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Battle Mountain District**



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**United States Department of Agriculture
United States Forest Service
Humboldt-Toiyabe National Forest
Austin and Tonopah Ranger Districts**

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**Environmental Assessment
DOI-BLM-NV-B010-2011-0015-EA**

**McGinness Hills
Geothermal Development Project
Lander County, Nevada**

NVN-84268X

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#AUS74

**McGinness Hills Geothermal Development Project
ENVIRONMENTAL ASSESSMENT**

DOI-BLM-NV-B010-2011-0015-EA

Lander County, Nevada

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Abstract:

This environmental assessment (EA) describes the anticipated environmental effects of the proposed McGinness Hills Geothermal Development Project and alternatives to the proposed action, including the No Action alternative. This project is located in Lander County, approximately 16 miles northeast of Austin, Nevada. The Project includes the construction and operation of two geothermal power generating facilities; geothermal production and injection wells and well pads; access roads; geothermal production and injection pipelines; an electrical transmission line, and ancillary support facilities.

Ormat Nevada, Inc.
McGinness Hills Geothermal Development Project
Environmental Assessment

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1 INTRODUCTION

1.1 BACKGROUND

Ormat Nevada, Inc. (Ormat) obtained federal geothermal leases in 2007 in the McGinness Hills area of Lander County, Nevada (see Figure 1). These leases were obtained and lease stipulations applied (see Appendix A). In 2008, the federal geothermal leases were unitized. This Unit is referred to as the McGinness Hills Geothermal Unit (NVN-84268X). Following acquisition of the federal geothermal leases and formation of the Unit, Ormat began conducting exploration activities.

In April 2009, the Bureau of Land Management (BLM), Mount Lewis Field Office (MLFO), issued a Finding of No Significant Impact (FONSI) based on the Environmental Assessment (EA) (NV063-EA08-093) for Ormat's McGinness Hills Geothermal Exploration Project. This exploration project included the drilling and testing of temperature gradient holes (TGHs), observation wells, and full-size wells at 27 identified sites, and the building and use of access roads, as appropriate, within federal geothermal Unit NVN-84268X. Figure 2 identifies the well sites which were evaluated by the BLM in the EA. Total surface disturbance associated with the McGinness Hills Geothermal Exploration Project was identified in the EA at approximately 68 acres. Subsequently, some of the approved drill sites were relocated. To date, 8 wells have been drilled from 7 pads and associated access roads have been constructed. See Table 1 for an itemization of well status.

Subsequent to the approval of the McGinness Hills Geothermal Exploration Project, Ormat acquired the Lake Ranch lease on private land. The Lake Ranch lease is part of the McGinness Hills Unit. Within the private land lease (which is private surface and private minerals), Ormat has drilled 5 additional wells and built associated access roads.

Figure 3 shows all public and private land wells and associated access roads that have been constructed to date. Surface disturbance associated with these construction activities totals 57.1 acres (33.9 acres on public lands managed by the BLM, and 23.2 acres on private land).

Based on the successful results of the exploration activities conducted within the McGinness Hills Unit Area, Ormat has determined that the geothermal resources within the Unit are capable of commercial production. As such, Ormat is proposing the McGinness Hills Geothermal Development Project described herein. For purposes of this EA, all components of the proposed Project are analyzed as connected actions under the National Environmental Policy Act.

In April 2011, Ormat designated ORNI 39, LLC as the Unit Operator, and ORNI 39 and ORNI 49 as tenants in common on the transmission system. This redesignation was recognized by the BLM in April 2011.

1.2 SUMMARY AND LOCATION OF PROPOSED ACTION

Ormat is proposing to construct, operate and maintain the McGinness Hills Geothermal Development Project (McGinness Hills Project or Project). The Project includes the construction and operation of two power generating facilities; geothermal production and injection well pads and wells; access roads; geothermal production and injection pipelines; a microwave communication tower at each power plant; a domestic water well located at each of the power plants; an electrical transmission line and co-located Optical Ground Wire (OPGW)/fiber optic line (hereafter, fiber optic line); and ancillary support facilities (see Figure 4, Figure 5 and Figure 6).

The components of the proposed Project directly related to the geothermal resource (geothermal production and injection wells, access roads, geothermal pipelines, geothermal power plants and microwave communication towers) would all be located within the McGinness Hills Geothermal Unit (NVN-84268X). This Unit is comprised of federal geothermal leases NVN-83967, NVN-83966 and the Lake Ranch lease on private land. The Unit Area encompasses approximately 7,680 acres of public lands managed by the BLM and private lands in Sections 9-16 and 21-24, Township 20 North, Range 45 East (T.20N., R.45E.), Mount Diablo Baseline and Meridian (MDB&M).

The approximately 9.01 mile, 230 kV overhead transmission line and fiber optic line would be constructed, originating at the proposed new McGinness Hills substations adjacent to the power plants, trending south and east and terminating at the existing Sierra Pacific Power Company (SPPCo.) dba NV Energy (NVE) Frontier substation (N-25341). Approximately 3.22 miles of the proposed 230 kV transmission line and fiber optic line (N-88978 and N-88979) would be located on public lands managed by the BLM, while the remaining 5.79 miles would be located on National Forest System lands (#AUS74) (see Figure 4).

The EA would be used to meet the DOE's NEPA requirements in making a determination of funding.

1.3 PURPOSE AND NEED

1.3.1 Background

Ormat's purpose of the Project is to commercially develop the geothermal resources within the federal geothermal unit; to construct and operate commercial geothermal power plants and a wellfield within the Unit; and to transport generated electricity from the Project to a power purchaser in compliance with the Nevada State mandated Renewable Portfolio Standard. The purpose of the Project's transmission line and electrical substation is to provide the electrical interconnection with the existing SPPCo./NVE electrical transmission system at the proposed junction in an economically viable manner which minimizes transmission line energy losses and adverse environmental impacts. The purpose of the fiber optic line is to provide line safety in protection of the existing transmission system. Ormat needs to be able to produce geothermal resources in commercial quantities from the Unit or the federal geothermal leases will terminate.

1.3.2 BLM Purpose and Need

In accordance with the Federal Land Policy and Management Act of 1976 and its implementing regulations, public lands are to be managed for multiple use that takes into account the long-term needs of future generations for renewable and non-renewable resources. The Secretary of the Interior is authorized to grant rights-of-way on public lands for systems of generation, transmission, and distribution of electric energy (Section 501(a)(4)). Taking into account the BLM's multiple use mandate, the purpose and need for the proposed action is to respond to Ormat's Right-of-Way (ROW) application. Under the terms of the Geothermal Steam Act, its revisions of 2007, and its implementing regulations (including 43 CFR 3200); and the Programmatic Geothermal Environmental Impact Statement for Geothermal Leasing in the Western United States (BLM 2008b) and its Record of Decision of December, 2008; BLM must respond to the proposed plans, applications and programs submitted by the lessee or the lessee's designated operator. The BLM's need for the Proposed Action is to respond to the Operations Plan, Utilization Plan and FLPMA ROW application submitted by the proponent to construct and operate the McGinness Hills Geothermal Development Project. This proposed action would, if approved, assist the BLM in addressing the management objectives in the Energy Policy Act of 2005 (Title II, Section 211) which establish a goal for the Secretary of the Interior to approve 10,000 MWs of electricity from non-hydropower renewable energy projects located on public lands. This proposed action, if approved, would also further the purpose of Secretarial Order 3285A1 (March 11, 2009) that establishes the development of environmentally responsible renewable energy as a priority for the Department of the Interior.

1.3.3 USFS Purpose and Need

Under the Federal Land Policy and Management Act of 1976 and the Forest Service's regulations, at 36 CFR 251, the Forest Service must respond to Ormat's Special Use Permit (SUP) application.

The Forest Service's need for the Proposed Action is to respond to the SUP application submitted by the proponent to construct and operate the transmission line that crosses national Forest System land.

1.3.4 DOE Purpose and Need

Title XVII of the Energy Policy Act of 2005 (EPAAct), P.L. 109-58 as amended by section 406 of the American Recovery and Reinvestment Act of 2009, P.L. 111-5 (the "Recovery Act"), established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII authorizes the Secretary of Energy to make loan guarantees for various types of projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." Section 406 of the Recovery Act added section 1705, which is designed to address the current economic conditions of the nation, in part, through eligible renewable and transmission projects to commence construction no later than September 30, 2011. The primary purposes of

the Recovery Act are job preservation and creation, infrastructure investment, energy efficiency and science, assistance to the unemployed, and state and local fiscal stabilization. The purpose and need for the Department of Energy (DOE) action would be to comply with its mandate by selecting eligible projects that meet the goals of EPAct and the Recovery Act.

1.3.5 BLM Decisions to be Made

The BLM has determined that an EA is the appropriate level of analysis to evaluate and disclose the potential environmental impacts associated with this proposed action and any reasonable alternatives to the proposed action, including a no action alternative. This EA will assist the BLM Battle Mountain District Office, MLFO authorized officer in a determination to approve the proposed action, require modification or deny the proposed action. At the conclusion of the EA process, the BLM must determine if the proposed action and/or any modifications of the proposed action would cause significant impacts to the human environment. If no such impact would occur, then a Finding of No Significant Impact (FONSI) would be prepared, and the BLM would make a decision whether or not to approve the submitted Operations Plan, Utilization Plan and a Right-of-Way application (for the 3.22 miles of the proposed transmission line and fiber optic line on public lands managed by the BLM). If, at any time during the analysis, a determination of significant impacts is made that could not be appropriately mitigated at the EA level, an Environmental Impact Statement (EIS) would be required.

