Native American consultation with the Fallon Paiute-Shoshone Tribe 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 implement the lease stipulations and environmental protection measures described in Appendix A and Section 2.1.9, respectively. These measures and stipulations include following procedures set forth in 43 CFR Part 10, Native American Graves Protection and Repatriation Regulations.

The Fallon Paiute-Shoshone Tribe has expressed concerns regarding the Proposed Action's potential to interrupt existing access to the Dixie Hot Springs. The Fallon Paiute-Shoshone Tribe has also requested that springs be protected from impacts associated with the Proposed Action. Consultation regarding the Proposed Action area between the BLM and tribal staff is ongoing.

Existing access to the Dixie Hot Springs would not be impacted or altered as a result of implementing the Proposed Action. The springs are located just east of the intersection of Dempsey Lane and Dixie Valley Road (Figure 12), outside of the limits of the Project Area. Up

to 18 additional trips per day on Dixie Valley Road would result from the Proposed Action, and while this may create an occasional inconvenience, it would not prevent or prohibit use of the road. Ormat would not utilize the northernmost 1.1 miles of Dempsey Lane for access to the project, which is the segment of the road nearest the hot springs and the segment providing spring access from Dixie Valley Road (Figure 12).

Ormat would implement environmental protection measures described in Section 2.1.9 during construction and operation of the proposed project to prevent or minimize impacts to wetlands and riparian areas and to surface and groundwater quality. During construction and operations, BMPs would prevent surface runoff from eroding soils and causing sedimentation of surface waters. Ormat would utilize BOPE to prevent geothermal and drilling fluids from flowing uncontrolled to ground surface from the well bore. Additionally, no new surface disturbance would occur within 650 feet of Dixie Hot Springs or the riparian areas surrounding the springs.

### **3.2.13 Invasive, Nonnative Species**

#### Affected Environment

The BLM Carson City District recognizes the current noxious weed list designated by the State of Nevada Department of Agriculture statute (Nevada Department of Agriculture 2010). An invasive species is defined as a non-native or alien plant or animal that has entered into an ecosystem. Invasive species are likely to cause economic harm or harm to human health (Executive Order 13112). Noxious weeds, and invasive and non-native species are highly competitive, aggressive and easily spread.

The only noxious weed species known to occur within the Project Area is tamarisk. An individual tamarisk plant was observed within the Project Area, approximately 300 feet southeast of proposed well pad “C” (Figure 2). A group of approximately 80 to 100 tamarisk plants were observed growing south of well pad “D” (Figure 2), but was restricted to areas outside the limits of the Project Area. Infrequent occurrences of individual tamarisk plants were observed elsewhere in the general vicinity surrounding the project area as well. Tamarisk is listed as a Category “C” noxious weed by the Nevada Department of Agriculture. Category C weeds are species that are “currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer” (Nevada Department of Agriculture 2010).

Invasive, non-native species observed in the Project Area included halogeton (*Halogeton glomeratus*) and cheatgrass (*Bromus tectorum*). These species were most prevalent within previously disturbed portions of the Project Area, including at the existing mineral material site north of proposed well pad “H”, areas surrounding proposed well pad “H”, and areas near the intersections of East Valley Road and the proposed access roads leading to well pad “I” and well pad “K”.

### Environmental Consequences

Environmental protection measures listed in Section 2.1.9 would require infestations of noxious weeds within the project area to be removed prior to commencement of surface disturbance activities. This would eliminate the potential for project equipment and personnel to directly transport or distribute noxious weed seeds internally within the project area. Construction activities would disturb approximately 137 acres of native soils and vegetation cover. This would create conditions favorable for the establishment of noxious weeds and invasive, non-native species. While noxious weeds would be removed from the project area prior to commencement, noxious weed infestations near the project area would persist and may become established once favorable conditions occur. This would be especially applicable near well pads "C" and "D", which are close to large group of tamarisk just outside of the project area. Construction near existing populations of invasive halogeton and cheatgrass within the Project Area may increase the potential for these species to spread as well. Implementation of the Noxious Weed Management Plan (Appendix B) and environmental protection measures would require noxious weeds to be treated should they become established within the project area during operations or during reclamation, including the period over which reclamation vegetation is becoming established. These combined measures would ensure that impacts from invasive species and noxious weeds would remain minimal.

### **3.2.14 Geology and Minerals**

#### Affected Environment

The Project Area is located on the floor of Dixie Valley, a generally north-south trending valley within the Great Basin section of Nevada's Basin and Range Province (U.S. Geological Survey 2002). The Stillwater Range defines the western edge of Dixie Valley and the eastern edge is defined by the Clan Alpine Mountains. Various geologic forms make up the Stillwater Range near the Lease Area, including Miocene volcanic rocks, Pliocene sedimentary rocks, Upper-Triassic limestone, and Upper-Jurassic gabbroic and dioritic rocks (Nevada Bureau of Mines 1965). Volcaniclastic rocks and Pre-Tertiary to Tertiary mafic and felsic rocks are the predominant geologic forms in the Clan Alpine Mountains.

A thick sequence of late Tertiary basin-fill material, including lacustrine, playa, and alluvial fan sediments make up the geology of Dixie Valley (Bruton et al. 1997). Bedrock beneath the valley floor and basin-fill material was initially deformed during tectonic activities that formed Dixie Valley. Dixie Valley is located in an active seismic area, and seismic activity since the formation of the valley has further deformed the bedrock beneath the valley floor. A complex series of bedrock faults have also resulted from natural seismic activity. The Dixie Valley fault lies beneath the west valley edge at the base of the Stillwater Range. A fault scarp, visible along portions of the west edge of Dixie Valley, was created from a magnitude 6.8 earthquake that occurred in Dixie Valley in 1954 (Ryall and Vetter 1982).

### Environmental Consequences

By the geologic nature of geothermal systems, they are located in actively seismic and/or volcanic areas. This can make it very difficult to distinguish seismic activity that is naturally occurring in the area from that which may be induced by geothermal operations. There have been examples of induced seismicity resulting from a variety of human activities, including the production and injection of geothermal fluids for some long-term geothermal power plant operations. The associated seismic activity has occurred in the form of “micro-earthquakes” with a Richter Scale magnitude of 3 or less, which is not detectable to humans (Jennejohn, Blodgett, and Gawell 2009). Ryall and Vetter (1982) suggest that the potential for injection of geothermal fluids into deep wells to induce seismicity in Dixie Valley is high. This was based on the history of recent seismic activity in the area and the presence of hot springs above underlying faults.

The Proposed Action does include the possibility of performing short-duration injection tests to determine whether the naturally occurring fractures in the reservoir would accept spent geothermal fluids. A short-duration injection test in a single well is of significantly smaller magnitude than long-term and continuous injection of spent geothermal fluids in multiple wells during commercial production operations. Additionally, the possible injection tests would be performed to determine whether the naturally occurring faults would accept the spent geothermal fluids. Since the naturally occurring faults would be the subject of the tests, additional faulting would be avoided to ensure only the existing faults are tested. The short duration and very localized nature of the injection tests would not be anticipated to result in any induced seismic events, and impacts to geology would not be anticipated.

The geothermal resource, considered to be a mineral by the BLM, would be targeted by drilling up to three types of exploratory wells at as many as 12 well pad locations. If drilling discovers a producible geothermal resource, the successful well(s) would be flow tested for a short time period in the range of hours to several days.. The volume of geothermal fluids withdrawn from the subsurface would be very small in comparison the volume contained in a geothermal reservoir and limited to the volume that can be contained within the reserve pit on the well pad. The proposed exploration drilling and possible short term and temporary flow testing would be performed in conformance with the rights granted in the federal geothermal leases (Appendix A) as well as in conformance with BLM and State of Nevada regulatory requirements. Implementation of BLM regulatory requirements for well casing and cementing programs designed to isolate water zones and any other undiscovered, subsurface mineral resources from the well bore(s) would protect such potential resources from the effects of well operations and flow testing.

There are no active mining claims located on or in the vicinity of the Lease Area. No other commercially developable mineral resources are known to occur within the lease area. The Proposed Action would not be expected to impact other mineral resources or other mineral extraction activities.

### **3.3 NO ACTION ALTERNATIVE**

#### Affected Environment

The affected environment described for the Proposed Action would be the same for the No Action Alternative.

#### Environmental Consequences

The environmental consequences described above under each resource would not occur under the No Action Alternative.

## 4.0 CUMULATIVE IMPACTS

This section analyzes the potential cumulative impacts from past, present, and reasonably foreseeable future actions combined with the Proposed Action within the cumulative impacts assessment area (CIAA) to the resources for which cumulative impacts may be anticipated. A cumulative impact is defined as the impact that results from the incremental impact of the action, decision, or project when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. The resource values analyzed for the Proposed Action, which may involve a cumulative impact with other past, present, and reasonably foreseeable future actions, are visual resources, vegetation, migratory birds, wildlife, special status species, and soils.

The CIAA comprises central Dixie Valley between the ridgeline of the Stillwater Range to the west and East Valley Road to the east. The CIAA extends north to near the Churchill-Lander County line and south to Settlement Road (Figure 14). This area encompasses approximately 207,130 acres and was determined to include all affected resources considered for cumulative impacts. Of the 207,130 acres, approximately 7,465 acres are owned by the DoN, 1,170 are private lands, and the remaining 198,495 acres are public lands administered by the BLM.

### 4.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

Past actions considered are those whose impacts to one or more of the affected resources have persisted to present day. Present actions are those occurring at the time of this evaluation and during implementation of the Proposed Action. Future actions are those that are planned or being planned, with a reasonable expectation of occurring within the next 10 years. The primary past, present, and reasonably foreseeable future actions that would contribute to cumulative impacts of the Proposed Action include continued use of existing unpaved roads, continued exploration and development of geothermal resources within leased areas, continued use of existing right-of-way authorizations, livestock grazing and ranching, dispersed recreation, and the training activities performed by the DoN. Specific past, present, and reasonably foreseeable future actions within the CIAA are discussed below.

*Geothermal Exploration* – Approximately 88,300 acres, or 43 percent of the 207,130-acre CIAA, is included in federal geothermal leases. Two geothermal exploration projects are proposed within the CIAA: Coyote Canyon Geothermal Exploration Project and Dixie Hope Geothermal Exploration Project (formerly the Dixie Meadows Exploration Project owned by TGP Dixie Development Company LLC). Each of these projects would result in approximately 73 acres of surface disturbance (BLM 2010a). Typical activities required under an exploration program include construction of well pads and access roads, exploratory well drilling, well testing, and site reclamation.



*Energy Production* – The Caithness Dixie Valley Geothermal Power Plant is located at the northern end of the CIAA. The power plant was constructed in 1988 following exploration activities that began in the early 1980s. It produces 66 megawatts of electricity from a geothermal resource of 480 degrees Fahrenheit at depths from 7,875 feet to 10,000 feet below ground surface. Approximately 145 acres of surface disturbance have resulted from the power plant. The Coyote Canyon Geothermal Utilization Project, a reasonably foreseeable future action, includes well drilling and testing, construction of a geothermal power plant, and production of energy. Approximately 134 acres of surface disturbance would result from the project (BLM 2010b).

*Transportation Networks* – There are approximately 150 miles of existing paved, dirt, and gravel roads within the CIAA. If an average road width of 18 feet is assumed, the existing roads within the study area account for approximately 327 acres of disturbance. Reasonably foreseeable future actions include the maintenance and utilization of roads. These roads are not vegetated, have compacted soils, and do not provide habitat for plants or wildlife.

*Livestock Grazing and Ranching* – Past and present livestock grazing occurs within the CIAA. Three grazing allotments occur within the CIAA: Boyer Ranch, Dixie Valley, and Cow Canyon. Each of these allotments is managed by the BLM. Three ranch sites within the CIAA when combined account for approximately 85 acres of surface disturbance. Grazing within the three allotments and operations at the existing ranch sites are expected to continue in the reasonably foreseeable future.

*Miscellaneous Administrative Rights-Of-Way* – There are several administrative ROW authorizations within the CIAA. These ROWs include aggregate operations at mineral material sites, seismological stations, water research and monitoring wells, and Navy facilities. A BLM right-of-way planning corridor exists within Dixie Valley with the express purpose of providing an outlet for geothermal power to be produced in the valley (BLM 2008a). Currently, there is a transmission line within this corridor that provided an outlet for energy produced at the Caithness Dixie Valley Geothermal Power Plant. Reasonably foreseeable future actions include the continued utilization and maintenance of these existing rights-of-way.

*DoN Training Activities* – The DoN owns approximately 7,465 acres of land within the CIAA, which represents approximately 3.6 percent of the total area within the CIAA. The parcels are part of the Naval Air Station Fallon's Electronic Warfare Range and Supersonic Operating Area, and are used primarily for training activities. These activities are expected to continue in the reasonably foreseeable future.

*Dispersed Recreation* – Past and present dispersed recreation takes place within the CIAA and would be expected to continue in the reasonably foreseeable future. Recreation activities include target shooting, ATV use, and casual recreation.

## **4.2 CUMULATIVE IMPACTS TO AFFECTED RESOURCES**

The following subsections identify the cumulative impacts to visual resources, vegetation, migratory birds, wildlife, special status species, soils, and invasive, nonnative species. No long-term impacts were identified for land use authorizations, floodplains, cultural resources, Native American religious concerns, or geology and minerals in Chapter 3, and they have been eliminated from consideration in the cumulative impacts assessment. As discussed in Chapter 3, impacts to water quality and wetlands and riparian areas as a result of the Proposed Action are not anticipated. Implementation of BLM-recommended mitigation measures described in Section 3.2.5 would confirm that no impacts to these two resources occur. Accordingly, the Proposed Action would not contribute to the cumulative impacts on either of these resources and they are not considered in the following analysis.

### **4.2.1 Visual Resources**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past, present, and reasonably foreseeable future actions that have impacted visual resources within the CIAA include administrative rights-of-way, livestock grazing and ranching, transportation networks, the existing Caithness Dixie Valley Geothermal Power Plant, a transmission line, and geothermal exploration activities. Most of the impacts to visual resources are in the form of reduced or altered vegetation and landforms. Construction of more than 150 miles of road have disturbed approximately 327 acres of vegetation and ultimately resulted in permanent removal of vegetation within the constructed travel surface area. Additionally, transportation networks have inevitably resulted in mobilization and transportation of noxious weed seeds and invasive species seeds within the CIAA. The Caithness Geothermal Power Plant has impacted approximately 145 acres of vegetation, and geothermal exploration would be expected to impact vegetation in the reasonably foreseeable future, including approximately 146 acres of impact associated with the Coyote Canyon and Dixie Hope projects. Ranching has removed approximately 85 acres of vegetation cover within the CIAA, and livestock grazing has impacted an unquantifiable amount of vegetation. Several structures and associated lighting are located within the CIAA in connection with ranching and the power plant. Livestock grazing, right-of-way authorizations, and transportation networks have added linear features to the landscape in the form of fences, overhead transmission lines, and unpaved roads. Reasonably foreseeable geothermal exploration projects within the CIAA would introduce drill crews and equipment such as drill rigs into the existing landscape. Some of the equipment would include lighting.

*Cumulative Impacts from the Proposed Action:* The past, present, and reasonably foreseeable future actions within the CIAA, in combination with the Proposed Action, would result in potential impacts to visual resources. The Proposed Action would result in approximately 137 acres of surface disturbance, including 80 acres that are currently vegetated. This disturbance would be in combination with the surface disturbance described above as a result of past, present, and reasonably foreseeable future actions. Stockpiling of soil and construction of reserve pits would create alterations in the natural landforms. Drill rigs, drill crew living quarters, lighting, and other equipment would be visible from Dixie Valley Road, East Valley Road, Dempsey Lane, and other unnamed roads near the Lease Area.

Visual impacts associated with the project would be limited to the period of active construction and drilling through final reclamation. Concurrent reclamation, where possible, in the Project Area would reduce the intensity of the impact during this period. Because disturbed surfaces would be reclaimed and project equipment and personnel would be removed from the site following completion of the project, the Proposed Action would contribute only minimal impacts to visual resources. The treatment of noxious weed infestations (Tamarisk) within the project area would improve visual resources.

*Cumulative Impacts from the No Action Alternative:* The No Action Alternative would not result in exploration of potential geothermal resources within the Lease Area. However, the impacts anticipated from other reasonably foreseeable future actions described above would occur.

#### **4.2.2 Soils**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past, present, and reasonably foreseeable future actions that have impacted soils within the CIAA include geothermal exploration, the Caithness Geothermal Power Plant, livestock grazing, ranching, transportation networks, and dispersed recreation. Construction of other administrative rights-of-way in the CIAA, including overhead transmission lines, mineral material sites, seismological stations, and monitoring wells, have also resulted in disturbances to soils. Reasonably foreseeable future actions include the continuation of all these actions. The past, present, and reasonably foreseeable future actions have impacted, or would be expected to impact, soils through the disturbance and occasional excavation of soils within the CIAA during construction and to a lesser extent during maintenance of rights-of-way.

*Cumulative Impacts from the Proposed Action:* The Proposed Action (approximately 137 acres) would impact 0.07 percent of the CIAA (approximately 207,130 acres). The potential impacts from the Proposed Action would be minimized due to the implementation of environmental protection measures outlined in Section 2.1.9 and concurrent and final reclamation described in Section 2.1.8. As a result, a minimal incremental impact to soils in the CIAA is expected.