1.3.6 USFS Decisions to be Made

The USFS has also determined that an EA is needed to evaluate and disclose the potential environmental impacts associated with this proposed action, any reasonable alternatives to the proposed action, and a no action alternative. The Forest Supervisor for the Humboldt-Toiyabe National Forest as the Responsible Official would make a decision based on this analysis regarding the approximately 6 miles of the proposed transmission line and fiber optic line on National Forest System lands. At the conclusion of the EA process, the Forest Service must first determine if the proposed action and/or any modifications of the proposed action would cause significant impacts to the human environment. If no such impact would occur, then the Responsible Official will decide 1) whether or not to approve implementation of the Proposed Action analyzed in this document, 2) approve an alternative to the proposed action, and 3) determine which mitigation measures to require. The Responsible Official's selected alternative, and accompanying rationale for the selection, would be documented in a forthcoming Decision Notice and Finding of No Significant Impact.

1.3.7 DOE Decisions to be Made

Pursuant to provisions of section 1705, on October 7, 2009, DOE competitively solicited applications for, "Commercial Technology Renewable Energy Generation Projects Under the Financial Institution Partnership Program." In response to that solicitation the John Hancock Life Insurance Company submitted an application to DOE on July 28, 2010, for a Federal loan guarantee for the Ormat Nevada, Inc. McGuinness Hills Geothermal Project. As part of the loan review process DOE carries out a detailed financial, technical, and legal evaluation of the project

submitted by the loan applicant, and negotiates the terms and conditions of a possible Federal loan guarantee pursuant to its procedures set out at 10 CFR Part 609. DOE is a cooperating agency on this EA pursuant to a Memorandum of Understanding (MOU) between DOE and the BLM Nevada State Office signed in April 2010. This EA would be used to meet the DOE's NEPA requirements in making a determination of funding.

1.4 LAND USE PLAN CONFORMANCE

The BLM-managed public lands within the Project Area are administered through the MLFO. The area is subject to the BLM Shoshone-Eureka Resource Management Plan (RMP), which was approved in 1986, and its amendments. The Proposed Action is in conformance with the Shoshone-Eureka RMP.

Part II, Section E, "Management Actions Not Expressly Addressed by the Resource Management Plan," of the RMP includes the section "Minerals Objectives and Management Decisions," brought forward unaltered from the earlier BLM "Management Framework Plan" (Record of Decision, page 29). Minerals Objectives 1, 2 and 3 lead to Management Decision #2 (Leaseable Minerals - Geothermal Steam). The three objectives are:

- Objective 1: Make available and encourage development of mineral resources to meet national, regional and local needs consistent with national objectives for an adequate supply of minerals.
- Objective 2: Assure that mineral exploration, development and extraction are carried out in such a way as to minimize environmental and other resource damage and to provide, where legally possible, for the rehabilitation of lands.
- Objective 3: Develop detailed mineral resource data in areas where different resources conflict so that informed decisions may be made that result in optimum use of the lands.

Management Decision #2 (Leaseable Minerals – Geothermal Steam), states that: "All areas designated by the BLM as prospectively valuable for geothermal steam will be open for exploration and development unless withdrawn or restricted from mineral entry. All public lands disposed of in these areas will have the geothermal resources reserved to the federal government." (BLM 1987).

The National Forest System lands within the Project Area are administered through the Austin Tonopah Ranger District. The area is subject to the USDA Forest Service Toiyabe National Forest Land and Resource Management Plan (LRMP), which was approved in 1986. The Proposed Action is in conformance with the LRMP. The following goals are identified in the LRMP which are applicable for the proposed Project Area and are provided below in their entirety:

- High quality water yields will be enhanced for approximately 949,500 acre feet to meet state water quality standards. Water rights and instream flows will be acquired as necessary for management and use of the National Forest.

- The Forest will improve water quality and manage riparian areas to satisfactory condition. All riparian area-dependent resources will be maintained or enhanced. Water resource improvement projects and other projects will be designed to improve and maintain the quality of water and soil resources.
- Threatened, endangered and sensitive species will be recognized and protected through habitat management and coordination with state wildlife agencies. Habitat will be in good-to-excellent condition. Lahontan cutthroat trout will be delisted. Paiute trout species will be firmly established. Bald eagle habitat will be maintained and peregrine falcons successfully reintroduced in the Sierra.
- Fish and game populations will be enhanced and managed at levels commensurate with habitat conditions with an emphasis on improving overall quality of wildlife habitat.
- Forest-wide programmatic inventory and evaluation will be implemented to identify cultural resources on the Toiyabe.
- Significant properties will be identified, evaluated for National Register nomination, and protected, as appropriate.
- The Forest will manage cultural resources in a comprehensive manner and eliminate “crisis management.”
- Enhancement and interpretation of cultural resources will encourage public interest.
- Use and occupancy of the National Forest will be provided when it is consistent with Forest management area objectives, is in the public interest, and when it cannot reasonably be served by development on private land.
- Land ownership will be adjusted to optimize public benefits and administrative effectiveness of the National Forest System.
- Sufficient access will be provided for public use and resource management of the Forest.
- A safe and efficient transportation network will be provided for resource protection, management and public use of National Forest System lands.
- Facilities will be developed or improved to facilitate resource management, and to ensure the health and safety of employees.

The Project Area is within Management Area #8 (Toiyabe), and there is no additional management area direction.

1.5 RELATIONSHIP TO LAWS, REGULATIONS AND OTHER PLANS

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

- The National Environmental Policy Act of 1969, as amended (Public Law [PL] 91-190, 42 U.S.C. 4321 (*et seq.*);
 - 40 CFR 1500 (*et seq.*). CEQ Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.
 - Considering Cumulative Effects under the National Environmental Policy Act [CEQ 1997];
 - USDI requirements (Departmental Manual 516, Environmental Quality [USDI 2007]);

- BLM NEPA Handbook (H-1790 1) (BLM 1988 and BLM 2008a);
- The Federal Land Policy and Management Act of 1976 (PL 94 579, 43 U.S.C. 1761 *et seq.*);
 - 43 CFR 2800, Rights-of-Way, Principles and Procedures; Rights-of-Ways under the Federal Land Policy and Management Act and the Mineral Leasing Act; Final Rule, April 22, 2005.
- The Geothermal Steam Act of 1970 (Act) (30 USC 1001-1025).
 - 43 CFR 3200, Geothermal Resources Leasing and Operations; Final Rule, May 2, 2007.
- The 2005 Energy Policy Act; The National Energy Policy, Executive Order 13212;
- Best Management Practices as defined in the Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (Gold Book) (USDI and USDA 2007);

Other environmental analysis documents which were used in production of this EA:

- Programmatic Environmental Assessment Geothermal Leasing and Exploration Shoshone-Eureka Planning Area (BLM BMFO 2002); and
- McGinness Hills Geothermal Exploration Project Environmental Assessment (BLM 2009).

1.5.1 Programmatic EIS for Geothermal Leasing in the Western United States

The Record of Decision (ROD) for the Programmatic EIS for Geothermal Leasing in the Western United States was signed on December 17, 2008 by the Department of the Interior Assistant Secretary for Land and Minerals Management. The ROD approves the BLM's decision to facilitate geothermal leasing of the federal mineral estate in 12 western states, which includes Nevada. This decision, 1) allocates BLM lands as open to be considered for geothermal leasing or closed for geothermal leasing, and identifies those National Forest System lands that are legally open or closed to leasing; 2) develops a reasonably foreseeable development scenario, and 3) adopts stipulations, best management practices and procedures for geothermal leasing and development.

These actions have been implemented as BLM Resource management plan amendments for 114 land use plans, which includes the Shoshone-Eureka RMP. The decision does not amend any USFS land use plans.

1.6 Public Involvement

1.6.1 Tribal Involvement

On August 3, 2010, BLM and USFS initiated coordination/consultation activities with the Fallon Paiute Shoshone Tribe, Battle Mountain Band Council, Duckwater Shoshone Tribe, Yomba Shoshone Tribe, Te-Moak Tribal Council, Elko Band Council, South Fork Band Council, Ely Shoshone Tribe, and Timbisha Shoshone Tribe. Members of the Western Shoshone Defense Project and the Western Shoshone Descendants of Big Smoky have been contacted and been

given an opportunity to provide information to the BLM and USFS. Various meetings/field visits have occurred and future opportunities for tribal input and participation have been extended. Coordination/consultation will be ongoing until completion of the Project (see also Section 3.4). However, depending on any site specific mitigation or monitoring agreements/commitments, coordination/consultation opportunities may continue throughout the life of the Project.

1.6.2 Public Scoping

The BLM and USFS sent out 180 public consultation letters on August 6, 2010, which contained a brief description of the proposed Project activities. The scoping period in which comments were accepted was from August 6, 2010 through September 8, 2010. A total ten responses were received from the following groups: Duckwater Shoshone Tribe, US Fish and Wildlife Service, US Environmental Protection Agency, Nevada Department of Wildlife, Center for Biological Diversity, and Western Watersheds Project.

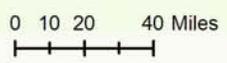
1.7 Identified Issues

In addition to requirements of law, regulation and policy, the scope of this EA is based upon specific issues and concerns identified by BLM, USFS, other federal, state and local agencies, and the members of the public. These issues, related to environmental impacts associated with the proposed Project, are:

- Impacts to cultural resource sites;
- Impacts to Native American concerns;
- Impacts to riparian vegetation and riparian habitat;
- Impacts to visual resources;
- Impacts to Special Status Species, including sage-grouse and pygmy rabbits; and
- Impacts to the quality and quantity of waters on public lands.



- Nevada Major Towns
- U.S. Highway
- State Route
- Interstate



1:3,500,000

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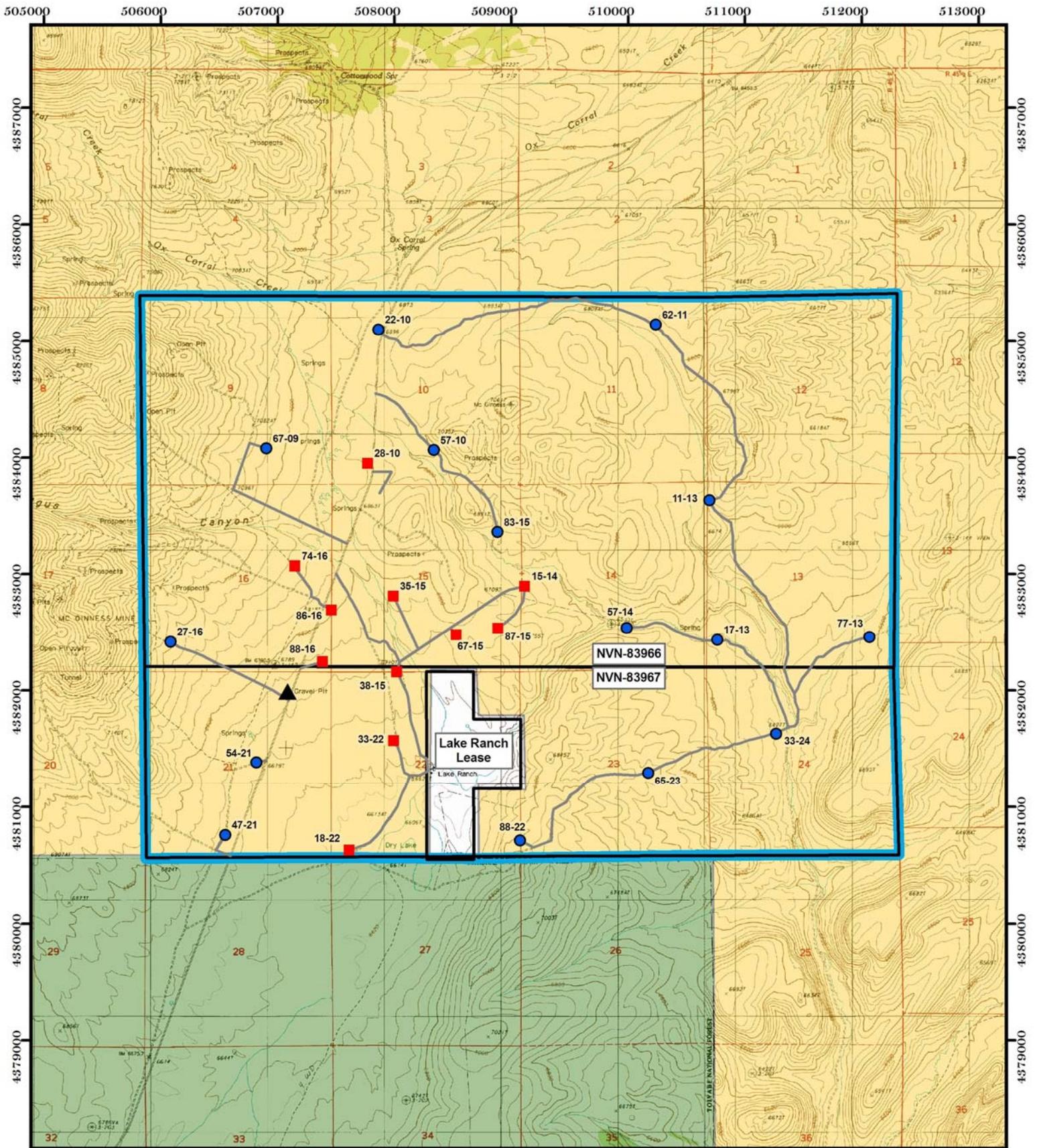
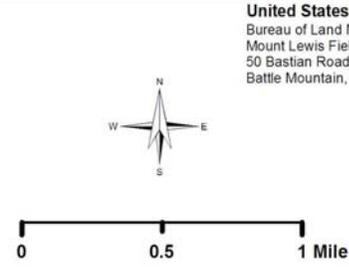


Figure 2: McGinness Hills Geothermal Exploration EA Approved Activities

- Previously Approved Access Roads
- ▲ Previously Approved Gravel Source
- Previously Approved Temperature Gradient Hole (TGH) Location
- Previously Approved TGH/Observation/Production Well Location
- McGinness Hills Geothermal Unit Area
- Geothermal Lease Boundaries
- Bureau of Land Management Administered Land
- Forest Service Administered Land
- Private



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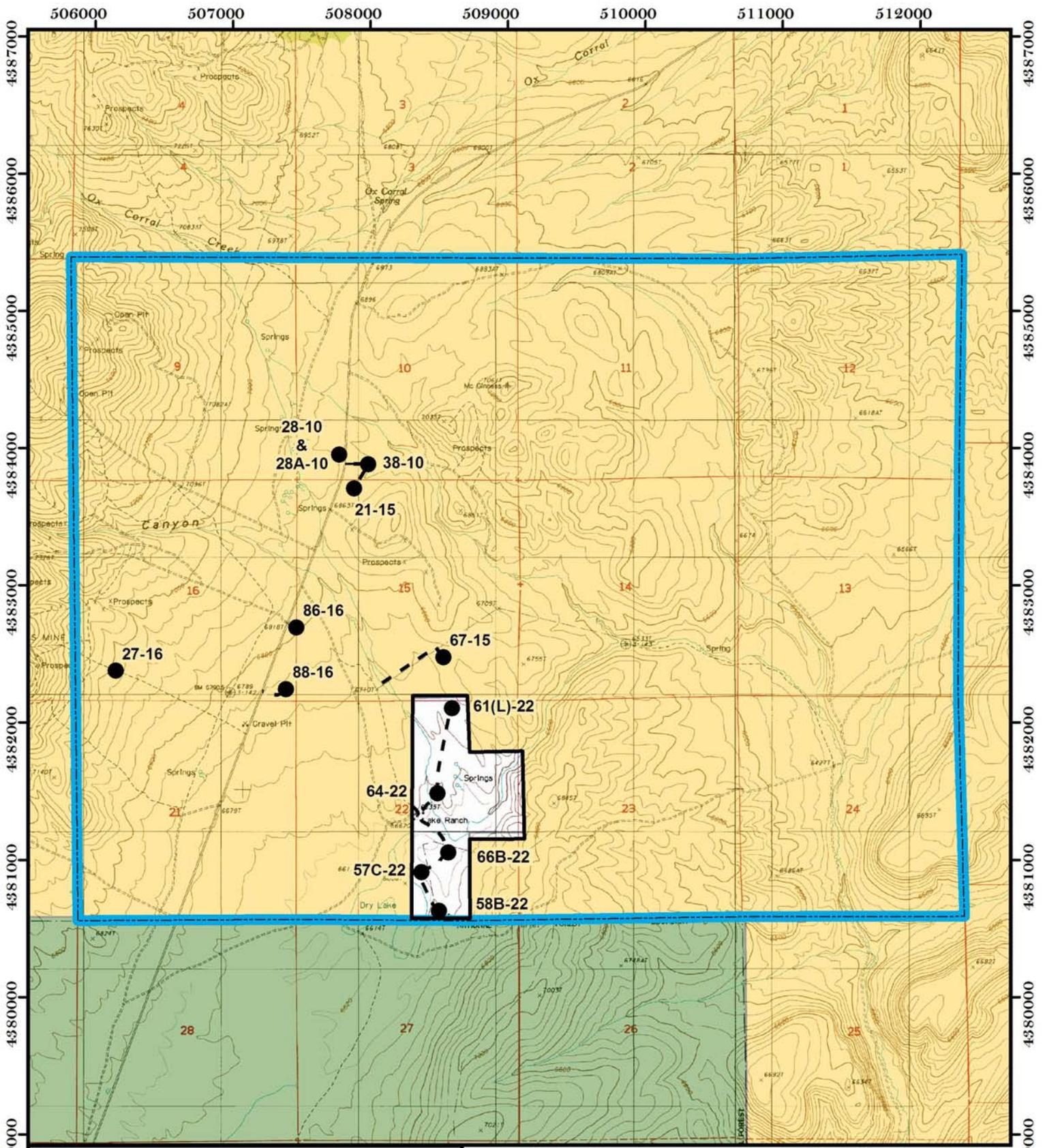


Figure 3: Activities Constructed on Public and Private Land

- Constructed Well Sites
- - Existing Access Roads
- ▭ McGinness Hills Geothermal Unit Area
- ▭ Geothermal Lease Boundaries
- Bureau of Land Management Administered Land
- Forest Service Administered Land
- Private