*Cumulative Impacts from the No Action Alternative:* Under the No Action Alternative, the approximately 137-acre impact to soils associated with the Proposed Action would not occur. The other present and reasonably foreseeable future actions in the CIAA would be expected to occur as described above and contribute to cumulative impacts to soils as described above.

### **4.2.3 Vegetation**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past, present, and reasonably foreseeable future actions that have impacted vegetation within the CIAA include geothermal exploration, the Caithness Geothermal Power Plant, livestock grazing, ranching, transportation networks, and dispersed recreation. The spread of Tamarisk, a noxious weed species, has altered vegetation within the CIAA. Construction of various administrative rights-of-way for overhead transmission lines, mineral material sites, seismological stations, and monitoring wells have also impacted vegetation. Reasonably foreseeable future actions include the continuation of all these actions. The past, present, and reasonably foreseeable future actions have impacted, or would be expected to impact, vegetation through the removal or alteration of the native vegetation cover within the CIAA during construction and to a lesser extent during maintenance. Construction of more than 150 miles of road have disturbed approximately 327 acres of vegetation and ultimately resulted in permanent removal of vegetation within the constructed travel surface area. Additionally, transportation networks have inevitably resulted in mobilization and transportation of noxious weed seeds and invasive species seeds within the CIAA. The Caithness Geothermal Power Plant has impacted approximately 145 acres of vegetation, and geothermal exploration would be expected to impact vegetation in the reasonably foreseeable future. Approximately 146 acres of impacts would result from the Coyote Canyon and Dixie Hope geothermal exploration projects. Ranching has removed approximately 85 acres of vegetation cover within the CIAA, and livestock grazing has impacted an unquantifiable amount of vegetation. Dispersed recreation has also likely impacted or reduced vegetation within the CIAA, primarily from overland travel.

*Cumulative Impacts from the Proposed Action:* Cumulatively, the past, present, and reasonably foreseeable future actions in combination with the Proposed Action would result in impacts to vegetation. The Proposed Action would result in up to approximately 137 acres of surface disturbance that represents direct impacts to vegetation cover. An impact of 137 acres represents approximately 0.07 percent of the 207,130-acre CIAA. Impacts to habitat would be temporary for the duration of construction through establishment of reclamation seeding. The potential impacts from the Proposed Action would be minimized due to the implementation of environmental protection measures outlined in Section 2.1.9 including the following BMPs: concurrent reclamation efforts; operator control; and removal of invasive, nonnative species and noxious weeds from project area. Even with other actions in the CIAA considered, including transportation networks, which have impacted approximately 327 acres, geothermal energy

production, which has impacted approximately 145 acres, and ranching, which has impacted approximately 85 acres, disturbance to 0.07 percent of the remaining habitat within the CIAA would be minimal.

*Cumulative Impacts from the No Action Alternative:* The disturbance to vegetation associated with the Proposed Action would not occur under the No Action Alternative. The other past, present, and reasonably foreseeable future actions within the CIAA would still occur and would be expected to impact vegetation as described above.

#### **4.2.4 Migratory Birds**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past, present, and reasonably foreseeable future actions that have impacted migratory birds within the CIAA include geothermal exploration, geothermal energy production and transmission, livestock grazing and ranching, transportation networks, and dispersed recreation. Miscellaneous administrative rights-of-way for mineral material sites, seismological stations, and monitoring wells have also impacted migratory birds. These actions have impacted migratory birds through the alteration or removal of nesting and/or foraging habitat within the CIAA. Additionally, transportation networks have inevitably resulted in injury and potentially death of migratory birds as a result of vehicle strikes.

Migratory birds have also likely suffered mortality from collisions with low flying military aircraft present within the CIAA during routine DoN training activities. Potential injury and death from vehicle and aircraft strikes are likely to continue into the reasonably foreseeable future. Overhead transmission lines associated with the Caithness Geothermal Energy Power Plant have provided some nesting and perching habitat for raptor species but simultaneously increased predation of small mammals, reptiles, and ground-nesting bird species. Dispersed recreation has also likely resulted in limited impacts to migratory bird habitat from overland travel. The Migratory Bird Treaty Act would protect birds and their nests from direct impacts resulting from reasonably foreseeable future actions within the CIAA, and migratory bird nesting surveys would be completed before these actions would be permitted to commence on public lands.

*Cumulative Impacts from the Proposed Action:* Cumulatively, the past, present, and reasonably foreseeable future actions in combination with the Proposed Action would result in potential impacts to migratory birds. The Proposed Action would result in up to approximately 137 acres of surface disturbance that represents direct impacts to migratory bird nesting and foraging habitat. Impacts to habitat would be temporary for the duration of construction through establishment of reclamation seeding. The 137-acre disturbance represents 0.07 percent of the total area within the CIAA. Even with other actions in the CIAA considered, including

transportation networks, which have impacted approximately 327 acres, geothermal energy production, which has impacted approximately 145 acres, and ranching, which has impacted approximately 85 acres, disturbance to 0.07 percent of the remaining habitat within the CIAA would be minimal.

Noise associated with the operation of drill rigs and associated equipment, as well as the increased presence of humans and human activity within the Project Area, would result in potential avoidance of the project vicinity by migratory birds. Like impacts to potential habitat, avoidance of potential foraging and nesting habitat in the project vicinity would also be temporary for the duration of the project. Implementation of the mitigation measures listed in Section 2.1.9 and compliance with the Lease Stipulations in Appendix A would further minimize impacts to migratory birds. These mitigation measures would also ensure that the Proposed Action does not impact nesting birds or nests. The Proposed Action would not contribute to the cumulative impacts on nesting birds or nests and add only small, incremental impacts to migratory bird nesting habitat.

*Cumulative Impacts from the No Action Alternative:* Under the No Action Alternative, the 137-acre disturbance to migratory bird habitat associated with the Proposed Action would not occur. Impacts associated with the increased human presence within the Project Area, as well as impacts associated with operation of the drill rigs, would not occur. The other past, present, and reasonably foreseeable future actions within the CIAA would still occur and would be expected to impact migratory birds as described above.

#### **4.2.5 Special Status Species and Wildlife and Key Habitat**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past and present actions that have impacted wildlife and wildlife habitat, including special status species, within the CIAA include livestock grazing, ranching, geothermal exploration and energy production, transportation networks, DoN training activities, and dispersed recreation. The construction of roads in the CIAA has impacted approximately 327 acres of wildlife habitat. Utilization of the roads has also inevitably resulted in injury and potentially death of wildlife as a result of vehicle strikes. Other miscellaneous rights-of-way within the CIAA have also impacted wildlife habitat. Perhaps most notable is an overhead transmission line, which like roads has resulted in some fragmentation of wildlife habitat. The transmission line has also provided some nesting and perching habitat for raptor species but simultaneously increased predation of small mammals, reptiles, and ground-nesting bird species. Low-level aircraft flown during training activities performed by the DoN has generated some noise that potentially displaces wildlife from areas of CIAA. Birds have likely suffered mortality from colliding with DoN aircraft during these activities. In addition to impacting approximately 145 acres of habitat, the Caithness Geothermal Power Plant has also resulted in increased human presence and activity which has likely displaced wildlife use

surrounding the plant. Geothermal exploration would be anticipated to temporarily displace wildlife during drilling and temporarily impact habitat for the duration of exploration and reclamation. Reasonably foreseeable future actions include the continuation of the past and present actions, and therefore the impact identified above would be anticipated to continue.

*Cumulative Impacts from the Proposed Action:* Cumulatively, the past, present, and reasonably foreseeable future actions in combination with the Proposed Action would result in potential impacts to wildlife or wildlife habitat, including special status species. The Proposed Action would result in up to approximately 137 acres of surface disturbance that represents direct impacts to wildlife habitat. Approximately 80 acres of this impact would occur outside of the playa. Habitat quality is generally poorer within the playa area due to the absence of vegetation. Regardless, the total impact would be minimal considering there would be approximately 21,882 acres of habitat within the Lease Area that would not be affected by surface disturbance resulting from the Proposed Action. Impacts would also be temporary for the duration of construction and drilling through establishment of reclamation vegetation. As required by stipulations attached to the leases, reclamation of all disturbances in the Lease Area would be performed within two years of completing exploration drilling unless a developable resource is identified. If such a resource is identified, any proposed further development of the resource would be subject to additional environmental review.

Noise associated with the operation of drill rigs and associated equipment, as well as the increased presence of humans and human activity within the Project Area, would result in potential displacement of wildlife within the Project Area and nearby vicinity. This displacement would be in conjunction with displacement resulting from noise generated by aircraft used during DoN training activities and nearby geothermal exploration in the CIAA. Displacement resulting from noise, human presence, and general disturbances related to the project would also be temporary for the duration of construction and drilling. The lease stipulations (Appendix A) and the environmental protection measures listed in Section 2.1.9 would further minimize impacts to wildlife. As a result, the Proposed Action would have minimal and temporary cumulative impacts to wildlife resources, including special status species.

*Cumulative Impacts from the No Action Alternative:* Implementation of the No Action Alternative would result in no additional impacts to wildlife habitat or wildlife individuals, including special status species. The No Action Alternative would not contribute to the cumulative impacts to wildlife that have resulted or would result from the past, present, and reasonably foreseeable future actions within the CIAA, as described above.

#### **4.2.6 Invasive, Nonnative Species**

*Past, Present, and Reasonably Foreseeable Future Actions:* Past and present actions with impacts affecting invasive, nonnative species (and noxious weeds) have included geothermal exploration, geothermal energy production and transmission, livestock grazing and ranching, transportation networks, construction of various administrative ROWs, and dispersed recreation. These actions would have resulted in removal of established vegetation and exposure of soils, which is conducive to the spread and establishment of invasive and nonnative species. Transportation networks have impacted approximately 327 acres within the CIAA through the construction and maintenance of approximately 150 miles of roads. During construction of these roads, the conditions caused by the grading and excavation would have left the areas susceptible to establishment of nonnative, invasive species, such as cheatgrass. Surveys located tamarisk, a noxious weed species, at isolated locations within the Project Area. These plants would be treated prior to any disturbance commencing within the project area. Invasive, nonnative halogeton and cheatgrass are also present in the project area. Noxious weeds, especially tamarisk, and invasive, nonnative species are located elsewhere in the CIAA, including dense infestations near the project area.

*Cumulative Impacts from the Proposed Action:* Cumulatively, the past, present, and reasonably foreseeable future actions in combination with the Proposed Action would result in potential impacts from invasive, nonnative species that would be limited to infestations following removal or disturbance of vegetation. The Proposed Action (approximately 137 acres) would impact 0.07 percent of the CESA (approximately 207,130 acres). This would be in addition to impacts from other actions in the CESA, including transportation networks which have impacted approximately 327 acres, geothermal energy production which has impacted approximately 145 acres, and ranching which has impacted approximately 85 acres. The potential impacts from the Proposed Action would be minimized due to the implementation of environmental protection measures outlined in Section 2.1.9 and the Noxious Weed Management Plan (Appendix B). As a result, the Proposed Action is not anticipated to contribute an incremental impact to invasive, nonnative species in the CESA.

*Cumulative Impacts from the No Action Alternative:* Cumulatively, the past, present, and reasonably foreseeable future actions would result in potential impacts from invasive, nonnative species that would be limited to infestations following removal of vegetation. These impacts would be localized. The No Action Alternative would not result in removal of vegetation or disturbance of surface soils. Therefore, potential adverse impacts associated with established or spread of invasive and nonnative species as a result of this alternative would not occur. The Proposed Action would include removing existing noxious weeds from within the Project Area, which would be a positive impact. This positive impact would not occur under the No Action Alternative.



## 5.0 CONSULTATION AND COORDINATION

### 5.1 PUBLIC INVOLVEMENT

Comments were accepted on the Environmental Assessment, Ormat Technologies, Inc., Dixie Meadows Geothermal Exploration Project, DOI-BLM-NV-C0110-2011-0516 EA, for a 30-day period from October 25, 2011, until November 25, 2011, although, comments received in a timely manner after the date were also considered. Hard copies of the EA were available at the Carson City District Office.

Comments were received from the Nevada Department of Wildlife, Nevada Division of State Lands and State Lands Use Planning Agency, Nevada State Historic Preservation Office, Nevada Department of Transportation and Naval Air Station Fallon, Nevada. All comments were reviewed, considered and minor changes were made to the content of the Final EA.

The Final EA is posted at:

[http://www.blm.gov/nv/st/en/fo/carson\\_city\\_field/blm\\_information/nepa.html](http://www.blm.gov/nv/st/en/fo/carson_city_field/blm_information/nepa.html) (note: click the "for completed projects click here" link on the posting website to be redirected to the Final EA).

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The following tribes, individuals, organizations, and agencies were contacted during the preparation of this document:

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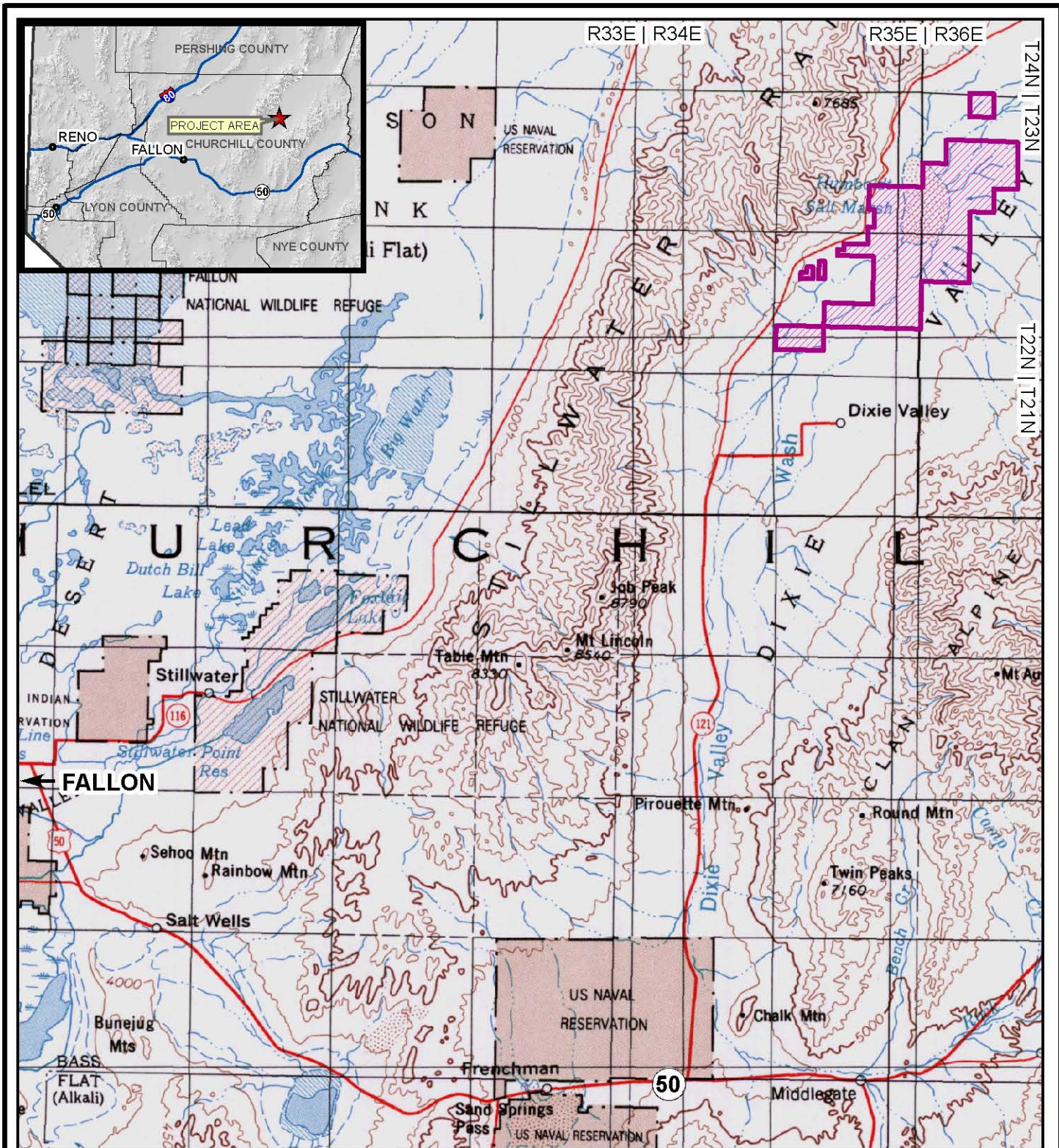
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- U.S. Fish and Wildlife Service. 2010c. Nevada Fish and Wildlife Office: Lahontan cutthroat trout (*Oncorhynchus clarkii henshawii*). Retrieved on August 3, 2011, from: [http://www.fws.gov/nevada/protected\\_species/fish/species/lct.html](http://www.fws.gov/nevada/protected_species/fish/species/lct.html)
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## **FIGURES**