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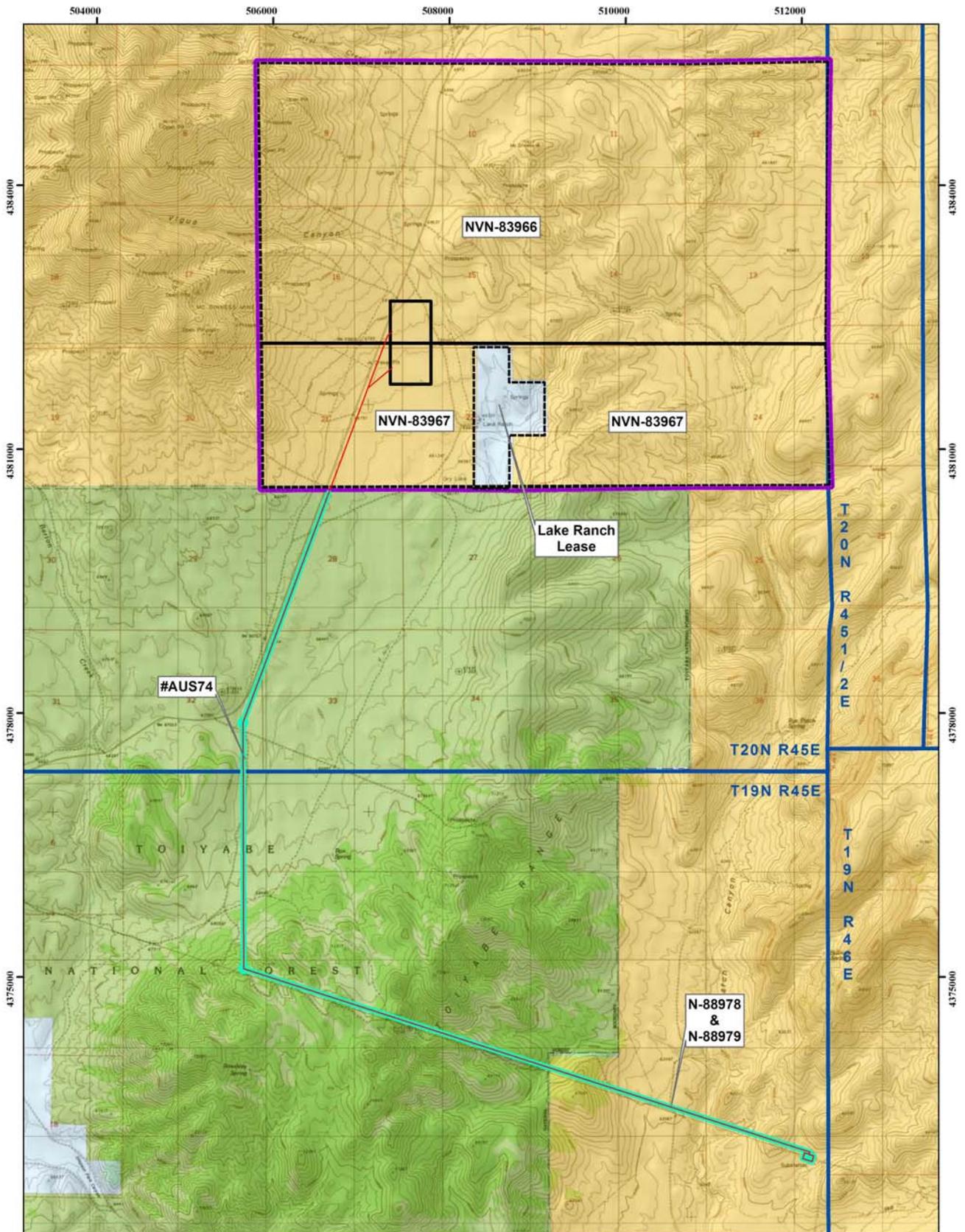


Figure 4: McGinness Hills Unit Area and Transmission Line Corridor Overview

- 230 kV Transmission Line-Proposed
- Project Area
- Development Area
- McGinness Hills Geothermal Unit Area
- Geothermal Lease Boundaries
- Bureau of Land Management
- Forest Service
- Private



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0 0.5 1 Mile

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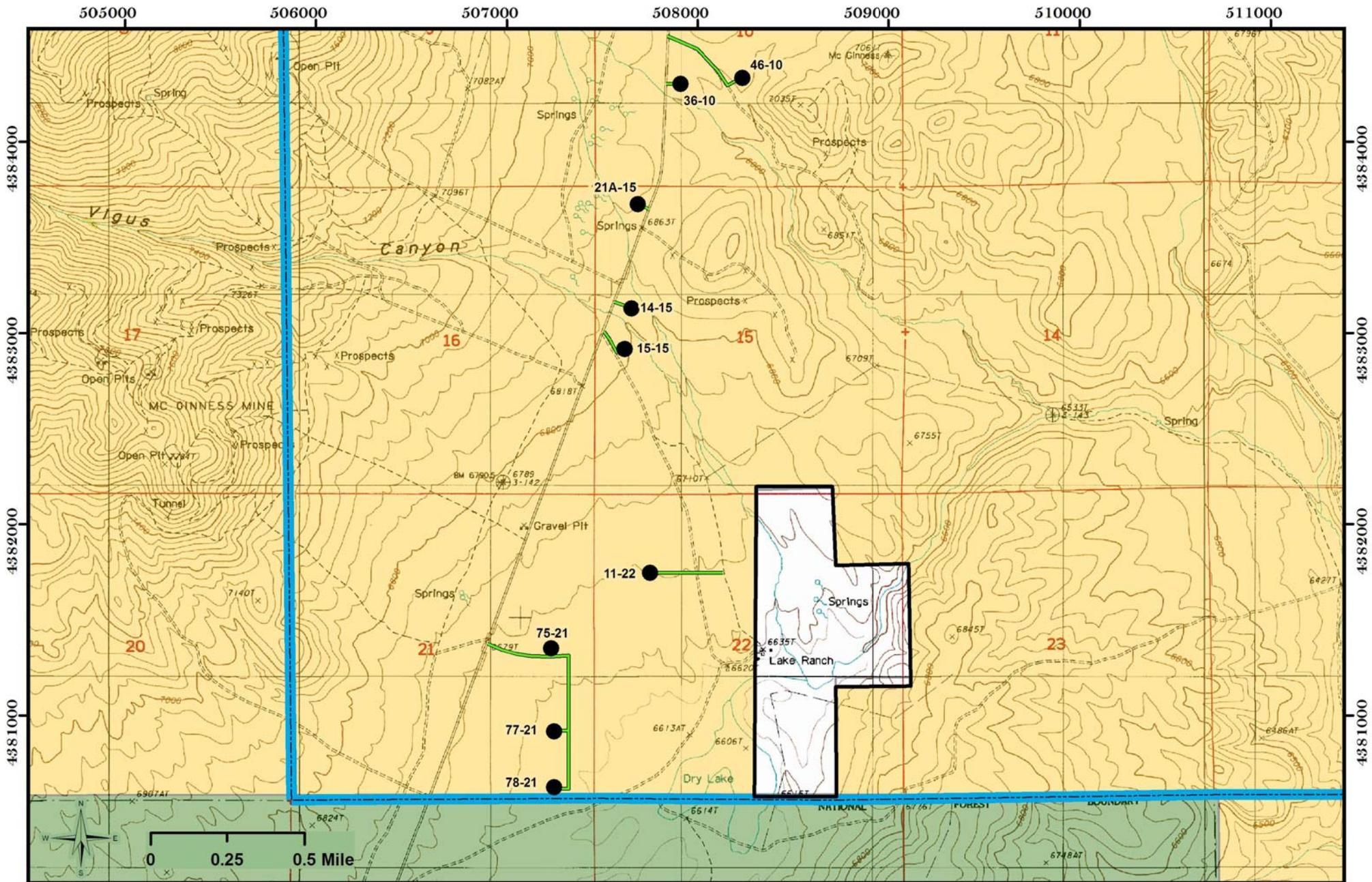


Figure 5: New Wells and Associated Roads Proposed Under the Development Project

- New Wells
- Private
- Forest Service Administered Land
- Bureau of Land Management Administered Land
- Proposed Access Roads
- McGinness Hills Geothermal Unit Area
- Geothermal Lease Boundaries



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Map Date : 05/05/2011

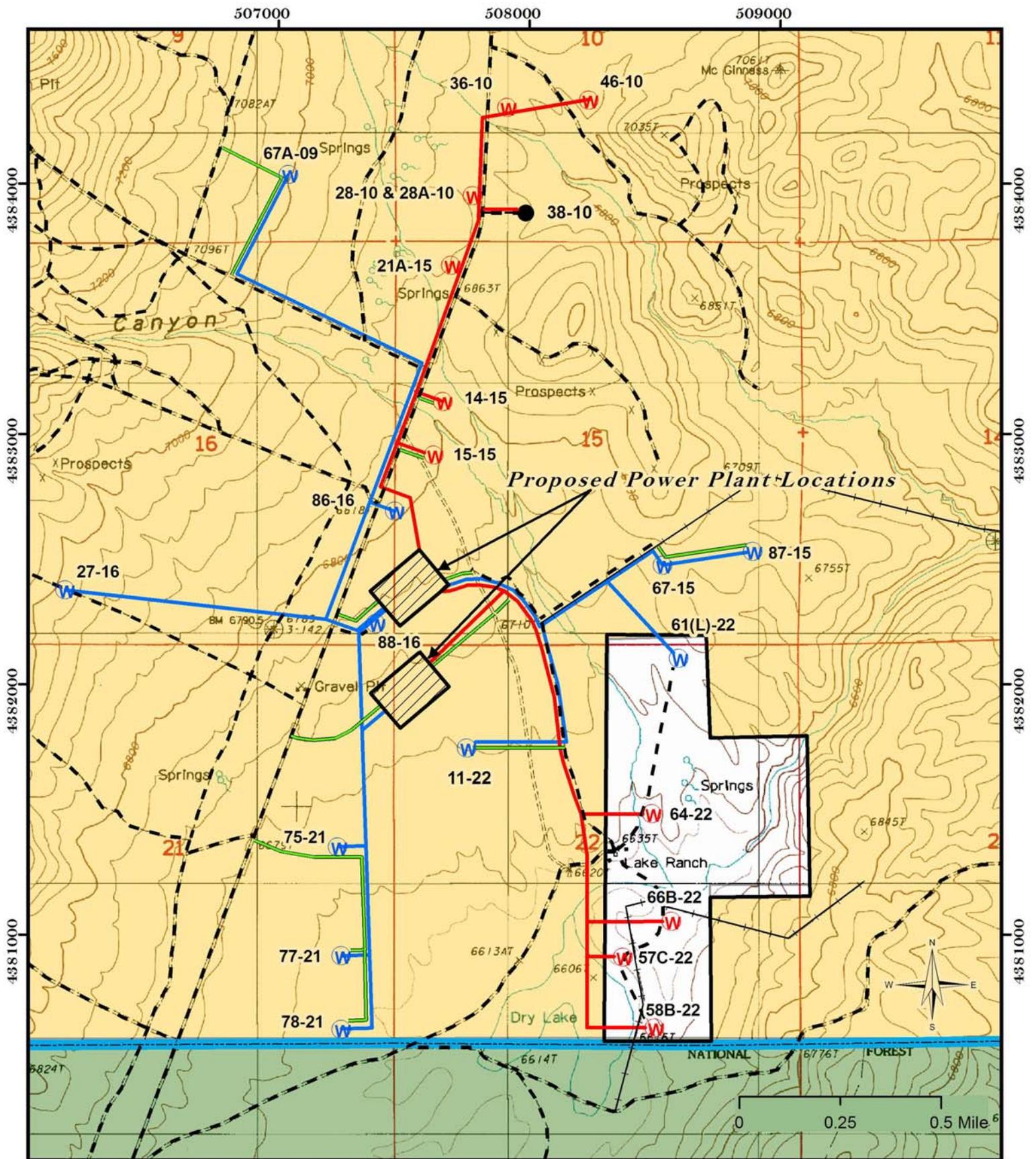


Figure 6: McGinness Hills Geothermal Development Project Components



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Map Date : 05/05/2011

2 PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

2.1.1 Proposed Project Area

The proposed Project Area is composed of the federal geothermal Unit Area and the width of the proposed ROW for the transmission line (200-feet wide, expanded an additional 100 feet at the angle points) (see Figure 4). The Project components within the proposed Project Area, either avoid adverse effects to eligible or unevaluated historic properties, or the adverse effects will be mitigated by an accepted Historic Properties Treatment Plan (HPTP).

2.1.2 Power Plants

Under the Proposed Action, Ormat would build and operate two binary air-cooled geothermal power plants, each approximately 33 MW (net), 45 MW (gross). One proposed power plant would be primarily located in the SW1/4SW1/4 Section 15, T.20N., R.45E. The other proposed power plant would be primarily located in the NW1/4NW1/4 Section 22, T.20N., R.45E (see Figure 6, depicting specific locations of the power plants). Each power plant would have a surface disturbance of approximately 16.5 acres. A substation, used to transform generated low voltage to the higher voltage required for a transmission line, would be constructed within each power plant boundary.

Additionally, a microwave communication tower and antenna would be constructed within each of the proposed power plant sites to deliver signals from control centers and other remote locations, and to report operating status. This network would also provide voice communication from dispatchers to power plant operators and maintenance personnel. The communications towers would be about 40 feet high and would be constructed at the proposed power plant sites, with a microwave antenna aimed toward an existing communication link at Austin Peak (SW1/4NW1/4 Section 5, T.18N., R.44E.) on National Forest System lands.

2.1.2.1 Construction Procedures and Surface Disturbance

Power plant site preparation activities would begin with clearing, earthwork, drainage, fencing and other improvements necessary for commencement of construction. Clearing would include removal of organic material, stumps, brush and slash, and will be stockpiled onsite for interim reclamation purposes throughout the proposed Project Area. Fencing of the power plant sites would be required for security and safety during construction, and would be permanent throughout the life of the proposed Project.

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

Mobile trailers or similar suitable facilities (e.g., modular offices) would be brought to the site to be used as construction offices for owner, contractor, and subcontractor personnel, and would be located within the disturbed areas associated with power plant and well pad construction areas. Parking would be provided for construction workers and visitors within the power plant areas.

Temporary utilities would be provided for the construction offices, the laydown area, and the power plant sites. Temporary construction power would be supplied by a portable generator and, if available when the transmission line is completed, at the site by utility-furnished power. Area lighting would be provided for safety and security. Drinking water would be imported and distributed daily. Portable toilets would be provided throughout the site.

Unless precluded by safety requirements, power plant buildings, structures, pipe, etc. would be painted covert green to blend with the area and minimize visibility, pursuant to BLM Instructional Memorandum (IM) 2007-021.

Estimates of the short and long term surface disturbance resulting from construction of the power plants are summarized in Table 5, on page 33.

2.1.2.2 Operation and Maintenance Procedures

The Ormat power plants will utilize an air-cooled binary geothermal design.

The geothermal fluids for the binary power plants would be produced from the production wells by pumping. Once delivered to the power plants by the geothermal fluid production pipelines, the heat in the geothermal fluid would be transferred to the “binary” (“secondary” or “working”) fluid in multiple-stage, non-contact heat exchangers (“vaporizers”). The binary turbine units would use pentane (C₅H₁₂), a flammable but non-toxic hydrocarbon, as the binary fluid, which would circulate through each power plant in a closed loop. The heat from the geothermal fluid would vaporize the binary fluid, which would turn the binary turbine and electrical generator to make electricity.

The vaporized binary fluid would exit the turbine and be condensed back into a liquid in an air cooled condenser. The condensed binary fluid would then be pumped back to the vaporizers for re-heating and vaporization, completing the closed cycle.

The geothermal fluid exiting from the vaporizers would be pumped under pressure out to the geothermal injection wells through the injection pipelines and injected back into the geothermal reservoir. The geothermal fluid would flow through the binary power plant in a closed system, with minimal emissions of non-condensable gases to the atmosphere.

Air-cooled condensers are large, open structure air-cooled heat exchangers, and would be the most prominent features of the power plants, both with respect to height and mass. They range between 28 and 35 feet in height and are about two-thirds the length of each site. Large finned tube radiators lie horizontal approximately 20 feet above the ground on steel beams. Large horizontal fans (about thirteen feet in diameter) on top of the tube assemblies draw ambient air at

the dry bulb temperature up through the tubes, cooling and condensing the binary vapor flowing through the inside of the tubes.

2.1.3 Wells, Wellfields, Well Maintenance and Other Ancillary Facilities

Production wells flow geothermal fluid to the surface. Injection wells are used to inject geothermal fluid from the power plant into the geothermal reservoir. Injection ensures the longevity and renewability of the geothermal reservoir. The number of geothermal production and injection wells required for the Project is principally dependent on the productivity (or injectivity) of the wells and the temperature and pressure of the produced geothermal fluid. Operation of the McGinness Hills power plants would co-mingle production from wells on federal leases with production from wells on the private Lake Ranch lease.

Within the McGinness Hills Unit Area, Ormat expects that together the two power plants would require 11 production wells (7 on public lands managed by the BLM and 4 on private lands) and 11 injection wells (10 on public lands managed by the BLM and 1 on private land) (see Figure 6). These sites are comprised of previously approved sites as identified in the McGinness Hills Exploration EA, relocated sites, private land sites and newly proposed sites (see Table 1). Two of the production wells (28-10 and 28A-10) would be drilled from the same well pad.

McGinness Hills Geothermal Development Project
Environmental Assessment: DOI-BLM-NV-B010-2011-0015-EA