---



**FIGURE 1**  
 PROJECT LOCATION MAP  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

 LEASE AREA



1" = 6 MILES

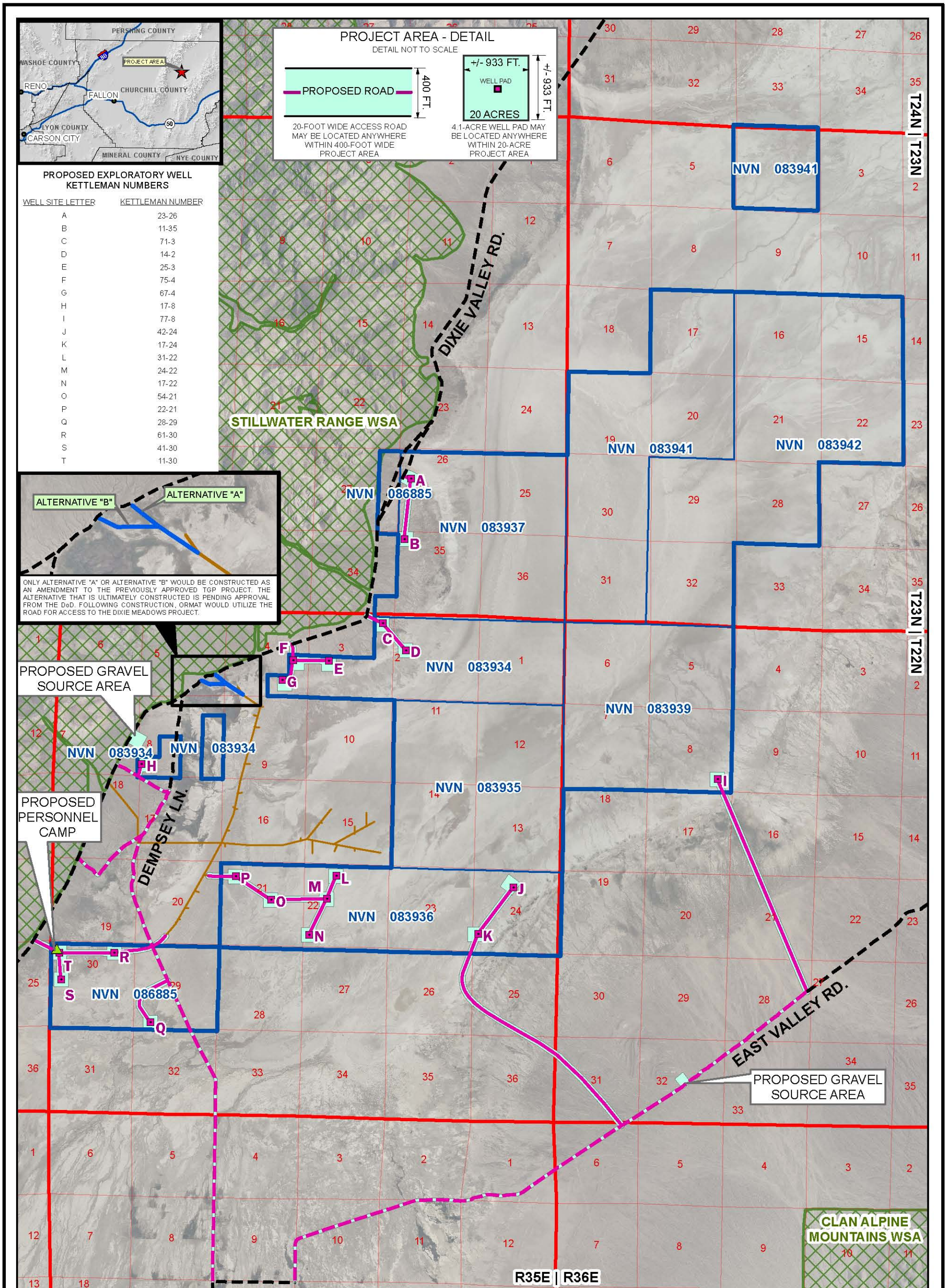
U.S. DEPARTMENT OF THE INTERIOR  
 BUREAU OF LAND MANAGEMENT  
 CARSON CITY DISTRICT  
 STILLWATER FIELD OFFICE  
 5665 MORGAN MILL ROAD  
 CARSON CITY, NV 89701



MAY 24, 2011

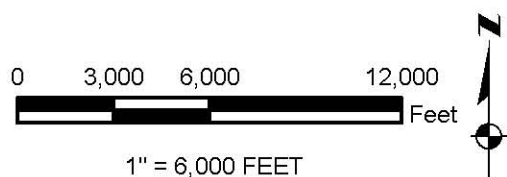
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA.





**FIGURE 2**  
**PROPOSED ACTION - PROJECT AND LEASE AREAS**

ORMAT DIXIE MEADOWS  
GEOTHERMAL EXPLORATION PROJECT



- PROPOSED EXPLORATORY WELL SITE
- EXISTING ROAD PROPOSED FOR ACCESS
- PROPOSED ACCESS ROAD
- ▲ PROPOSED PERSONNEL CAMP
- PROJECT AREA
- LEASE AREA AND LEASE NUMBERS
- ACCESS ROAD - AMENDMENT TO DIXIE HOPE PROJECT
- DIXIE HOPE APPROVED ACCESS ROUTES
- EXISTING ROADS
- WILDERNESS STUDY AREA

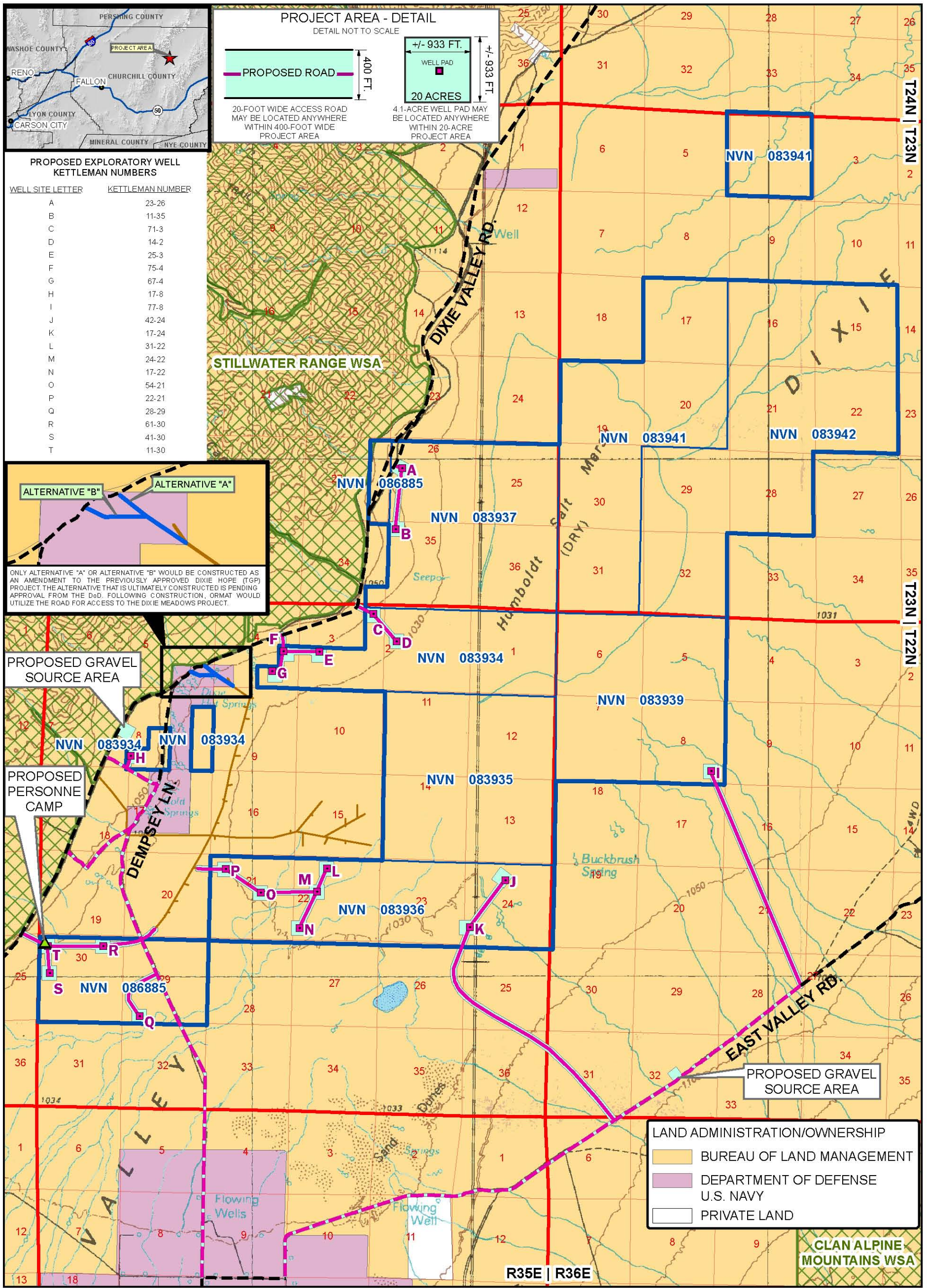
U.S. DEPARTMENT OF THE INTERIOR  
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CARSON CITY DISTRICT  
STILLWATER FIELD OFFICE  
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CARSON CITY, NV 89701



SEPTEMBER 12, 2011

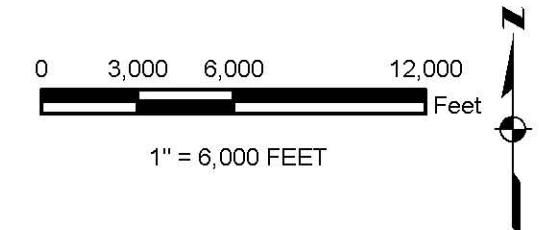
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**FIGURE 3**  
LAND ADMINISTRATION

ORMAT DIXIE MEADOWS  
GEOTHERMAL EXPLORATION PROJECT



- PROPOSED EXPLORATORY WELL SITE
- EXISTING ROAD PROPOSED FOR ACCESS
- PROPOSED ACCESS ROAD
- ▲ PROPOSED PERSONNEL CAMP
- PROJECT AREA
- LEASE AREA AND LEASE NUMBERS
- ACCESS ROAD - AMENDMENT TO DIXIE HOPE PROJECT
- DIXIE HOPE APPROVED ACCESS ROUTES
- EXISTING ROADS
- WILDERNESS STUDY AREA
- OPEN WATER
- TOWNSHIP AND RANGE

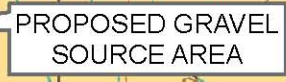
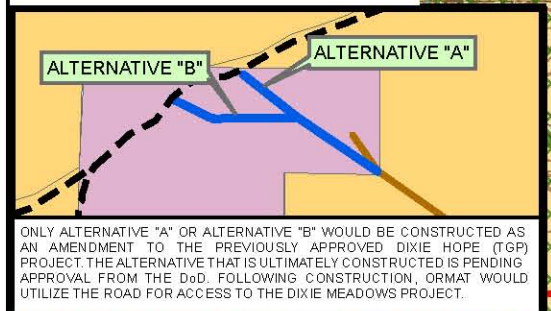
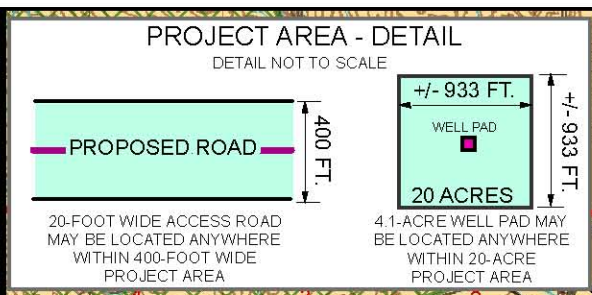
U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CARSON CITY DISTRICT  
STILLWATER FIELD OFFICE  
5665 MORGAN MILL ROAD  
CARSON CITY, NV 89701



SEPTEMBER 12, 2011  
NO WARRANTY IS MADE BY THE BUREAU OF LAND MANAGEMENT AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA.

**PROPOSED EXPLORATORY WELL KETTLEMAN NUMBERS**

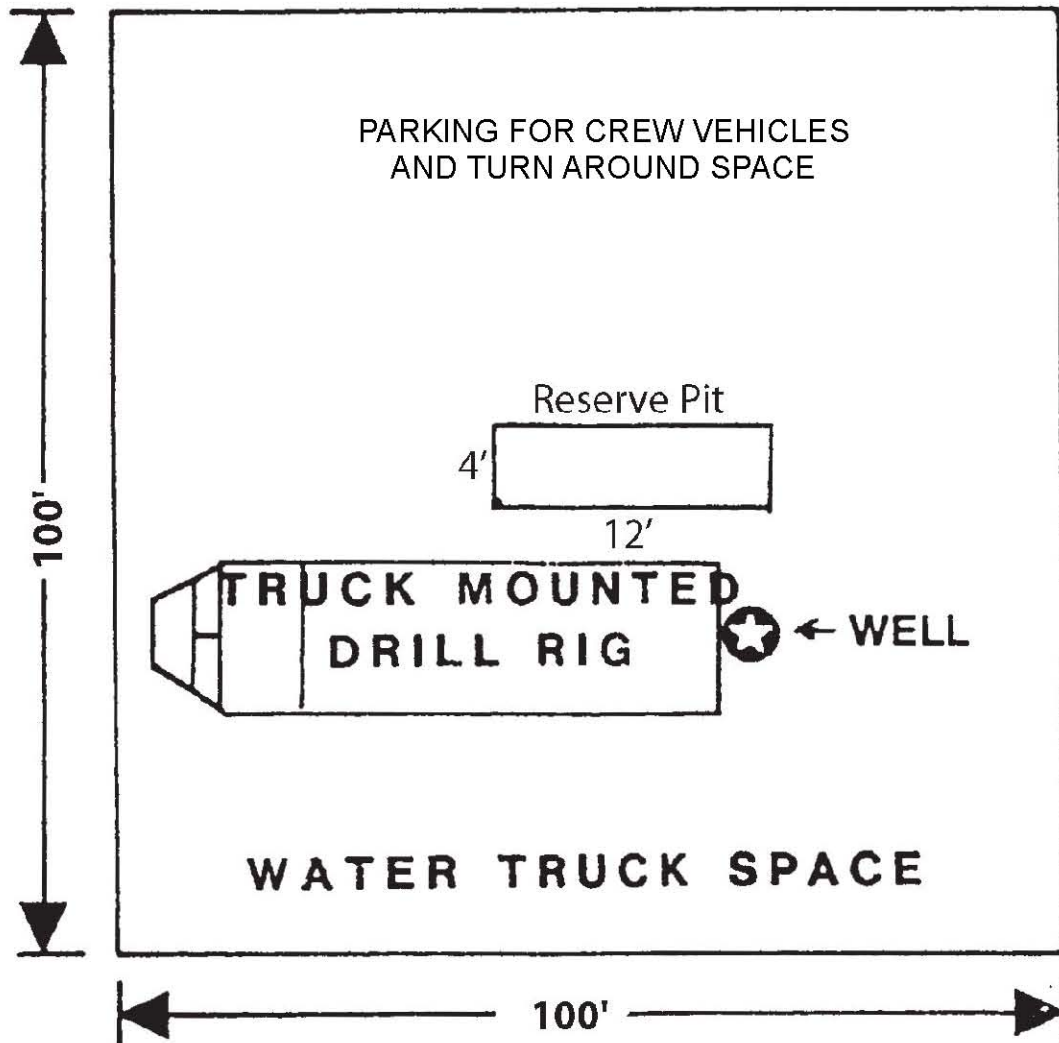
WELL SITE LETTER	KETTLEMAN NUMBER
A	23-26
B	11-35
C	71-3
D	14-2
E	25-3
F	75-4
G	67-4
H	17-8
I	77-8
J	42-24
K	17-24
L	31-22
M	24-22
N	17-22
O	54-21
P	22-21
Q	28-29
R	61-30
S	41-30
T	11-30