Table 1: Well Status, Current and Historic

Kettleman No.	Type ¹	Section No. and Aliquot Part (T. 20 N., R. 45 E.)	UTM (NAD 83)		Approval		Current Status
			Easting	Northing	Date	Type ²	
<i>Sites Identified in McGinness Hills Geothermal Exploration EA (BLM 2009)</i>							
22-10	T	NW1/4NW1/4, Sec. 10	507783	4385300	4/2009	EA	Not built.
57-10	T	SW1/4SE1/4, Sec. 10	508258	4384265	4/2009	EA	Not built.
83-15	T	SE1/4NE1/4, Sec. 15	508801	4383556	4/2009	EA	Not built.
57-14	T	SW1/4SE1/4, Sec. 14	509908	4382735	4/2009	EA	Not built.
47-21	T	SE1/4SW1/4, Sec. 21	506473	4380957	4/2009	EA	Not built.
88-22	T	SE1/4SE1/4, Sec. 22	508995	4380908	4/2009	EA	Not built.
33-24	T	SE1/4NW1/4, Sec. 24	511189	4381831	4/2009	EA	Not built.
17-13	T	SW1/4SW1/4, Sec. 13	510685	4382633	4/2009	EA	Not built.
11-13	T	NW1/4NW1/4, Sec. 13	510616	4383830	4/2009	EA	Not built.
62-11	T	NW1/4NE1/4, Sec. 11	510158	4385343	4/2009	EA	Not built.
65-23	T	NW1/4SE1/4, Sec. 23	510094	4381493	4/2009	EA	Not built.
54-21	T	SW1/4NE1/4, Sec. 21	506739	4381586	4/2009	EA	Not built.
77-13	T	SE1/4SE1/4, Sec. 13	511987	4382655	4/2009	EA	Not built.
27-16	F	SW1/4SW1/4, Sec. 16	506005	4382616	11/2009	Sundry/GDP	Proposed as TGH. Pad built; well drilled. Proposed for development. (see below)
67-9	T	SW1/4SE1/4, Sec. 9	506823	4384280	4/2009	EA	Not built. Proposed for development (see below)
21-15	F	NW1/4NW1/4, Sec. 15	507791	4383890	4/2009	GDP	Pad built; well drilled. Not included in development project; will be reclaimed.
35-15	T/O/F	NE1/4SW1/4, Sec. 15	507912	4383011	4/2009	EA	Not built.
18-22	T/O/F	SW1/4SW1/4, Sec. 22	507536	4380825	4/2009	EA	Not built.
86-16	F	NE1/4SE1/4, Sec. 16	507382	4382890	06/2009	GDP	Pad built; well drilled. Proposed for development (see below).
88-16	F	SE1/4SE1/4, Sec. 16	507306	4382444	10/2009	GDP	Pad built; well drilled. Proposed for development (see below).
74-16	T/O/F	SE1/4NE1/4, Sec. 16	507062	4383354	4/2009	EA	Not built.
33-22	T/O/F	SE1/4NW1/4, Sec. 22	507915	4381773	4/2009	EA	Not built.
15-14	M	NW1/4SW1/4, Sec. 14	509037	4383095	5/2009	Sundry/GDP	15-14 relocated to 38-10. Monitoring well drilled. Proposed for development (see below).
28-10	F	SW1/4SW1/4, Sec. 10	507693	4384153	02/2010	GDP	Pad built; two wells drilled on pad. Both wells proposed for development (see below).
38-15	W	SE1/4SW1/4, Sec. 15	507941	4382357	04/2009	EA	Not built
87-15	T/O/F	SE1/4SE1/4, Sec. 15	508809	4382732	4/2009	EA	Not built. Proposed for development (see below).
67-15	F	SW1/4SE1/4, Sec. 15	508452	4382677	08/2010	GDP	Pad built; well drilled. Proposed for development (see below).
<i>Sites Constructed on Private Land</i>							
61(L)-22	F	NW1/4NE1/4 Sec. 22	508594	4382099	01/2010	NDOM	Pad built; well directionally drilled. Proposed for development (see below).
64-22	F	SW1/4NE1/4, Sec. 22	508487	4381484	09/2009	NDOM	Pad built; well drilled. Proposed for development (see below).
66B-22	F	NW1/4SE1/4, Sec. 22	508487	4381087	09/2009	NDOM	Pad built; well drilled. Proposed for development (see below).
57C-22	F	SW1/4SE1/4, Sec. 22	508371	4380910	09/2009	NDOM	Pad built; well drilled. Proposed for development (see below).
58B-22	F	SW1/4SE1/4, Sec. 22	508496	4380630	09/2009	NDOM	Pad built; well drilled. Proposed for development (see below).
<i>Proposed in McGinness Hills Geothermal Development Project</i>							
46-10	P	NE1/4SW1/4, Sec. 10	508234	4384335	NA	NA	Pad not built. To be used in development project.
36-10	P	NW1/4SW1/4, Sec. 10	507909	4384302	NA	NA	Pad not built. To be used in development project.

McGinness Hills Geothermal Development Project
Environmental Assessment: DOI-BLM-NV-B010-2011-0015-EA

Kettleman No.	Type ¹	Section No. and Aliquot Part (T. 20 N., R. 45 E.)	UTM (NAD 83)		Approval		Current Status
			Easting	Northing	Date	Type ²	
28-10	P	SW1/4SW1/4, Sec. 10	507754	4383941	NA	NA	Pad built (co-located with 28A-10) and well drilled. To be used in development project.
28A-10	P	SW1/4SW1/4, Sec. 10	507754	4383941	NA	NA	Pad built (co-located with 28-10) and well drilled. To be used in development project.
14-15	P	SW1/4NW1/4, Sec. 15	507653	4383129	NA	NA	Pad not built. To be used in development project.
15-15	P	NW1/4SW1/4, Sec. 15	507618	4382918	NA	NA	Pad not built. To be used in development project..
21A-15	P	NW1/4NW1/4, Sec. 15	507686	4383675	NA	NA	Pad not built. To be used in development project.
64-22	P	SW1/4NE1/4, Sec. 22	508487	4381484	NA	NA	Pad built and well drilled. To be used in development project.
66B-22	P	NW1/4SE1/4, Sec. 22	508487	4381087	NA	NA	Pad built and well drilled. To be used in development project.
57C-22	P	SW1/4SE1/4, Sec. 22	508371	4380910	NA	NA	Pad built and well drilled. To be used in development project.
58B-22	P	SW1/4SE1/4, Sec. 22	508496	4380630	NA	NA	Pad built and well drilled. To be used in development project.
67A-9	I	SW1/4SE1/4, Sec. 9	507036	4384033	NA	NA	Pad not built. To be used in development project
86-16	I	NE1/4SE1/4, Sec. 16	507471	4382704	NA	NA	Pad built and well drilled. To be used in development project.
27-16	I	SW1/4SW1/4, Sec. 16	506148	4382376	NA	NA	Pad built and well drilled. To be used in development project.
75-21	I	NE1/4SE1/4, Sec. 21	507238	4381351	NA	NA	Pad not built. To be used in development project
77-21	I	SE1/4SE1/4, Sec. 21	507253	4380915	NA	NA	Pad not built. To be used in development project
67-15	I	SW1/4SE1/4, Sec. 15	508532	4382477	NA	NA	Pad built and well drilled. To be used in development project.
87-15	I	SE1/4SE1/4, Sec. 15	508889	4382532	NA	NA	Pad not built. To be used in development project
78-21	I	SE1/4SE1/4, Sec. 21	507250	4380623	NA	NA	Pad not built. To be used in development project
61(L)-22	I	NW1/4NE1/4 Sec. 22	508594	4382099	NA	NA	Pad built and well drilled. To be used in development project.
11-22	I	NW1/4NW1/4, Sec. 22	507749	4381745	NA	NA	Pad not built. To be used in development project.
38-10	M	SE1/4SW1/4, Sec. 10	507985	4383882	NA	NA	Pad built and monitoring well drilled. To be used in development project.

1: Temperature Gradient Hole (T); Observation Well (O); Full-Size Well (F); Production Well (P); Injection Well (I); Monitoring Well (M)
2: Environmental Assessment (EA); Sundry Notice (Sundry); Geothermal Drilling Permit (GDP)

2.1.3.1 Construction Procedures and Surface Disturbance

Each well is or would be located on a well pad in the shape of a rectangle and approximately 4.2 acres in size.

Reserve pits would be constructed on each pad for the containment and temporary storage of water, drill cuttings and waste drilling mud during drilling operations. Each reserve pit would be constructed in accordance with best management practices identified in the “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development (The Gold Book)” (Fourth Edition – 2007) and would measure approximately 75 feet by 200 feet by 10 feet deep (a 2-ft freeboard would be maintained). The McGinness Hills Geothermal Exploration EA (BLM 2009) identified 3 freshwater wells in the vicinity of the Project as having depth to groundwater of 10-20 feet. In order to prevent co-mingling geothermal fluids and other potential contaminants from the drilling process with groundwater, Ormat would line all reserve pits with an approved pit liner.

During well drilling, the reserve pits would be fenced on three sides, per the Gold Book standard. Once drilling has been completed, the fourth side would be fenced. Fencing would prevent access by persons, wildlife or livestock. In addition to this fence, Ormat would install a smaller-mesh barrier/wildlife deterrent fence. This fence helps exclude smaller mammals and also provides a measure of protection to human safety. All fencing would remain in place until pit reclamation begins.

Well pad construction on BLM-managed land would disturb a total of 75.6 acres. Well pads constructed on private land have disturbed a total of 21 acres. The estimated short and long term surface disturbance associated with well pad construction and other geothermal wellfield activities is summarized in Table 5 on page 33.

2.1.3.2 Well Drilling and Testing

The specific drill rig and drilling information proposed for the Project is provided in Table 2. Photo 1 is a representative shot of a geothermal well site during well drilling.

Table 2: Well Drilling Specifics

Rig Type	Rig Height (ft.)	Trucks Needed (on average)	Drilling Time (days) ¹	Workers On Site	Depth Drilled (ft.)
Large rotary drilling rig	160-170	25+ tractor/trailer 8 small trucks	45 ²	Avg. = 9-10 Max = 18	7,000
¹ Difficulties encountered during the drilling process, including the need to re-drill the well, could as much as double the time required to successfully complete each well. ² Drilling would be conducted 24 hours a day, 7 days a week.					



Photo 1: Representative Geothermal Well Site During Well Drilling

The drilling supervisor and mud logger would typically sleep in a trailer on the active drill site while the well is being drilled. The drilling crew may also live “on site” during the drilling operations in a self-contained “bunkhouse” (sleeping quarters, galley, water tank and septic tank) or portable trailers which would be placed on one of the drill sites not being actively drilled to accommodate the drill rig workers.

“Blow-out” prevention equipment would be utilized while drilling below the surface casing. During active drilling operations, a minimum of 10,000 gallons of cool water and 12,000 pounds of inert, non-toxic, non-hazardous barite (barium sulfate) would be stored at each well site for use in preventing uncontrolled well flow (“killing the well”).

The well bore 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 would be hazardous substances (see Section 3.12), but they would only be used in low concentrations that would not render the drilling mud toxic.