**LAND ADMINISTRATION/OWNERSHIP**

■	BUREAU OF LAND MANAGEMENT
■	DEPARTMENT OF DEFENSE U.S. NAVY
■	PRIVATE LAND





**FIGURE 4**  
 TEMPERATURE GRADIENT WELL PAD LAYOUT (TYPICAL)  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

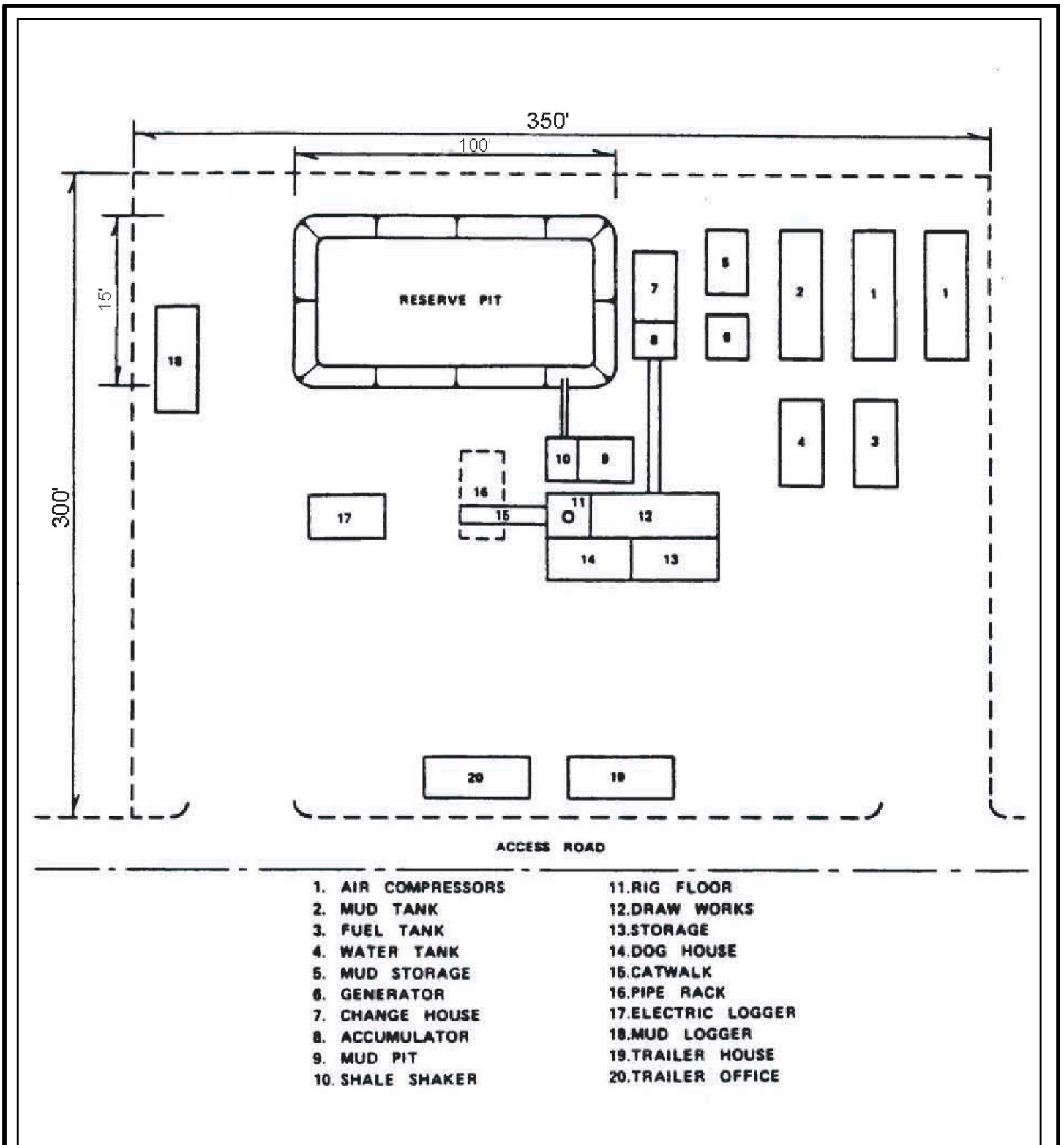
NOT TO SCALE

U.S. DEPARTMENT OF THE INTERIOR  
 BUREAU OF LAND MANAGEMENT  
 CARSON CITY DISTRICT  
 STILLWATER FIELD OFFICE  
 5665 MORGAN MILL ROAD  
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**FIGURE 5**  
OBSERVATION WELL PAD LAYOUT (TYPICAL)  
ORMAT DIXIE MEADOWS  
GEOTHERMAL EXPLORATION PROJECT

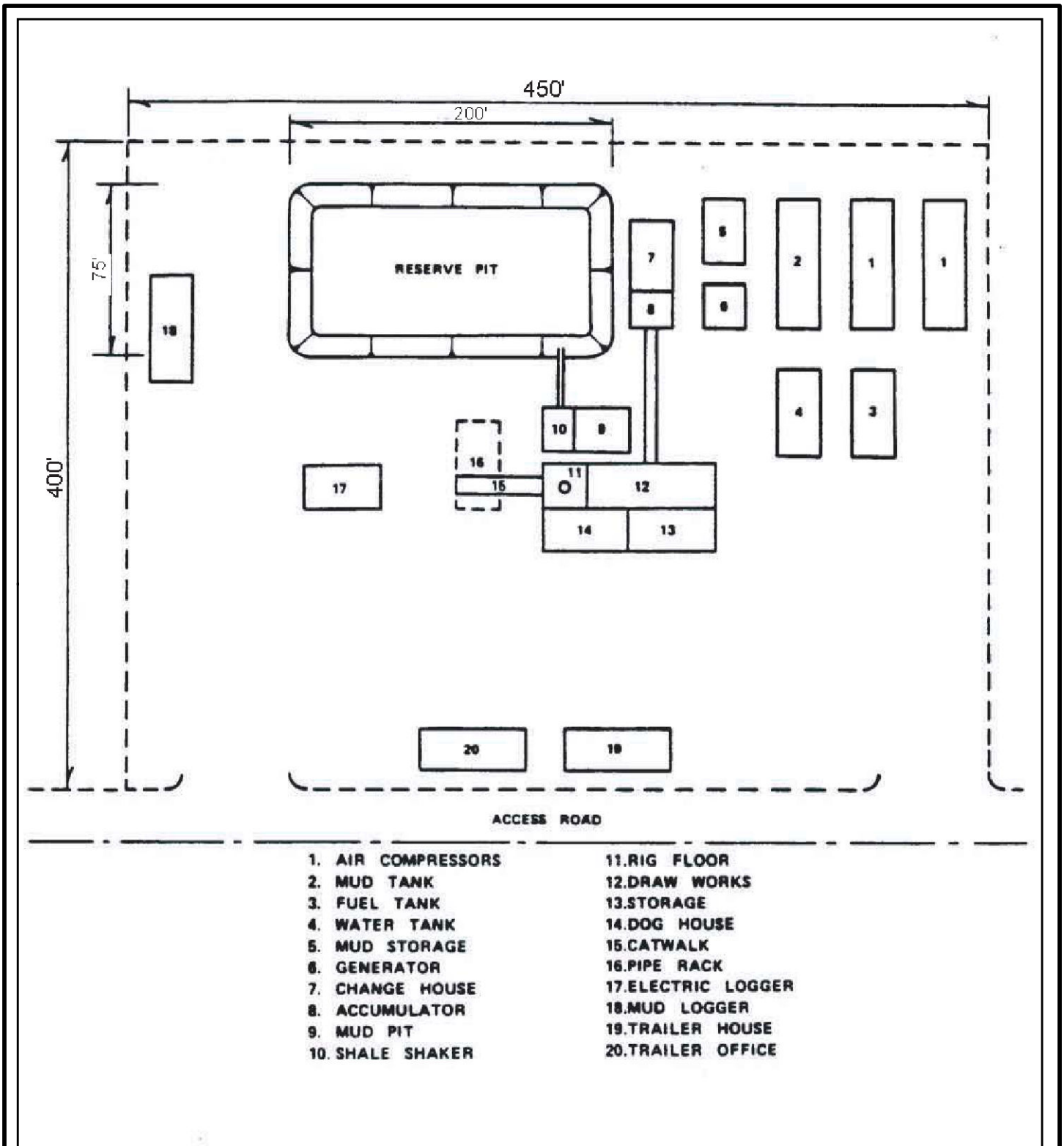
NOT TO SCALE

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**FIGURE 6**  
 PRODUCTION WELL PAD LAYOUT (TYPICAL)  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

NOT TO SCALE

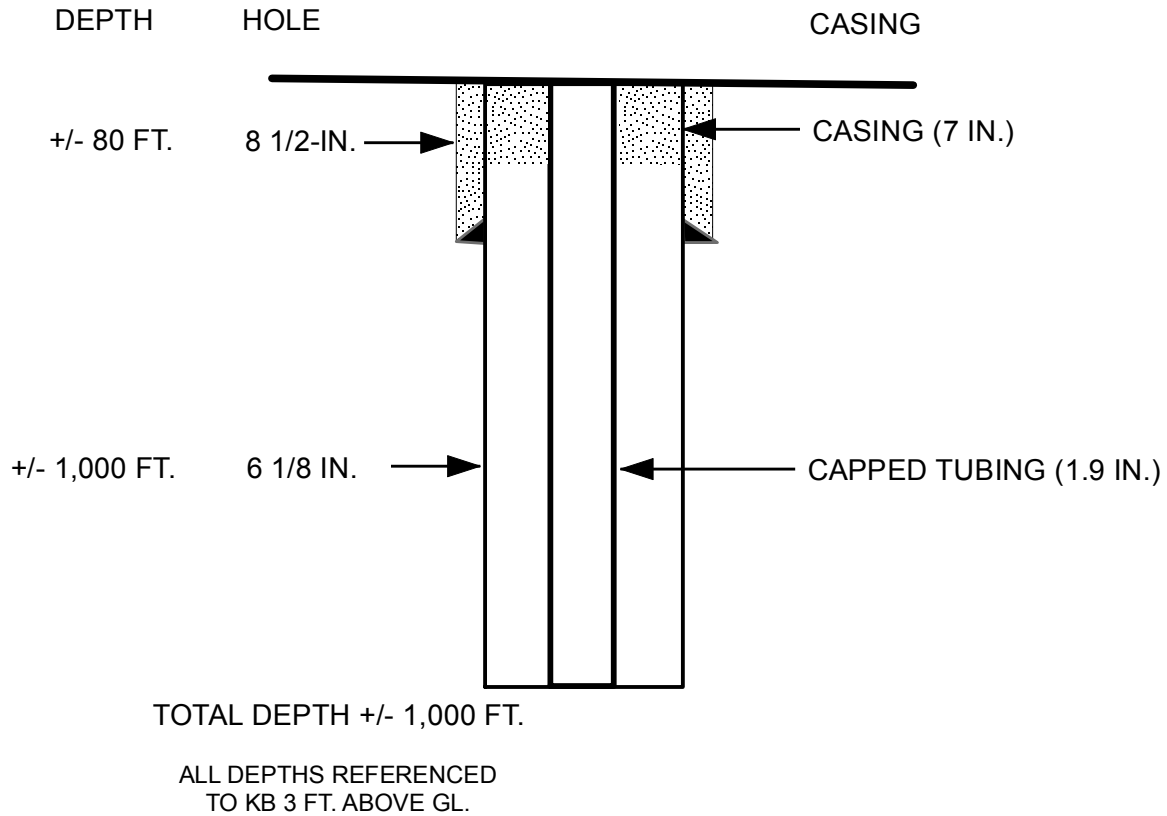
U.S. DEPARTMENT OF THE INTERIOR  
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## TYPICAL TEMPERATURE GRADIENT WELL



### FIGURE 7

TEMPERATURE GRADIENT WELL CROSS-SECTION (TYPICAL)

ORMAT DIXIE MEADOWS  
GEOTHERMAL EXPLORATION PROJECT

NOT TO SCALE

U.S. DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CARSON CITY DISTRICT  
STILLWATER FIELD OFFICE  
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CARSON CITY, NV 89701

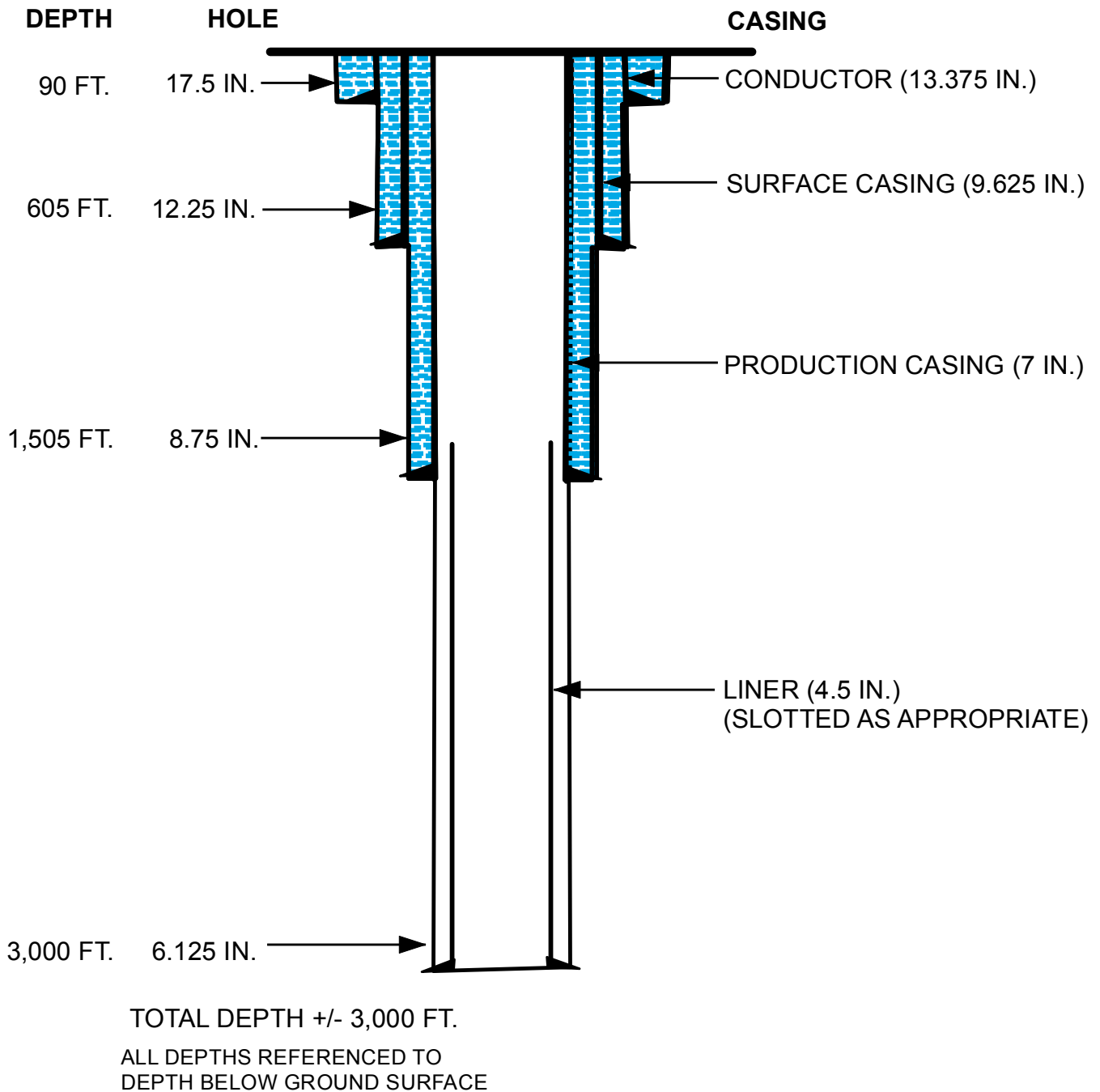


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AS TO THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THESE  
DATA FOR INDIVIDUAL USE OR AGGREGATE USE WITH OTHER DATA.



## TYPICAL OBSERVATION WELL



**FIGURE 8**  
 OBSERVATION WELL CROSS-SECTION (TYPICAL)  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

NOT TO SCALE

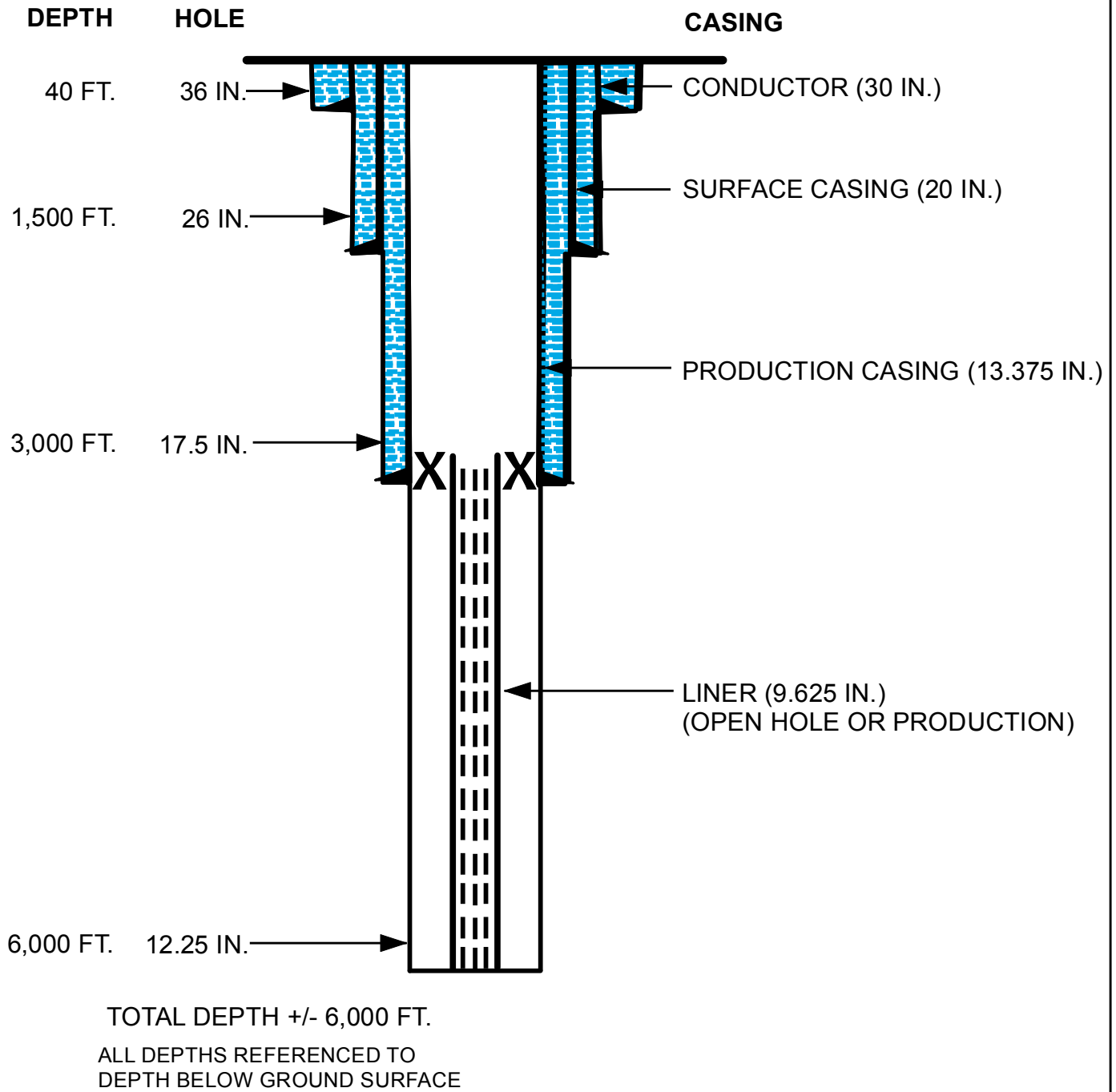
U.S. DEPARTMENT OF THE INTERIOR  
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## TYPICAL PRODUCTION WELL



**FIGURE 9**  
 PRODUCTION WELL CROSS-SECTION (TYPICAL)  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

NOT TO SCALE

U.S. DEPARTMENT OF THE INTERIOR  
 BUREAU OF LAND MANAGEMENT  
 CARSON CITY DISTRICT  
 STILLWATER FIELD OFFICE  
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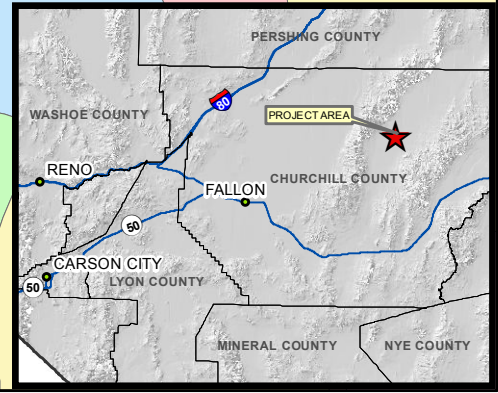
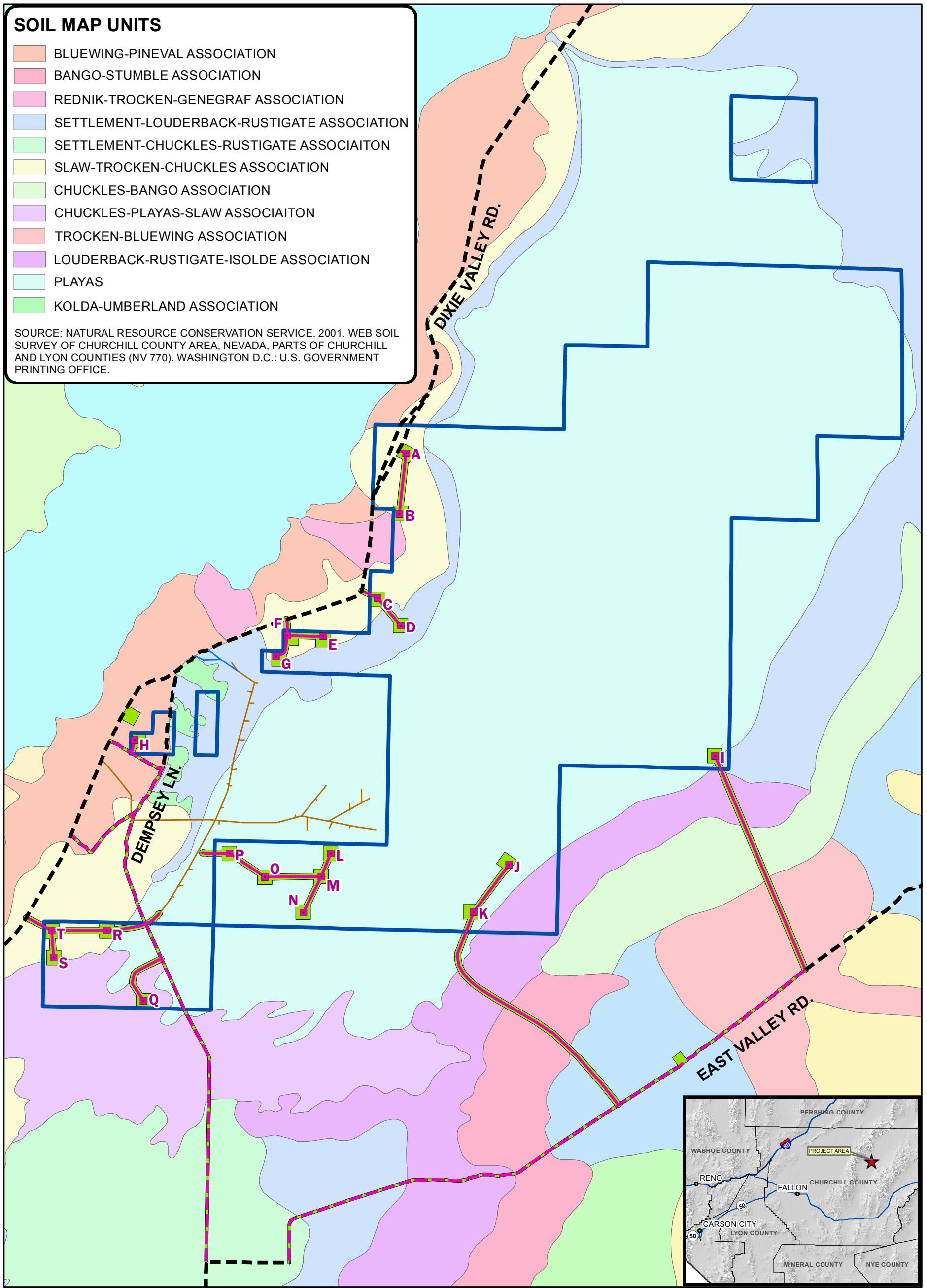
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**SOIL MAP UNITS**

- BLUEWING-PINEVAL ASSOCIATION
- BANGO-STUMBLE ASSOCIATION
- REDNIK-TROCKEN-GENEGRAF ASSOCIATION
- SETTLEMENT-LOUDERBACK-RUSTIGATE ASSOCIATION
- SETTLEMENT-CHUCKLES-RUSTIGATE ASSOCIATION
- SLAW-TROCKEN-CHUCKLES ASSOCIATION
- CHUCKLES-BANGO ASSOCIATION
- CHUCKLES-PLAYAS-SLAW ASSOCIATION
- TROCKEN-BLUEWING ASSOCIATION
- LOUDERBACK-RUSTIGATE-ISOLDE ASSOCIATION
- PLAYAS
- KOLDA-UMBERLAND ASSOCIATION

SOURCE: NATURAL RESOURCE CONSERVATION SERVICE. 2001. WEB SOIL SURVEY OF CHURCHILL COUNTY AREA, NEVADA, PARTS OF CHURCHILL AND LYON COUNTIES (NV 770). WASHINGTON D.C.: U.S. GOVERNMENT PRINTING OFFICE.



**FIGURE 10**  
SOILS MAP

ORMAT DIXIE MEADOWS  
GEOTHERMAL EXPLORATION PROJECT

0 3,000 6,000 12,000  
Feet

1" = 6,000 FEET



- PROPOSED EXPLORATORY WELL SITE
- EXISTING ROAD PROPOSED FOR ACCESS
- PROPOSED ACCESS ROAD
- PROJECT AREA
- LEASE AREA
- ACCESS ROAD - AMENDMENT TO DIXIE HOPE PROJECT
- DIXIE HOPE APPROVED ACCESS ROUTES
- EXISTING ROADS

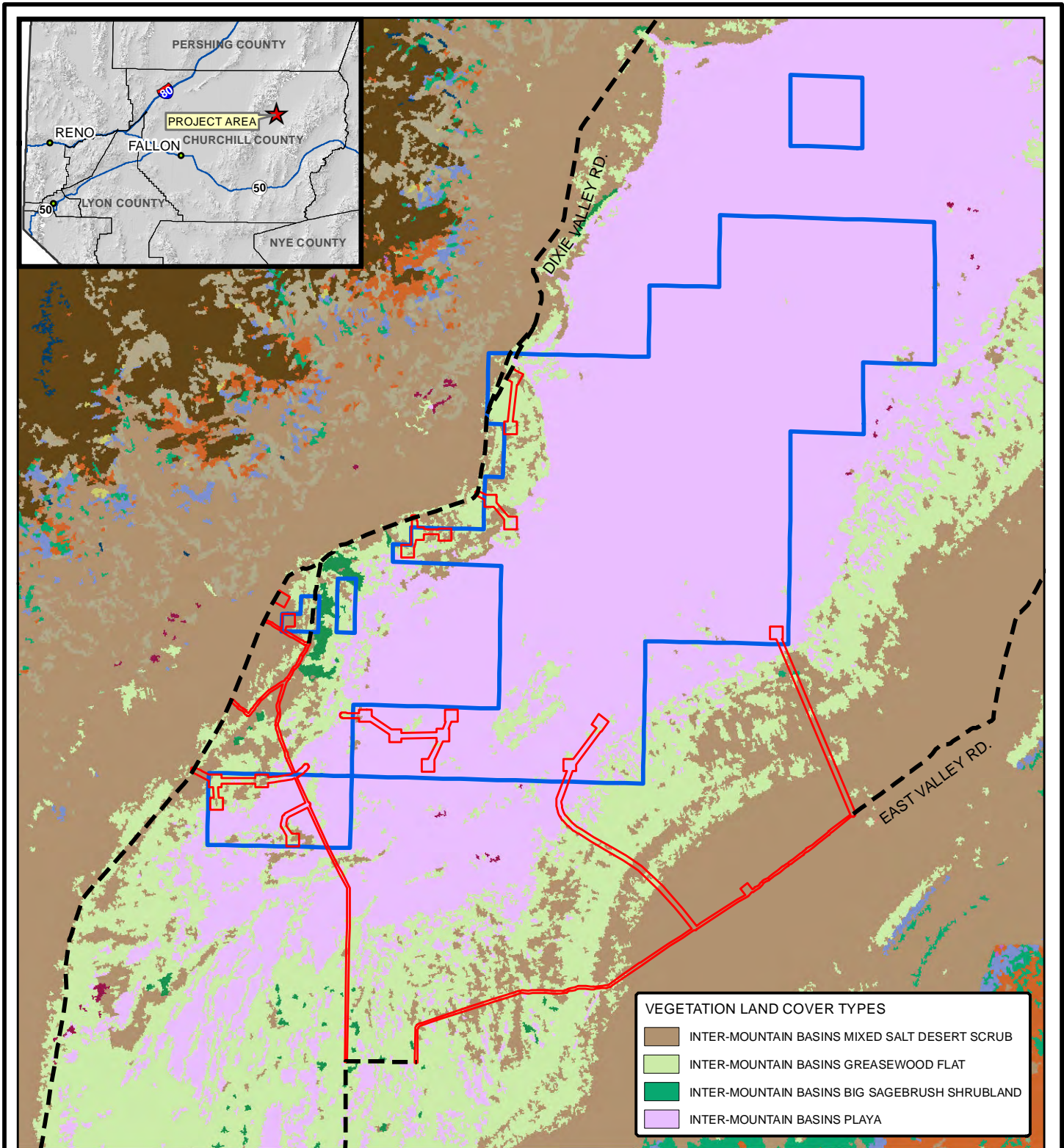
U.S. DEPARTMENT OF THE INTERIOR  
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CARSON CITY, NV 89701



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**FIGURE 11**  
 VEGETATION LAND COVER TYPES  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

PROJECT AREA  
 LEASE AREA



1" = 2 MILES  
 0 1 2 4 Miles

VEGETATION LAND COVER TYPES	
	INTER-MOUNTAIN BASINS MIXED SALT DESERT SCRUB
	INTER-MOUNTAIN BASINS GREASEWOOD FLAT
	INTER-MOUNTAIN BASINS BIG SAGEBRUSH SHRUBLAND
	INTER-MOUNTAIN BASINS PLAYA

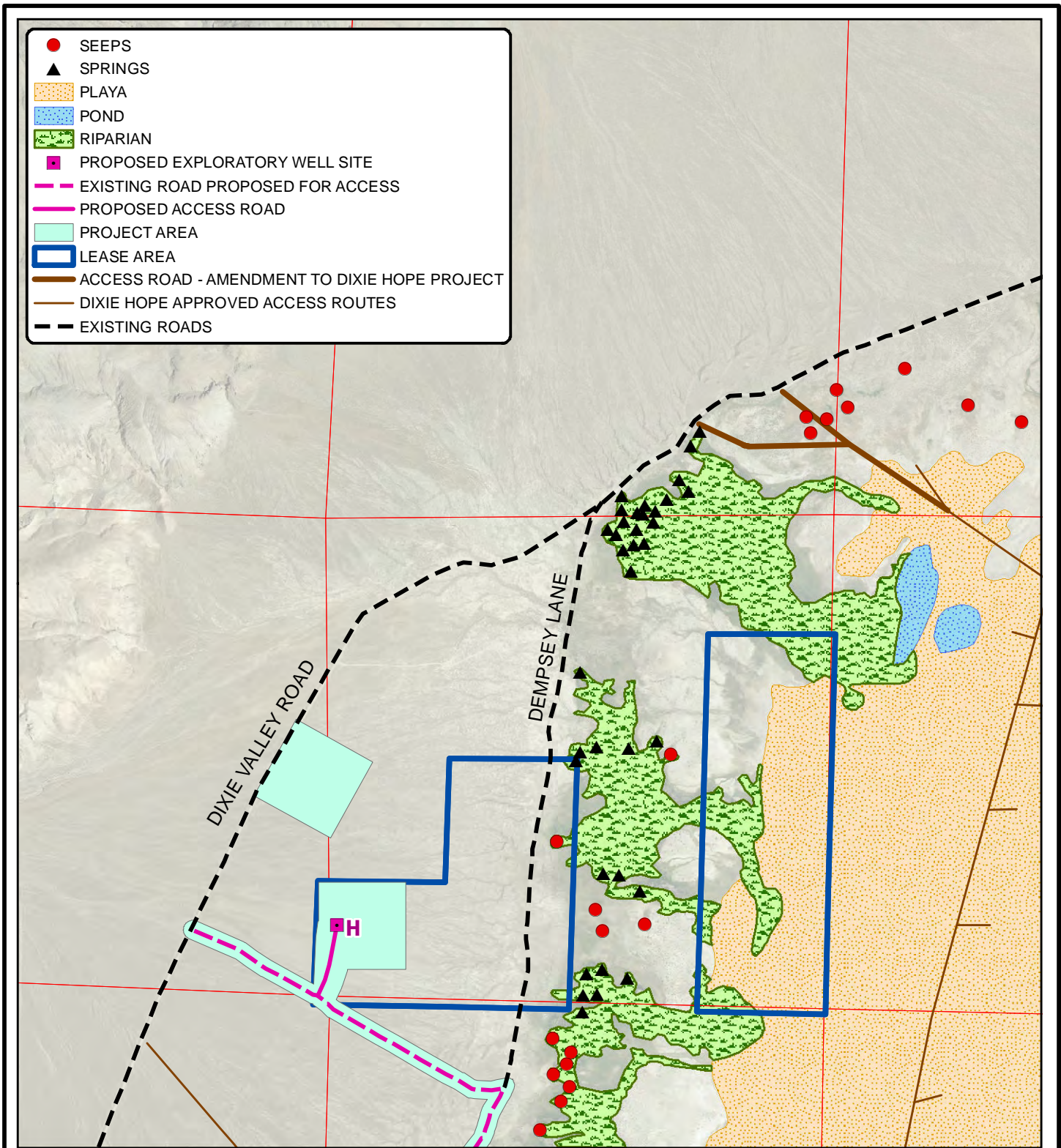
U.S. DEPARTMENT OF THE INTERIOR  
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 CARSON CITY DISTRICT  
 STILLWATER FIELD OFFICE  
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 CARSON CITY, NV 89701



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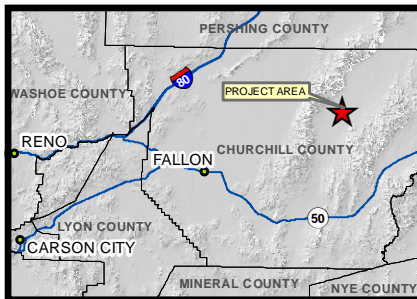
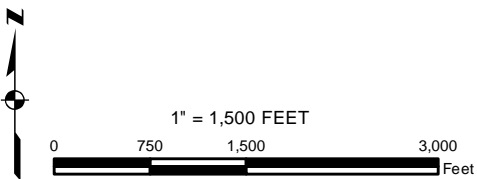
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- SEEPS
- ▲ SPRINGS
- ▨ PLAYA
- ▨ POND
- ▨ RIPARIAN
- PROPOSED EXPLORATORY WELL SITE
- - - EXISTING ROAD PROPOSED FOR ACCESS
- PROPOSED ACCESS ROAD
- ▨ PROJECT AREA
- ▭ LEASE AREA
- ACCESS ROAD - AMENDMENT TO DIXIE HOPE PROJECT
- DIXIE HOPE APPROVED ACCESS ROUTES
- - - EXISTING ROADS