Additional drilling mud would be mixed and added to the mud system as needed to maintain the required quantities.

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

Well redrilling may consist of: 1) reentering and redrilling the existing well bore; 2) reentering the existing well bore and drilling and casing a new well bore; or 3) sliding the rig over a few feet on the same well pad and drilling a new well bore through a new conductor casing. While the drill rig is still over the well, the residual drilling mud and cuttings would be flowed from the well bore and discharged to the reserve pit.

Short-Term Well Testing

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

Long-Term Well Testing

One or more long-term flow test(s) of each well drilled may 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 between 7-30 days, would be conducted by pumping the geothermal fluids from the well through onsite test equipment closed to the atmosphere (using a line shaft turbine pump or electric submersible pump) to the reserve pit. Each long-term well test is expected to flow approximately 15 million gallons.

A surface booster pump would then pump the residual produced geothermal water/fluid from the reserve pit through a temporary 8” to 10” 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 on the surface of the disturbed shoulders on the access roads connecting the geothermal full-size wells (as required, roads would be crossed by trenching and burying the temporary pipe in the trench). The onsite test equipment would include standard flow metering, recording, and sampling apparatus.

Geothermal fluid produced from a well during flow testing will also drain to the reserve pit. The reserve pit waste will be sampled for hazardous contaminants. Typical tests may include the Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311), tested for heavy metals; pH (EPA Method 9045D); Total Petroleum Hydrocarbons/Diesel (EPA Method 8015B);

and Oil and Grease (EPA Method 413.1). Contaminated materials, if any, would be disposed of at an approved facility.

2.1.3.3 Well Operations

Once a well is drilled and well head completed, an industrial grate would be placed over the hole to prevent humans and wildlife from falling into the cellar.

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

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

An approximately 15-foot by 15-foot by 10-foot high motor control building may be located on production well pads within approximately 50 feet of each production well. The well control systems, data transmitters and geothermal fluid treatment systems used for the injection wells would be placed inside a smaller structure on the injection well pads.

2.1.4 Geothermal Pipelines

Geothermal production pipelines bring the geothermal fluid from the production wells to the power plant. Geothermal injection pipelines deliver the cooled geothermal fluid from the power plant to the injection wells.

Approximately 3.65 miles of production pipeline (3.28 miles on public lands managed by the BLM and 0.37 miles on private land) and 5.33 miles of injection pipeline (5.26 miles on public land managed by the BLM and 0.07 miles on private land) would be constructed within the McGinness Hills Unit Area (see Figure 6). A 60-foot wide construction corridor would be needed along the length of the pipeline. Long term disturbance associated with pipeline operation assumes a 20-foot width along the length of the pipeline, as some of the short term construction disturbance would be reclaimed following completion of construction.

The production and injection pipeline routes generally follow the shortest distance from each well pad to the next well pad or the power plant in order to minimize the amount of pipe required, reduce heat losses, reduce the energy required to move the fluids, and to minimize the amount of surface disturbance associated with the pipeline. Additionally, the proposed pipeline routes are generally located adjacent to existing or proposed roads to facilitate ongoing monitoring and future maintenance.

The final alignment and total lengths of the pipeline routes would be dictated by the specific wells developed for the project and the need to match fluid characteristics and balance fluid volumes in these pipelines.

2.1.4.1 Construction Procedures and Surface Disturbance for the Geothermal Pipelines

The geothermal fluid pipelines would be constructed from seamless, welded-steel pipe. They are expected to range in diameter from 8 inches to 24 inches. Two to three inches of insulation and a protective aluminum sheath would jacket the steel production pipes, increasing the diameter of the finished production pipelines by up to six inches. Unless precluded by safety requirements, pipelines and power trays would be painted covert green to blend with the area and minimize visibility, pursuant to BLM IM 2007-021.

Horizontal and/or vertical expansion loops (a square bend in the pipeline approximately 30 feet in length by 40 feet in width) would be constructed about every 300 to 600 feet along the production pipelines. Expansion loops allow the pipeline to flex as it lengthens and shortens due to heating and cooling. Fewer expansion loops would be needed along the injection pipelines, as the injection pipelines are subject to less heating and cooling.

The pipelines would be constructed near ground level (averaging about one foot of ground clearance) on steel supports called “sleepers.” Sleepers support the pipeline and would be constructed approximately every 30 feet.

When completed, the top of the new geothermal pipelines would average three feet above the ground surface. However, a number of pipeline lengths could be up to six feet in height to accommodate terrain undulations and to facilitate movement of wildlife and livestock through the wellfield. Additionally, to further facilitate livestock movement and access to water, the pipelines would be buried at the following three locations in T.20N., R.45E.: Section 10, SW1/4; Section 21, NE1/4; and Section 22, NW1/4NE1/4.

The pipelines would be constructed across roads to allow continued vehicle access, either by trenching under the road, or running the roadbed up and over the pipeline. Electrical power and instrumentation cables for the wells would then be installed in steel conduit constructed along the same pipe sleepers.

Photo 2 below shows a typical insulated geothermal pipeline with electrical cables.



Photo 2: Typical Insulated Geothermal Pipeline with Electrical Cables

The estimated short and long term surface disturbance associated with pipeline construction activities is summarized in Table 5 on page 33.

2.1.4.2 Operation and Maintenance Procedures of Geothermal Pipeline

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

2.1.5 Right of Way/Special Use Permit for the Transmission Line Corridor and Fiber Optic Line

Ormat is also proposing to construct, operate and maintain an approximately 9.01-mile 230 kV overhead transmission line and fiber optic line (for control and protection of the electrical system, and would be an exclusive use for Ormat), originating at the proposed McGinness Hills substation adjacent to the power plant in the SW1/4SW1/4 Section 15, T.20N., R.45E and terminating at the existing SPPCo/NVE Frontier substation in the SE1/4 Section 13,

T19N, R45E; which is located on public lands managed by the BLM (see Figure 4). The transmission line and fiber optic line would be co-located. The proposed transmission line would require a 200-foot wide ROW (90-foot permanent width and an additional 110-foot temporary width required for construction). At the angle points, an additional 100-foot width would be required.

No additional surface disturbance associated with improvements to the existing SPPCo./NVE substation is anticipated.

Approximately 3.22 miles of the proposed 230 kV transmission line would be located on public lands managed by the BLM, while the remaining 5.79 miles would be located on National Forest System lands (see Figure 4).

2.1.5.1 Construction Procedures and Surface Disturbance of the Transmission Line

The entire route of the transmission system would be mono-pole with perch protection on the top of every pole. The two exceptions would be the angle points and the switch structures (see Table 3). Structural components would be transported to the pole location site by truck or helicopter. Helicopter operations would be located at the Austin airport. Structure sites would include assembly and crane-landing areas. On average, each of these structure sites would disturb an area of approximately 2,500 square feet. For ground construction, a crane or helicopter would be used to erect the structure. Approximately 14 poles would be placed by helicopter. The approximate area of helicopter pole placement is reflected on Figure 8. Specific helicopter pole placement locations are identified in the Plan of Development. Total short term and long term surface disturbance associated with the transmission line is shown in Table 5.

Equipment could include cranes, augers, bulldozers, bucket trucks, backhoes, air compressors, electric generators, pickup trucks, and other vehicles, machinery, and field equipment. Construction materials and equipment would be placed in areas that would minimize disturbance to vegetation. Existing USFS and BLM roads would be used for construction of the transmission line and no new roads would be constructed.

2.1.5.2 Facility Design Factors and Additional Components

The transmission line would be designed to meet all temperature, wind, voltage, span and structure height clearance requirements. The proposed transmission line would also provide raptor protection in compliance with the standards described in the “Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006” (APLIC 2006). To prevent perching, a cone (Kaddas Enterprises type KE1140 or equal) would be installed on the top of each transmission line pole along the entirety of the transmission line.

The design, construction, operation, and maintenance of the 230 kV transmission line would meet or exceed the requirements of the National Electrical Safety Code (NESC), U.S. Department of Labor, Occupational Safety and Health Standards, and Sierra Pacific Power Company’s requirements for safety and protection of landowners and their property.

Typical design characteristics for the transmission line are summarized in Table 3 below.

Table 3: Typical Transmission Line Typical Design Characteristics

Type of structure	69 Single weathering steel poles (see Figure 9 and Figure 10). Two (2) weathering three-pole steel structures. One (1) two-pole steel switch structure. One (1) wood H-Frame structure.
Structure height	Single Pole: 82 to 104 feet (above ground line), direct buried 10% + 4' of total pole length. Three Pole: 48 to 52 feet (above ground line), direct buried 10% + 2' of total pole length. Switch Structure: ~50 feet (above ground line), direct buried. H-Frame: ~80 feet (above ground line), direct buried.
Span length	Average ~ 640 ft.; Minimum ~ 150 ft.; Maximum ~ 1,240 ft.
Number of structures/mile	Approximately 8 per mile
Structure Base	Direct embedded
Conductor Types	Conductor – 795 ACSR All Aluminum “Tern” Shield Wire – Optical Ground Wire, 12 Fiber Insulators – lightweight, thin line polymer rubber with non-reflective light gray color
Clearance of Conductor	Minimum of 8 feet phase to phase based on SPPCo standard for structures at 230 kV

Staging areas would be located on public land managed by the BLM and on private land locations as identified in Table 4 below and as shown on Figure 7. These staging areas would be used to temporarily store materials required for construction. There would be no additional surface disturbance related to the staging areas, as the areas are either already disturbed (i.e. Frontier Substation area) or the surface disturbance is accounted for in other areas of this EA (i.e. the well sites and power plant area).