**FIGURE 12**  
 DIXIE HOT SPRINGS AND NEARBY SEEPS  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT



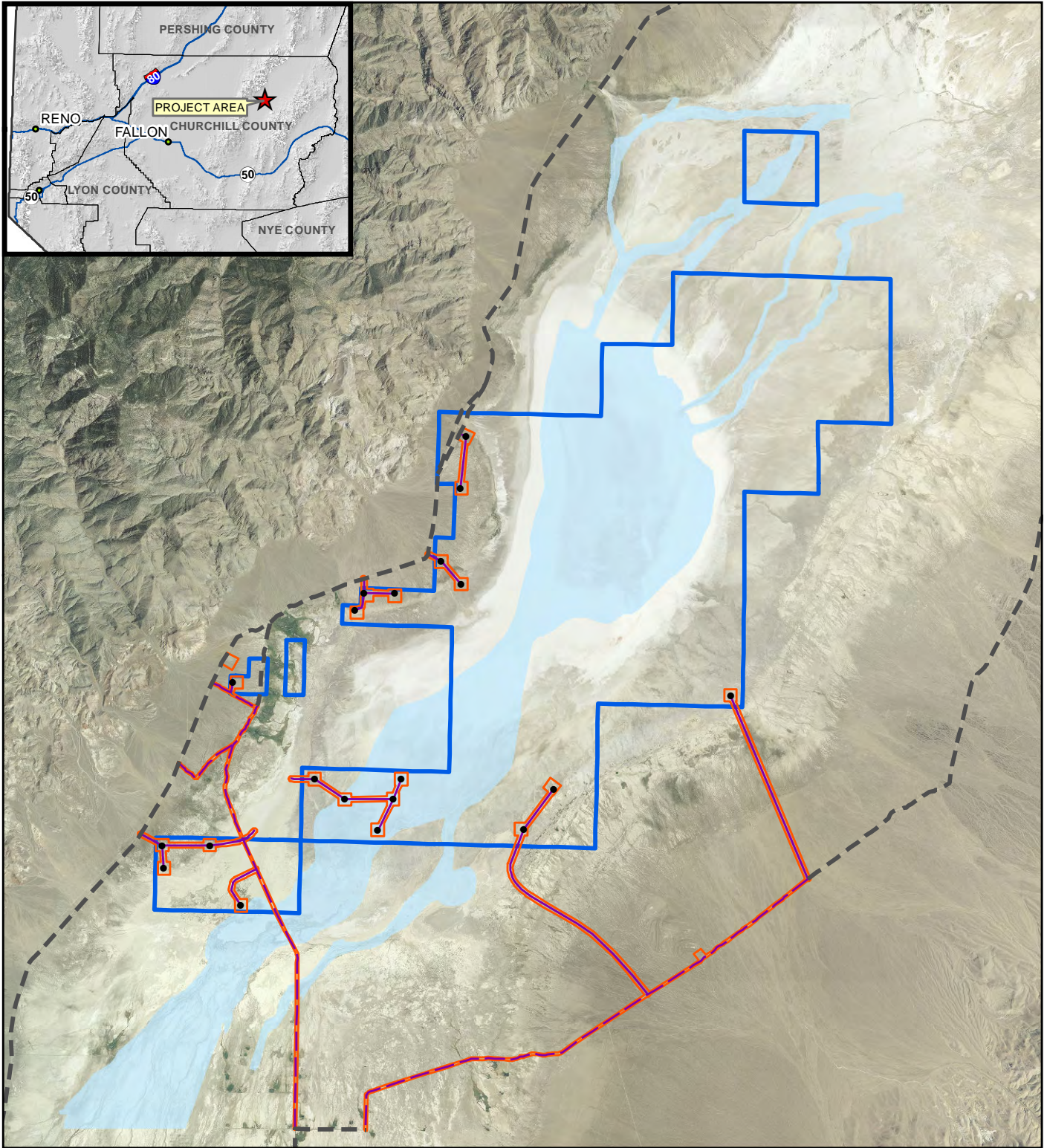
U.S. DEPARTMENT OF THE INTERIOR  
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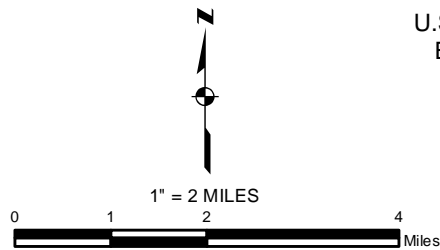
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**FIGURE 13**  
 100-YEAR FLOODPLAIN MAP  
 ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

- 100-YEAR FLOODPLAIN
- PROJECT AREA
- LEASE AREA
- PROPOSED EXPLORATORY WELL SITE
- EXISTING ROAD PROPOSED FOR ACCESS
- PROPOSED ACCESS ROAD
- EXISTING ROADS



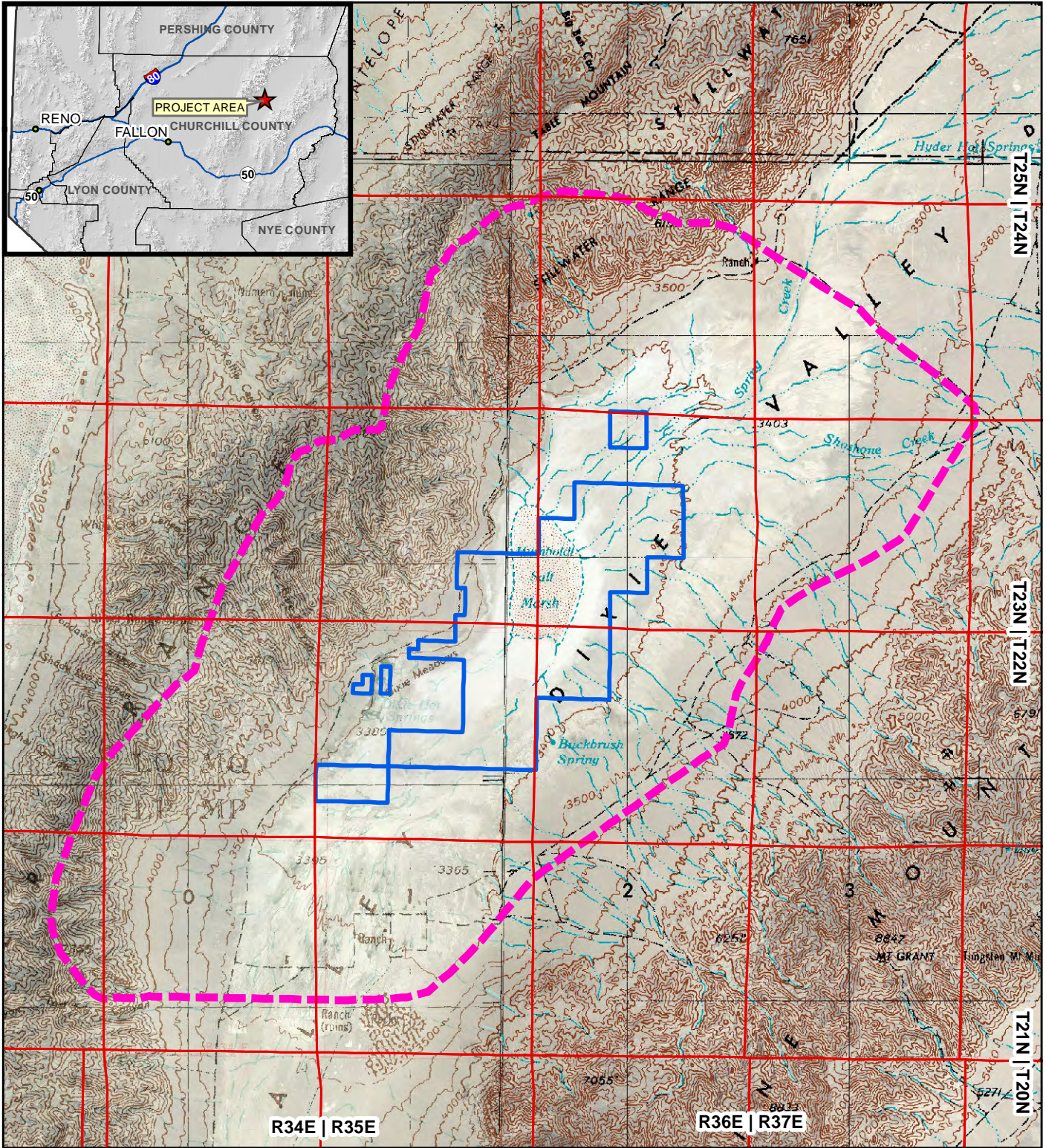
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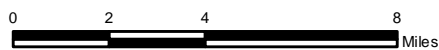
**FIGURE 14**  
 CUMULATIVE IMPACTS ASSESSMENT AREA

ORMAT DIXIE MEADOWS  
 GEOTHERMAL EXPLORATION PROJECT

-  CUMULATIVE IMPACTS ASSESSMENT AREA
-  LEASE AREA
-  TOWNSHIP AND RANGE



1" = 4 MILES



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## **APPENDIX A**

---

# **Geothermal Leases and Stipulations**



Form 3200-24a  
May 2007

United States  
Department of the Interior  
Bureau of Land Management

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083934

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name ORMAT NEVADA INC  
Street 6225 NEIL RD  
City, State, Zip Code RENO, NV 89511

Future rental payments must be made on or before the anniversary date to: Minerals Management Service Royalty Management Program P.O. Box 5640 Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. R. Meridian State County

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T. 0220N R. 0350E Meridian MDM State NV County Churchill  
Sec. 001 LOTS 1-4;  
001 S2N2,S2;  
002 LOTS 1-4;  
002 S2N2,S2;  
003 LOTS 1;  
003 SENE,S2;  
004 E2SE,SWSE;  
008 SENE,E2SW,SWSW,E2SE;  
Total acres in lease 2038.320  
Rental Retained \$ 4078.00

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

Acting

Comments

THE UNITED STATES OF AMERICA

BY Elaine M. Larcus

(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION

SEP 10 2007

(Title)

(Date)

EFFECTIVE DATE OF LEASE OCT 01 2007

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION**—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004  
THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV

Date of Sale 8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____ <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-009</u> Name of Known Geothermal Resource Area (KGRA) _____	<u>\$407,800<sup>00</sup></u>	<u>\$81,560<sup>00</sup></u>

The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

Print or Type Name of Lessee

Signature of Lessee or Bidder

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1544213

<b>Transaction #:</b> 1595603	
<b>Date of Transaction:</b> 08/14/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NELL RD #300 RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	GEOHERMAL / COMPETITIVE / PROCESSING FEE (5104) CASES: NVN 083934/\$130.00		- n/a -	130.00
2	1.00	GEOHERMAL / COMPETITIVE / ADVANCE LEASE RENTAL (450) CASES: NVN 083934/\$4078.00		- n/a -	4078.00
3	1.00	GEOHERMAL / COMPETITIVE / BONUS BID (450) CASES: NVN 083934/\$81560.00		- n/a -	81560.00
<b>TOTAL:</b>					<b>\$85,768.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$85,768.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/14/2007
	CHECK NO:	044922	
	NAME:	ORMAT NEVADA INC 6225 NELL RD #300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



United States  
Department of the Interior  
Bureau of Land Management

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083935

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name **ORMAT NEVADA INC**  
Street **6225 NEIL RD**  
City, State, Zip Code **RENO, NV 89511**

Future rental payments must be made on or before the anniversary date to:  
Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T. **0220N** R. **0350E** Meridian **MDM** State **NV** County **Churchill**  
Sec. **011 ALL;**  
**012 ALL;**  
**013 ALL;**  
**014 ALL;**

Total acres in lease 2560.000

Rental Retained \$ 5120.00

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

**Acting**

Comments

THE UNITED STATES OF AMERICA

BY Elaine M. Lewis

(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION

**SEP 10 2007**

(Title)

(Date)

EFFECTIVE DATE OF LEASE **OCT 01 2007**

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION \_\_\_\_\_

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION**—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV

Date of Sale  
8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____  <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-010</u> Name of Known Geothermal Resource Area (KGRA) _____	\$ 204,800 <sup>00</sup>	\$ 40,960 <sup>00</sup>

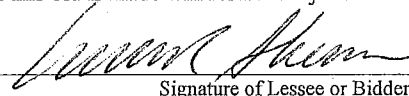
The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

  
Signature of Lessee or Bidder

Print or Type Name of Lessee

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1557015

<b>Transaction #:</b> 1608641	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Geothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM JOK 8/31/07</i> CASES: NVN 083935/\$163840.00		- n/a -	163840.00
<b>TOTAL:</b>					<b>\$163,840.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$163,840.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



Form 3200-24a  
May 2007

United States  
Department of the Interior  
Bureau of Land Management

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083936

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name **ORMAT NEVADA INC**  
Street **6225 NEIL RD**  
City, State, Zip Code **RENO, NV 89511**

Future rental payments must be made on or before the anniversary date to:  
Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T. **0220N** R. **0350E** Meridian **MDM** State **NV** County **Churchill**  
Sec. **021 ALL;**  
**022 ALL;**  
**023 ALL;**  
**024 ALL;**

Total acres in lease **2560.000**

Rental Retained \$ **5120.00**

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

Acting

THE UNITED STATES OF AMERICA

BY Elaine M. Lawin

(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION

SEP 10 2007

(Title)

(Date)

EFFECTIVE DATE OF LEASE

**OCT 01 2007**

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION \_\_\_\_\_

Comments \_\_\_\_\_

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

EFFECT OF NOT PROVIDING INFORMATION—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV

Date of Sale 8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____  <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-011</u> Name of Known Geothermal Resource Area (KGRA) _____	<u>\$ 254,000<sup>00</sup></u>	<u>\$ 51,200<sup>00</sup></u>

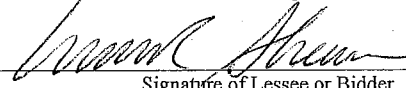
The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

  
Signature of Lessee or Bidder

Print or Type Name of Lessee

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

- Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
- Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
- If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
- This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
- In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

- Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
- Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
- Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
- Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
- If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1557017

<b>Transaction #:</b> 1608642	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Geothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM JPK 8/31/07</i> CASES: NVN 083936/\$204800.00		- n/a -	204800.00
<b>TOTAL:</b>					<b>\$204,800.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$204,800.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



United States  
Department of the Interior  
Bureau of Land Management

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083937

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name **ORMAT NEVADA INC**  
Street **6225 NEIL RD**  
City, State, Zip Code **RENO, NV 89511**

Future rental payments must be made on or before the anniversary date to:  
Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T. **0230N** R. **0350E** Meridian **MDM** State **NV** County **Churchill**  
Sec. **025 ALL;**  
**026 ALL;**  
**034 SESE;**  
**035 ALL;**  
**036 ALL;**

Total acres in lease **2600.000**

Rental Retained \$ **5200.00**

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

**Acting**

THE UNITED STATES OF AMERICA

BY Elaine M. Lewis

(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION

**SEP 10 2007**

(Title)

(Date)

Comments

EFFECTIVE DATE OF LEASE

**OCT 01 2007**

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

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Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

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### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.**

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

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LEASE STIPULATION

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RIPARIAN AREAS STIPULATION

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Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV  
Date of Sale 8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____  <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-012</u> Name of Known Geothermal Resource Area (KGRA) _____	\$ 260,000 <sup>00</sup>	\$ 52,000 <sup>00</sup>

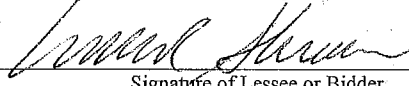
The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.



Print or Type Name of Lessee

Signature of Lessee or Bidder

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior  
Bureau of Land Management  
DIV OF SUPPORT SERVICES  
P.O. BOX 12000  
RENO, NV 89520  
Phone: (775) 861-6400**

Receipt

No: 1557019

<b>Transaction #:</b> 1608644	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Acothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM JOK 8/31/07</i> CASES: NVN 083937/\$208000.00		- n/a -	208000.00
<b>TOTAL:</b>					<b>\$208,000.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$208,000.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



United States  
Department of the Interior  
Bureau of Land Management

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083939

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name ORMAT NEVADA INC  
Street 6225 NEIL RD  
City, State, Zip Code RENO, NV 89511

Future rental payments must be made on or before the anniversary date to:  
Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T. 0220N R. 0360E Meridian MDM State NV County Churchill  
Sec. 005 LOTS 1-4;  
005 S2N2,S2;  
006 LOTS 1-7;  
006 S2NE,SE,SW,E2SW,SE;  
007 LOTS 1-4;  
007 E2,E2W2;  
008 ALL;

Total acres in lease 2542.640

Rental Retained \$ 5086.00

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

Acting

THE UNITED STATES OF AMERICA

BY Elaine M. Lewis

(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION

SEP 10 2007

(Title)

(Date)

EFFECTIVE DATE OF LEASE OCT 01 2007

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION \_\_\_\_\_

Comments

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.**

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

## RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

### Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV

Date of Sale 8-14-07

PARCEL NUMBER	AMOUNT OF BID <i>(see instructions below)</i>	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR <i>(check one)</i> : <input type="checkbox"/> Oil and Gas Parcel Number _____		
<input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV 07-08-014</u> Name of Known Geothermal Resource Area (KGRA) _____	<u>\$ 178,010<sup>00</sup></u>	<u>\$ 35,602.<sup>00</sup></u>

The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. *(See details concerning lease qualifications on next page.)*

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

Print or Type Name of Lessee

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

*[Signature]*  
Signature of Lessee or Bidder

**INSTRUCTIONS FOR OIL AND GAS BID**  
*(Except NPR-A)*

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1557020

<b>Transaction #:</b> 1608645	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Geothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM G/DK 8/31/07</i> CASES: NVN 083939/\$142408.00		- n/a -	142408.00
<b>TOTAL:</b>					<b>\$142,408.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$142,408.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



**United States  
Department of the Interior  
Bureau of Land Management**

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**

Serial No. NVN083941

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

**Read Instructions Before Completing**

1. Name **ORMAT NEVADA INC**  
Street **6225 NEIL RD**  
City, State, Zip Code **RENO, NV 89511**

Future rental payments must be made on or before the anniversary date to:  
Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease:

T.	0230N	R.	0360E	Meridian	MDM	State	NV	County	Churchill
Sec.	004 LOTS 1-4;	Sec.	030 LOTS 1-4;						
	004 S2N2,S2;		030 E2,E2W2;						
	017 ALL;		031 LOTS 1-4;						
	019 LOTS 1-4;		031 E2,E2W2;						
	019 E2,E2W2;								
	020 ALL;								

Total acres in lease **3802.800**

Rental Retained \$ **7606.00**

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

**Acting**

Comments

THE UNITED STATES OF AMERICA

BY Elaine M. Lewis  
(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION **SEP 10 2007**  
(Title) (Date)

EFFECTIVE DATE OF LEASE **OCT 01 2007**

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.**

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

## RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

### Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004 THRU PARCEL NV-07-08-022	All Lands.
PARCEL NV-07-08-025	All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State

Date of Sale

NV

8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____  <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-016</u> Name of Known Geothermal Resource Area (KGRA) _____	\$209,165 <sup>00</sup>	\$41,833 <sup>00</sup>

The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

Signature of Lessee or Bidder

Print or Type Name of Lessee

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1557022

<b>Transaction #:</b> 1608647	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Geothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM GPK 8/31/07</i> CASES: NVN 083941/\$167332.00		- n/a -	167332.00
<b>TOTAL:</b>					<b>\$167,332.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$167,332.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS	

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



United States  
Department of the Interior  
Bureau of Land Management

OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES

Serial No. NVN083942

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are available for lease pursuant to the Geothermal Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

Read Instructions Before Completing

1. Name ORMAT NEVADA INC  
Street 6225 NEIL RD  
City, State, Zip Code RENO, NV 89511

Future rental payments must be made on or before the anniversary date to: Minerals Management Service Royalty Management Program P.O. Box 5640 Denver, CO 80217

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands):

T. \_\_\_\_\_ R. \_\_\_\_\_ Meridian \_\_\_\_\_ State \_\_\_\_\_ County \_\_\_\_\_

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

DO NOT WRITE BELOW THIS LINE

3. Land included in lease:

T. 0230N R. 0360E Meridian MDM State NV County Churchill  
Sec. 015 ALL;  
016 ALL;  
021 ALL;  
022 ALL;  
028 ALL;  
029 ALL;  
032 ALL;

Total acres in lease 4480.000

Rental Retained \$ 8960.00

In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

Competitive  Noncompetitive

Noncompetitive direct use (43 CFR subpart 3205)

Acting

Comments

THE UNITED STATES OF AMERICA

BY Elaine M. Lewis  
(Signing Official)

CHIEF, BRANCH OF MINERALS ADJUDICATION  
(Title) SEP 10 2007 (Date)

EFFECTIVE DATE OF LEASE OCT 01 2007

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION \_\_\_\_\_

(Continued on page 2)

## Instructions

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(d) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the basis of each such lot or quarter-quarter section containing 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

### PAPERWORK REDUCTION ACT STATEMENT

1. This information is being collected pursuant to law and regulations (30 U.S.C. 1000 et seq.; 43 CFR Part 3200).
2. This information will be used to create and maintain a record of geothermal lease activity.
3. Response to this request is required to obtain a benefit.

### NOTICE

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

### ROUTINE USES:

- (1) The adjudication of the lessee's rights to the land or resources.
- (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources.
- (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources.
- (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

**EFFECT OF NOT PROVIDING INFORMATION**—If all the information is not provided, the offer may be rejected. See regulations at 43 CFR Part 3200.

§

ENDANGERED SPECIES ACT  
SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

CULTURAL RESOURCE PROTECTION  
LEASE STIPULATION

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

## RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

### Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

NATIVE AMERICAN CONSULTATION STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

Description of Lands

PARCEL NV-07-08-004

THRU

PARCEL NV-07-08-022

All Lands.

PARCEL NV-07-08-025

All Lands.

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
**COMPETITIVE OIL AND GAS OR  
GEOTHERMAL RESOURCES LEASE BID**  
30 U.S.C. 181 et seq.; 30 U.S.C. 351-359;  
30 U.S.C. 1001-1025; 42 U.S.C. 6508

FORM APPROVED  
OMB NO. 1004-0074  
Expires: December 31, 2009

State NV

Date of Sale 8-14-07

PARCEL NUMBER	AMOUNT OF BID (see instructions below)	
	TOTAL BID	PAYMENT SUBMITTED WITH BID
THE BID IS FOR (check one): <input type="checkbox"/> Oil and Gas Parcel Number _____  <input checked="" type="checkbox"/> Geothermal Parcel Number <u>NV-07-08-017</u> Name of Known Geothermal Resource Area (KGRA) _____	\$ 291,200 <sup>00</sup>	\$ 58,240 <sup>00</sup>

The appropriate regulations applicable to this bid are: (1) for oil and gas leases--43 CFR 3120; (2) for National Petroleum Reserve-Alaska (NPR-A) leases--43 CFR 3132; and (3) for Geothermal resources leases--43 CFR 3220. (See details concerning lease qualifications on next page.)

I CERTIFY THAT I have read and am in compliance with; and not in violation of the lessee qualification requirements under the applicable regulations for this bid.

I CERTIFY THAT this bid is not in violation of 18 U.S.C. 1860 which prohibits unlawful combination or intimidation of bidders. I further certify that this bid was arrived at independently and is tendered without collusion with any other bidder for the purpose of restricting competition.

**IMPORTANT NOTICE:** Execution of this form where the offer is the high bid, constitutes a binding lease offer including all applicable terms and conditions. Failure to comply with the applicable laws and regulations under which this bid is made will result in rejection of the bid and forfeiture of all monies submitted.

ORMAT NEVADA, INC.

*[Handwritten Signature]*  
Signature of Lessee or Bidder

Print or Type Name of Lessee

6225 NEIL ROAD

Address of Lessee

RENO NV 89511  
City State Zip

**INSTRUCTIONS FOR OIL AND GAS BID**  
(Except NPR-A)

1. Separate bid for each parcel is required. Identify parcel by the parcel number assigned in the *Notice of Competitive Lease Sale*.
2. Bid must be accompanied by the national minimum acceptable bid, the first year's rental and the administrative fee. The remittance must be in the form specified in 43 CFR 3103.1-1. The remainder of the bonus bid, if any, must be submitted to the proper Bureau of Land Management (BLM) office within 10 working days after the last day of the oral auction. **Failure to submit the remainder of the bonus bid within 10 working days will result in rejection of the bid offer and forfeiture of all monies paid.**
3. If the bidder is not the sole party in interest in the lease for which the bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.
4. This bid may be executed (*signed*) before the oral auction. If signed before the oral auction, this form cannot be modified without being executed again.
5. In view of the above requirement (4), the bidder may wish to leave the AMOUNT OF BID section blank so that final bid amount may be either completed by the bidder or the BLM at the oral auction.

**INSTRUCTIONS**

**INSTRUCTIONS FOR GEOTHERMAL OR  
NPR-A OIL AND GAS BID**

1. Separate bid for each parcel is required. Identify the parcel by the number assigned to a tract.
2. Bid must be accompanied by one-fifth of the total amount of the bid. The remittance must be in the form specified in 43 CFR 3220.4 for a Geothermal Resources bid and 3132.2 for a NPR-A lease bid.
3. Mark the envelope "Bid for Geothermal Resources Lease" in (*Name of KGRA*) or "Bid for NPR-A Lease," as appropriate. Be sure correct parcel number of tract on which the bid is submitted and date of bid opening are noted plainly on envelope. No bid may be modified or withdrawn unless such modification or withdrawal is received prior to time fixed for opening of bids.
4. Mail or deliver bid to the proper BLM office or place indicated in the *Notice of Competitive Lease Sale*.
5. If the bidder is not the sole party in interest in the lease for which bid is submitted, all other parties in interest may be required to furnish evidence of their qualifications upon written request by the BLM.

**United States Department of the Interior**  
**Bureau of Land Management**  
 DIV OF SUPPORT SERVICES  
 P.O. BOX 12000  
 RENO, NV 89520  
 Phone: (775) 861-6400

Receipt

No: 1557023

<b>Transaction #:</b> 1608650	
<b>Date of Transaction:</b> 08/29/2007	
<b>CUSTOMER:</b>	ORMAT NEVADA INC 6225 NEIL RD RENO, NV 89511

LINE #	QTY	DESCRIPTION	REMARKS	UNIT PRICE	TOTAL
1	1.00	<i>Geothermal</i> OIL & GAS / COMPETITIVE / BALANCE BONUS BID (450) <i>BLM gdk 8/31/07</i> CASES: NVN 083942/\$232960.00		- n/a -	232960.00
<b>TOTAL:</b>					<b>\$232,960.00</b>

PAYMENT INFORMATION			
1	AMOUNT:	\$232,960.00	POSTMARKED: N/A
	TYPE:	CHECK	RECEIVED: 08/29/2007
	CHECK NO:	045339	
	NAME:	ORMAT NEVADA INC 6225 NEIL RD SUITE 300 RENO NV 89511	

REMARKS

This receipt was generated by the automated BLM Collections and Billing System and is a paper representation of a portion of the official electronic record contained therein.



UNITED STATES  
DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT

Serial No.

NVN86885

**OFFER TO LEASE AND LEASE FOR GEOTHERMAL RESOURCES**  
**(For New Leases Issued Under the Energy Policy Act of 2005 [August 5, 2005])**

The undersigned (see page 2) offers to lease all or any of the lands in item 2 that are av:  
Steam Act of 1970, as amended (30 U.S.C. 1001-1025).

Future rental payments must be made on or  
before the anniversary date to:

Minerals Management Service  
Royalty Management Program  
P.O. Box 5640  
Denver, CO 80217

**READ INSTRUCTIONS BEFORE COMPLETING**

1. Name ORMAT NEVADA INC		1a. Street 6225 NEIL ROAD SUITE 300	1d. Zip Code 89511
1b. City RENO		1c. State NV	

2. Surface managing agency if other than BLM: \_\_\_\_\_ Unit/Project: \_\_\_\_\_

Legal description of land requested (segregate by public domain and acquired lands): Enter T., R., Meridian, State and County

Total Acres Applied for \_\_\_\_\_

Percent U.S. interest \_\_\_\_\_

Amount remitted: Processing Fee \$ \_\_\_\_\_ Rental Fee \$ \_\_\_\_\_ Total \$ \_\_\_\_\_

**DO NOT WRITE BELOW THIS LINE**

3. Land included in lease: Enter T., R., Meridian, State and County

T.0220N, R.0350E, 21 MDM, NV

Sec. 029 1 ALL;

030 LOTS 1-4;

030 E2,E2W2;

T.0230N, R.0350E, 21 MDM, NV

Sec. 027 E2E2;

Churchill County

Total Acres in Lease 1436.76

Rental Retained \$ 2874.00


In accordance with the above offer, or the previously submitted competitive bid, this lease is issued granting the exclusive right to drill for, extract, produce, remove, utilize, sell, and dispose of all the geothermal resources in the lands described in Item 3 together with the right to build and maintain necessary improvements thereupon, for a primary term of 10 years and subsequent extensions thereof in accordance with 43 CFR subpart 3207. Rights granted are subject to: applicable laws; the terms, conditions, and attached stipulations of this lease; the Secretary of the Interior's regulations and formal orders in effect as of lease issuance; and, when not inconsistent with the provisions of this lease, regulations and formal orders hereafter promulgated.

Type of Lease:

- Competitive
- Noncompetitive
- Noncompetitive direct use (43 CFR subpart 3205)

Comments:

THE UNITED STATES OF AMERICA

BY  \_\_\_\_\_  
(Signing Official)

ATANDA CLARK  
(Printed Name)

Chief, Branch of Minerals Adjudication AUG 07 2009  
(Title) (Date)

EFFECTIVE DATE OF LEASE SEP - 1 2009  
(Date)

Check if this is a converted lease

EFFECTIVE DATE OF LEASE CONVERSION \_\_\_\_\_

4. (a) The undersigned certifies that:

- (1) The offeror is a citizen of the United States; an association of such citizens; a municipality; or a corporation organized under the laws of the United States, any State or the District of Columbia; (2) All parties holding an interest in the offer are in compliance with 43 CFR part 3200 and the authorizing Act; (3) The offeror's chargeable interests, direct and indirect, do not exceed those allowed under the Act; and (4) The offeror is not considered a minor under the laws of the State in which the lands covered by this offer are located.
- (b) The undersigned agrees that signing this offer constitutes acceptance of this lease, including all terms, conditions and stipulations of which the offeror has been given notice. The offeror further agrees that this offer cannot be withdrawn, either in whole or part, unless the withdrawal is received by the proper BLM State Office before this lease, an amendment to this lease, or a separate lease, whichever covers the land described in the withdrawal, has been signed on behalf of the United States.

This offer will be rejected and will afford the offeror no priority if it is not properly completed and executed in accordance with the regulations or if it is not accompanied by the required payments. Title 18 U.S.C. § 1001 makes it a crime for any person knowingly and willfully to make to any Department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

Duly executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

(Printed Name of Lessee or Attorney-in-fact)

(Signature of Lessee or Attorney-in-fact)

**LEASE TERMS**

**Sec. 1. Rentals**—Rentals must be paid to the proper office of the lessor in advance of each lease year. Annual rental rates per acre or fraction thereof, as applicable, are:

- (a) Noncompetitive lease (includes post-sale parcels not receiving bids, a direct use lease or a lease issued to a mining claimant): \$1.00 for the first 10 years; thereafter \$5.00; or  
(b) Competitive lease: \$2.00 for the first year; \$3.00 for the second through tenth year; thereafter \$5.00. Annual rental is always due by the anniversary date of this lease (43 CFR 3211.13), regardless of whether the lease is in a unit or outside of a unit, the lease is in production or not, or royalties or direct use fees apply to the production.

Rental may only be credited toward royalty under 43 CFR 3211.15 and 30 CFR 218.303. Rental may not be credited against direct use fees. Failure to pay annual rental timely will result in late fees and will make the lease subject to termination in accordance with 43 CFR 3213.14.

**Sec. 2. (a) Royalties**—Royalties must be paid to the proper office of the lessor. Royalties are due on the last day of the month following the month of production. Royalties will be computed in accordance with applicable regulations and orders. Royalty rates for geothermal resources produced for the commercial generation of electricity but not sold in an arm's length transaction are: 1.75 percent for the first 10 years of production and 3.5 percent after the first 10 years. The royalty rate is to be applied to the gross proceeds derived from the sale of electricity in accordance with 30 CFR part 206 subpart H.

The royalty rate for byproducts derived from geothermal resource production that are minerals specified in section I of the Mineral Leasing Act (MLA), as amended (30 U.S.C. 181), is 5 percent, except for sodium compounds, produced between September 29, 2006 and September 29, 2011 (Pub. L. No. 109-338, §102; note to 30 U.S.C. 362) for which the royalty rate is 2 percent. No royalty is due on byproducts that are not specified in 30 U.S.C. § 181. (43 CFR 3211.19.)

If this lease or a portion thereof is committed to an approved communitization or unit agreement and the agreement contains a provision for allocation of production, royalties must be paid on the production allocated to this lease.

(b) Arm's length transactions—The royalty rate for geothermal resources sold by you or your affiliate at arm's length to a purchaser is 10 percent of the gross proceeds derived from the arm's-length sale (43 CFR 3211.17, 3211.18).

(c) Advanced royalties—In the absence of a suspension, if you cease production for more than one calendar month on a lease that is subject to royalties and that has achieved commercial production, your lease will remain in effect only if you make advanced royalty payments in accordance with 43 CFR 3212.15(a) and 30 CFR 218.305.

(d) Direct use fees—Direct use fees must be paid in lieu of royalties for geothermal resources that are utilized for commercial, residential, agricultural, or other energy needs other than the commercial production or generation of electricity, but not sold in an arm's length transaction (43 CFR 3211.18; 30 CFR 206.356). This requirement applies to any direct use of federal geothermal resources (unless the resource is exempted as described in 30 CFR 202.351(b) or the lessee is covered by paragraph (e), below) and is not limited to direct use leases. Direct use fees are due on the last day of the month following the month of production.

(e) If the lessee is a State, tribal, or local government covered by 43 CFR 3211.18(a)(3) and 30 CFR 206.366, check here: . A lessee under this paragraph is not subject to paragraph (d), above. In lieu of royalties, the lessee under this paragraph must pay a nominal fee of \$\_\_\_\_\_.

**Sec. 3. Bonds**—A bond must be filed and maintained for lease operations as required by applicable regulations.

**Sec. 4. Work requirements, rate of development, unitization, and drainage**—Lessee must perform work requirements in accordance with applicable regulations (43 CFR 3207.11, 3207.12), and must prevent unnecessary damage to, loss of, or waste of leased resources. Lessor reserves the right to specify rates of development and production and to require lessee to commit to a communitization or unit agreement, within 30 days of notice, if in the public interest. Lessee must drill and produce wells necessary to protect leased lands from drainage or pay compensatory royalty for drainage in the amount determined by lessor. Lessor will exempt lessee from work requirements only where the lease overlies a mining claim that has an approved plan of operations and where BLM determines that the development of the geothermal resource on the lease would interfere with the mining operation (43 CFR 3207.13).

**Sec. 5. Documents, evidence, and inspection**—Lessee must file with the proper office of the lessor, not later than (30) days after the effective date thereof, any contract or evidence of other arrangement for the sale, use, or disposal of geothermal resources, byproducts produced, or for the sale of electricity generated using geothermal resources produced from the lease. At such times and in such form as lessor may prescribe, lessee must furnish detailed statements and all documents showing (a) amounts and quality of all geothermal resources produced and used (either for commercial production or generation of electricity, or in a direct use operation) or sold; (b) proceeds derived therefrom or from the sale of electricity generated using such resources; (c) amounts that are unavoidably lost or rejected before use, used to generate plant parasitic electricity (as defined in 30 CFR 206.351) or electricity for lease operations, or otherwise used for lease operations related to the commercial production or generation of electricity; and (d) amounts and quality of all byproducts produced and proceeds derived from the sale or disposition thereof. Lessee may be required to provide plats and schematic diagrams showing development work and improvements, and reports with respect to parties in interest.

In a format and manner approved by lessor, lessee must: keep a daily drilling record, a log, and complete information on well surveys and tests; keep a record of subsurface investigations; and furnish copies to lessor when required.

Lessee must keep open at all reasonable times for inspection by any authorized officer of lessor, the leased premises and all wells, improvements, machinery, and fixtures thereon, and all books, accounts, maps, and records relative to operations, surveys, or investigations on or in the leased lands. Lessee must maintain copies of all contracts, sales agreements, accounting records, billing records, invoices, gross proceeds and payment data regarding the sale, disposition, or use of geothermal resources, byproducts produced, and the sale of electricity generated using resources produced from the lease, and all other information relevant to determining royalties or direct use fees. All such records must be maintained in lessee's accounting offices for future audit by lessor and produced upon request by lessor or lessor's authorized representative or agent. Lessee must maintain required records for 6 years after they are generated or, if an audit or investigation is underway, until released of the obligation to maintain such records by lessor.

**Sec. 6. Conduct of operations**—Lessee must conduct operations in a manner that minimizes adverse impacts to the land, air, and water, to cultural, biological, visual, and other resources, and to other land uses or users. Lessee must take reasonable measures deemed necessary by lessor to accomplish the intent of this section. To the extent consistent with leased rights granted, such measures may include, but are not limited to, modification to siting or design of facilities, timing of operations, and specification of interim and final reclamation measures. Lessor reserves the right to continue existing uses and to authorize future uses upon or in the leased lands, including the approval of easements or rights-of-way. Such uses will be conditioned so as to prevent unnecessary or unreasonable interference with rights of lessee. Prior to disturbing the surface of the leased lands, lessee must contact lessor to be apprised of procedures to be followed and modifications or reclamation measures that may be necessary. Areas to be disturbed may require inventories or special studies to determine the extent of impacts to other resources. Lessor may require lessee to complete minor inventories or short term special studies under guidelines provided by lessor. If, in the conduct of operations, threatened or endangered species, objects of historic or scientific interest, or substantial unanticipated environmental effects are observed, lessee must immediately contact lessor. Lessee must cease any operations that are likely to affect or take such species, or result in the modification, damage or destruction of such habitats or objects.

**Sec. 7. Production of byproducts**—If the production, use, or conversion of geothermal resources from these leased lands is susceptible of producing a valuable byproduct or byproducts, including commercially demineralized water for beneficial uses in accordance with applicable State water laws, lessor may require substantial beneficial production or use thereof by lessee.

**Sec. 8. Damages to property**—Lessee must pay lessor for damage to lessor's improvements, and must save and hold lessor harmless from all claims for damage or harm to persons or property as a result of lease operations.

**Sec. 9. Protection of diverse interests and equal opportunity**—Lessee must maintain a safe working environment in accordance with applicable regulations and standard industry practices, and take measures necessary to protect public health and safety. Lessor reserves the right to ensure that production is sold at reasonable prices and to prevent monopoly. Lessee must comply with Executive Order No. 11246 of September 24, 1965, as amended, and regulations and relevant orders of the Secretary of Labor issued pursuant thereto. Neither lessee nor lessee's subcontractor may maintain segregated facilities.

**Sec. 10. Transfer of lease interests and relinquishment of lease**—As required by regulations, lessee must file with lessor any assignment or other transfer of an interest in this lease. Subject to the requirements of 43 CFR subpart 3213, lessee may relinquish this lease or any legal subdivision by filing in the proper office a written relinquishment, which will be effective as of the date BLM receives it, subject to the continued obligation of the lessee and surety to be responsible for: paying all accrued rentals and royalties; plugging and abandoning all wells on the relinquished land; restoring and reclaiming the surface and other resources; and complying with 43 CFR 3200.4.

**Sec. 11. Delivery of premises**—At such time as all or portions of this lease are returned to lessor, lessee must place all wells in condition for suspension or abandonment, reclaim the land as specified by lessor, and within a reasonable period of time, remove equipment and improvements not deemed necessary by lessor for preservation of producible wells or continued protection of the environment.

**Sec. 12. Proceedings in case of default**—If lessee fails to comply with any provisions of this lease or other applicable requirements under 43 CFR 3200.4, and the noncompliance continues for 30 days after written notice thereof, this lease will be subject to termination in accordance with the Act and 43 CFR 3213. This provision will not be construed to prevent the exercise by lessor of any other legal and equitable remedy or action, including waiver of the default. Any such remedy, waiver, or action will not prevent later termination for the same default occurring at any other time. Whenever the lessee fails to comply in a timely manner with any of the provisions of the Act, this lease, the regulations, or other applicable requirements under 43 CFR 3200.4, and immediate action is required, the lessor may enter on the leased lands and take measures deemed necessary to correct the failure at the lessee's expense.

**Sec. 13. Heirs and successors-in-interest**—Each obligation of this lease will extend to and be binding upon, and every benefit hereof will inure to, the heirs, executors, administrators, successors, or assigns of the respective parties hereto.

## INSTRUCTIONS

### A. General

1. Items 1 and 2 need to be completed only by parties filing for a noncompetitive lease. The BLM will complete the front of the form for other types of leases. The BLM may use the "Comments" space under Item 3 to identify when: the lessee has elected to make all lease terms subject to the Energy Policy Act of 2005 under 43 CFR 3200.7(a)(2) or 43 CFR 3200.8(b) (box labeled "converted lease" must also be checked); the lease is being issued noncompetitively to a party who holds a mining claim on the same lands as is covered by the lease under 43 CFR 3204.12; the lease is a direct use lease issued to a State, local, or tribal government (box at section 2(e) under Lease Terms must also be checked); the lease is a competitive lease with direct-use-only stipulations attached; or other special circumstances exist. A lessee who seeks to convert only the royalty rate of a lease under 43 CFR 3212.25 or who qualifies for a case-by-case royalty rate determination under 43 CFR 3211.17(b)(1)(i) should not use this form, but should instead use an addendum to the existing lease.
2. Entries must be typed or printed plainly in ink. The offeror must sign the form (Item 4) in ink.
3. An original and two copies of this offer must be prepared and filed in the proper BLM State Office. See regulations at 43 CFR 1821.10 for office locations.
4. If more space is needed, additional sheets must be attached to each copy of the form submitted.

### B. Specific

Item 1—Enter the offeror's name and billing address.

Item 2—Indicate the agency managing the surface use of the land and the name of the unit or project of which the land is a part. The offeror may also provide other information that will assist in establishing status of the lands. The description of land must conform to 43 CFR 3203.10. Total acres applied for must not exceed that allowed by regulations (43 CFR 3203.10; 43 CFR 3206.12).

Payments: For noncompetitive leases, the amount remitted must include the processing fee for noncompetitive lease applications (43 CFR 3204.10; 43 CFR 3000.12) and the first year's rental at the rate of \$1 per acre or fraction thereof. If the United States owns only a fractional interest in the geothermal resources, you must pay a prorated rental under 43 CFR 3211.11(d). The BLM will retain the processing fee even if the offer is completely rejected or withdrawn. To maintain the offeror's priority, the offeror must submit rental sufficient to cover all the land requested. If the land requested includes lots or irregular quarter-quarter sections, the exact acreage of which is not known to the offeror, rental should be submitted on the assumption that each such lot or quarter-quarter section contains 40 acres. If the offer is withdrawn or rejected in whole or in part before a lease issues, the BLM will return the rental remitted for the parts withdrawn or rejected.

The BLM will fill in the processing fee for competitive lease applications (43 CFR 3203.17; 43 CFR 3000.12) and the first year's rental at the rate of \$2 per acre or fraction thereof.

Item 3—The BLM will complete this space.

## NOTICES

The Privacy Act of 1974 and the regulation at 43 CFR 2.48(d) provide that you be furnished with the following information in connection with information required by this geothermal lease application.

AUTHORITY: 30 U.S.C. 1000 et seq.

PRINCIPAL PURPOSE—The information is to be used to process geothermal lease applications.

ROUTINE USES: (1) The adjudication of the lessee's rights to the land or resources. (2) Documentation for public information in support of notations made on land status records for the management, disposal, and use of public lands and resources. (3) Transfer to appropriate Federal agencies when concurrence is required prior to granting uses or rights in public lands or resources. (4) Transfer to the appropriate Federal, State, local, or foreign agencies, when relevant to civil, criminal, or regulatory investigations or prosecutions.

RIPARIAN AREAS STIPULATION

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

No surface occupancy or disturbance will be allowed within 650 feet (horizontal measurement) of any surface water bodies, riparian areas, wetlands, playas, or 100-year floodplains to protect the integrity of these resources (as delineated by the presence of riparian vegetation and not actual water). Exceptions to this restriction may be considered on a case-by-case basis if the BLM determines at least one of the following conditions apply: 1) additional development is proposed in an area where current development has shown no adverse impacts, 2) suitable off-site mitigation will be provided if habitat loss is expected, or 3) BLM determines development proposed under any plan of operations ensures adequate protection of the resources.

	<u>Description of Lands</u>
PARCEL NV-09-07-007 THRU PARCEL NV-09-07-008	ALL LANDS
PARCEL NV-09-07-015 THRU PARCEL NV-09-07-017	ALL LANDS
PARCEL NV-09-07-020	ALL LANDS
PARCEL NV-09-07-025	
PARCEL NV-09-07-027 THRU PARCEL NV-09-07-028	ALL LANDS
PARCEL NV-09-07-032 THRU PARCEL NV-09-07-033	ALL LANDS
PARCEL NV-09-07-040 THRU PARCEL NV-09-07-051	ALL LANDS
PARCEL NV-09-07-055 THRU PARCEL NV-09-07-057	ALL LANDS
PARCEL NV-09-07-060 THRU PARCEL NV-09-07-067	ALL LANDS
PARCEL NV-09-07-074	ALL LANDS

**NATIVE AMERICAN CONSULTATION STIPULATION**

The lessee shall comply with the following special conditions and stipulations unless they are modified by mutual agreement of the Lessee and the Authorized Officer (AO):

All development activities proposed under the authority of this lease are subject to the requirement for Native American consultation prior to BLM authorizing the activity. Depending on the nature of the lease developments being proposed and the resources of concerns to tribes potentially effected, Native American consultation and resulting mitigation measures to avoid significant impacts may extend time frames for processing authorizations for development activities, as well as, change in the ways in which developments are implemented.

	<u>Description of Lands</u>
PARCEL NV-09-07-007 THRU PARCEL NV-09-07-008	ALL LANDS
PARCEL NV-09-07-015 THRU PARCEL NV-09-07-017	ALL LANDS
PARCEL NV-09-07-020	ALL LANDS
PARCEL NV-09-07-025 THRU PARCEL NV-09-07-028	ALL LANDS
PARCEL NV-09-07-032 THRU PARCEL NV-09-07-033	ALL LANDS
PARCEL NV-09-07-040 THRU PARCEL NV-09-07-051	ALL LANDS
PARCEL NV-09-07-055 THRU PARCEL NV-09-07-057	ALL LANDS
PARCEL NV-09-07-060 THRU PARCEL NV-09-07-067	ALL LANDS
PARCEL NV-09-07-074	ALL LANDS
PARCEL NV-09-07-079	ALL LANDS

NV-030-NA-1

**ENDANGERED SPECIES ACT**  
**SECTION 7 CONSULTATION STIPULATION**

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modifications of a designated or proposed critical habitat. BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act, 16 USC § 1531 *et seq.*, as amended, including completion of any required procedure for conference or consultation.

**CULTURAL RESOURCE PROTECTION**  
**LEASE STIPULATION**

This lease may be found to contain historic properties or resources protected under the National Historic Preservation Act, American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, EO 13007, or other statutes and executive orders. The BLM will not approve any ground-disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require exploration or development proposals to be modified to protect such properties, or it may disapprove any activity that is likely to result in adverse effects that could not be successfully avoided, minimized, or mitigated.

## **APPENDIX B**

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### **Noxious Weed Management Plan**



**Dixie Meadows Geothermal Exploration Project**  
**Noxious Weed Management Plan**  
**Churchill County, Nevada**

**Prepared for:**

Ormat Technologies, Inc.

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**February 1, 2011**

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## LIST OF ACRONYMS AND ABBREVIATIONS

<b>BLM</b>	Bureau of Land Management
<b>Ormat</b>	Ormat Technologies, Inc.

# NOXIOUS WEED MANAGEMENT PLAN DIXIE MEADOWS GEOTHERMAL EXPLORATION PROJECT

## 1.0 INTRODUCTION

Ormat Technologies, Inc. (Ormat) is planning a geothermal exploration drilling program at Dixie Valley located approximately 75 miles northeast of Fallon, Nevada, on public land administered by the Bureau of Land Management (BLM). The proposed project as described in Environmental Assessment Ormat Technologies, Inc. Dixie Meadows Geothermal Exploration Project includes the construction of 20 drill pads and associated access roads for a total disturbance of 139 acres (BLM, 2011). This Noxious Weed Management Plan is being developed in order to help control noxious weed species from becoming established in areas disturbed by this project.

Noxious weeds within Nevada are defined in the Nevada Revised Statutes 555.05 as “any species of plant which is, or is likely to be, detrimental or destructive and difficult to control or eradicate.” The Nevada Department of Agriculture Plant Industry Division provides a list of all weeds currently listed as noxious for the State of Nevada. Noxious weeds in Nevada are divided into three categories as identified below. This management plan treats all three categories equally as far as treatment when identified.

Category A weeds are currently not found or found in limited distribution throughout the state. These species are actively excluded from the state and actively eradicated. Control is required by the state on all infestations.

Category B weeds are those that are established in scattered populations in some counties of the state; actively excluded where possible, actively eradicated from nursery stock dealer premises; control required by the state in areas where populations are not well established or previously unknown to occur.

Category C weeds are species that are currently established and generally widespread in many counties of the state; actively eradicated from nursery stock dealer premises; abatement at the discretion of the state quarantine officer.

## **2.0 NOXIOUS WEED MANAGEMENT PLAN**

In order to minimize the establishment of noxious weeds within the project area, Ormat would use the following environmental protection measures:

- Use certified weed-free seed mixes during revegetation of disturbed areas;
- Complete concurrent reclamation when feasible in order to minimize disturbed areas where weed species could establish;
- Revegetate growth medium and overburden stockpiles with a weed-free seed mix as soon as possible following stockpile completion;
- Restrict vehicle traffic to defined roads or overland travel routes to reduce potential mechanical transport of noxious weed seeds; and
- Wash all vehicles that are within areas of established noxious weed populations prior to leaving the site.

Along with these environmental protection measures, Ormat would conduct the weed surveys and treatment described below, as necessary.

### **2.1 NOXIOUS WEED SURVEYS**

A survey for State of Nevada noxious weed species would take place within areas disturbed by Ormat' Dixie Meadow exploration project every three years following the initial disturbance per the BLM's request. These surveys would continue until successful reclamation of disturbance has been achieved. Successful reclamation is determined through the Nevada Guidelines for Successful Revegetation for the Nevada Division of Environmental Protection, the Bureau of Land Management and the U.S. Department of Agriculture Forest Service. Surveys would consist of walking disturbance and identifying locations of noxious weed infestations using a Trimble global positioning unit.

### **2.2 NOXIOUS WEED TREATMENT**

If noxious weed species are found within the pads and roads associated with the Dixie Meadows exploration plan, appropriate treatment for the type of species present would take place. A certified individual would complete treatment of noxious weed species.

### **3.0 REFERENCES**

Bureau of Land Management (BLM). 2011. Environmental Assessment Ormat Technologies, Inc. Dixie Meadows Geothermal Exploration Project. United States Department of the Interior, Bureau of Land Management Carson City District, Stillwater Field Office.

Nevada Department of Agriculture, Plant Industry Division. 2011. Noxious Weeds List. Available at [http://agri.nv.gov/nwac/PLANT\\_No WeedList.htm](http://agri.nv.gov/nwac/PLANT_No WeedList.htm). Accessed February 1, 2011.