Table 4: Staging Area Locations

Staging Areas	Township/ Range	Legal Description (Section Number & Aliquot Part)
McGinness Hills Power Plant Area	T.20N., R.45E.	SW1/4SW1/4 Section 15
Well Site 75-21	T.20N., R.45E.	NE1/4SE1/4 Section 21
Well Site 87-15	T.20N., R.45E.	NE1/4SE1/4 Section 15
Frontier Substation Area	T.19N., R.45E.	SE1/4 Section 13
Well Site 66B-22	T.20N., R.45E.	NW1/4SE1/4 Section 22
Well Site 57C-22	T.20N., R.45E.	SW1/4SE1/4 Section 22

Conductor pulling sites for stringing the conductor would typically be spaced at 12,000 feet to 15,000 feet intervals. However, distances between each site would vary depending on the geography and topography and environmental sensitivity of the specific area, the length of the conductor pull, and the accessibility by equipment. Pulling sites would require a temporary

working area. At each pulling site, stringing equipment would be set up approximately 250 feet from the initial structure for leveraging the conductor pull safely. Angle structure pulling sites will be located inside the temporary construction ROW, and all conductor pulling operations will be contained within the environmental study corridor.

The estimated short and long term surface disturbance associated with transmission line construction activities are summarized in Table 5 on page 33.

2.1.5.3 Operation and Maintenance Procedures for the Transmission Line and Fiber Optic Line

Infrequently, maintenance would include transmission line, fiber optic line and pole repair and/or replacement. Corridor maintenance could include limbing and brushing activities. Ormat would annually inspect the transmission line from a light, off-road vehicle. Repairs and/or facility replacement would transpire, as necessary. Routine travel within the ROW is not expected. Repair and maintenance of the access roads commensurate with the operator's use could be determined by the BLM and/or USFS.

2.1.6 Water Requirements and Needs

Water required for well drilling and testing is estimated to be 13.0 acre feet total. Water required for construction of each power plant and the associated pipelines (including earthwork, erosion control, concrete, finishing subgrade and aggregate base) is estimated to be 17.6 acre feet throughout the 2 year construction period. Therefore, total water required for well drilling and construction is estimated to be 30.6 acre feet.

Water required for construction activities would be obtained from a water well (Lancaster B well) on private land at the Grass Valley Ranch (T. 21 N., R. 46 E., SE1/4NW1/4, Section 16). This water would be trucked from Lancaster B to the construction sites. Ormat would obtain a waiver from the Nevada State Water Engineer (Nevada Department of Water Resources) for the use of the Lancaster B well.

A water well, which would be used for domestic purposes only, would be drilled at each power plant site. Water consumption from each well would be approximately 2.5-3.0 af/yr.

2.1.7 Site Access

The Project Area would be accessed by traveling south on State Route 305 from Battle Mountain, Nevada approximately 87.5 miles to US-50. Turn left onto US-50 and travel east for approximately 6 miles. Turn left onto a north-northeast trending Lander County road (County Road 201, also known as the Grass Valley Road) and travel for approximately 10 miles. County Road 201 runs through the western portion of the proposed Project Area (see Figure 4 and Figure 6).

The proposed Project Area is traversed by numerous roads and “two-tracks.” To the extent feasible, existing roads will be utilized for Project construction and operations. Existing roads would be maintained as necessary to prevent the formation of deep ruts.

Within the McGinness Hills Unit Area, approximately 2.19 miles of new access roads will be constructed on public lands managed by the BLM (see Figure 6).

Large portions of the proposed transmission line route would be constructed along existing roads and/or County maintained roads. However, portions of approximately 4.52 miles of existing roads may need to be improved to maintain all weather access (see Figure 11). Approximately 3.57 miles are on National Forest System lands and approximately 0.95 miles are on public lands managed by the BLM. Otherwise, existing access roads and/or overland vehicle travel will be utilized.

Maintenance activities could include blading, surface replacement, dust abatement, spot repairs, slide removal, ditch cleaning (if ditches are needed), culvert cleaning (if culverts are necessary), litter cleanup, noxious weed control and snow removal (USDI and USDA 2007, pages 30 – 36).

Prior to the commencement of surface disturbing activities, Ormat, in conjunction with the Lander County Road Department, will document the condition of the County Road. Over the life of the proposed Project, Ormat will work with Lander County to maintain the road in this condition, to the extent that road deterioration can be reasonably attributable to Ormat’s proposed activities.

The estimated short and long term surface disturbance associated with access road construction is summarized in Table 5 on page 33.

2.1.8 Aggregate Requirements and Source(s)

Native materials (derived from grading to balance cut and fill) would be used for power plant site and road building materials, to the extent practical.

Total aggregate required for the well pad construction is estimated at 18,000 cubic yards. Approximately 45,000 cubic yards of surfacing material may be needed for power plant and pipeline construction. Aggregate material would be obtained from the Lander County Free Use Permit located in the NW1/4NE1/4 of Section 21, T.20N., R.45E.

2.1.9 Work Force and Schedule

Drilling would be conducted by a crew of 9-10 workers with as many as 18 workers on site during short periods. Power plant and pipeline construction would likely require a maximum of up to 50 workers, although substantially fewer would be on site most of the time during construction, as the construction activities are staged. Construction of the transmission line and fiber optic line would require approximately 8 – 10 workers. In total, approximately 70 construction workers would be needed during the construction period.

Once the power plants are operating, and if they are remotely operated, 5-8 workers would be needed. If the power plants are not remotely operated, approximately 8-15 workers would be needed.

Construction of the Project would require 12 to 24 months to complete once all permits are obtained and equipment orders scheduled. Transmission line construction is expected to take approximately 6 months. Commercial operations would commence at the end of the fourth quarter of 2011.

2.1.10 Project Decommissioning and Site Reclamation

The estimated life of the Project is 30 years, consistent with the issued site license (43 CFR 3273.22(a))

A complete reclamation plan is provided as Appendix B. A general description of Project reclamation activities is provided below.

Once drilling is completed at a drill site, the shoulders of the respective well pad could be reclaimed, but the majority of the pad must be kept clear for ongoing operations and the potential need to work on or re-drill the well. The portions of the cleared well sites not needed for operational and safety purposes would be recontoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. Areas able to be reclaimed would be ripped, tilled, or disked on contour, as necessary. National Forest System lands would be reseeded with native grasses and forbs. Public lands managed by the BLM would be reseeded with the appropriate seed mixes. The stockpiled topsoils would also be spread on the area to aid in revegetation.

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

Reclamation of the roads would include recontouring the road back to the original contour, seeding and controlling noxious weeds. Reclamation may include other techniques to improve reclamation success, such as ripping, scarifying, replacing topsoil, pitting and mulching.

When it is time to remove the poles, conductors, and hardware associated with the 230 kV transmission line, the holes would be filled with soil gathered from the immediate vicinity. The areas where the poles were removed would be raked to match the surrounding topography. Bladed areas would be recontoured and seeded with the appropriate seed mix.

The power plants, geothermal pipelines and all other above-ground facilities and areas of surface disturbance associated with geothermal development would be removed and reclaimed. Stormwater diversion would remain in place until successful revegetation is attained.

2.1.11 Adopted Environmental Protection Measures

Ormat would comply with all stipulations that are applicable to the proposed Project operations on the geothermal leases (see Appendix A) and the transmission line ROWs (see Appendix E). In addition, Ormat would implement the following additional environmental protection measures:

- Water would be applied to the ground during the construction and utilization of the drill pads, access roads, and other disturbed areas as necessary to control dust.
- Portable chemical sanitary facilities would be available and used by all personnel during periods of well drilling and/or flow testing, and construction. These facilities would be maintained by a local contractor.
- To prevent the spread of invasive, nonnative species, all vehicles, heavy earth-moving construction equipment, mobile trailers and RV campers brought to and used on the Project site would go through high pressure washing of the entire vehicle/unit at a commercial wash station prior to arriving and/or being used on the Project site.
- On public lands managed by the BLM, revegetation would include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious, invasive, and non-native seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM.
- All construction and operating equipment would be equipped with applicable exhaust spark arresters. Fire extinguishers would be available in all vehicles/equipment, and would be available on the active sites. In addition to requirements that water that is used for construction and dust control would be available for fire fighting. Personnel would be allowed to smoke only in designated areas, and they would be required to follow applicable BLM regulations.
- Cut and fill activities have been minimized through the selection of the power plant sites and pipeline routes. Off-site storm water would be intercepted in ditches and channeled to energy dissipaters as necessary to minimize erosion around the power plant. To minimize erosion from storm water runoff, access roads would be maintained consistent with the best management practices applicable to development roads. BLM best management practices for storm water would be followed, as applicable, on public lands.
- Geothermal fluids would not be discharged to the ground under normal operating conditions. Accidental discharges of geothermal fluids are unlikely because of frequent inspections, ultrasonic testing of the pipeline, flow and pressure monitoring and well pump and pipeline valve shutdown features.
- Following project construction, areas of disturbed land no longer required for operations would be reclaimed to promote the reestablishment of native plant and wildlife habitat.
- The power plant, pipelines, wellheads, pump motors and motor control buildings would each be painted covert green to blend with the area and minimize visibility.
- The proposed transmission line would also provide raptor protection in compliance with the standards described in the “Suggested Practices for Raptor Protection on Power Lines, The State of the Art in 2006.”

- An anti-perching device, (a cone, Kaddas Enterprises type KE1140 or equal) would be installed on the top of each transmission line pole along the entirety of the transmission line (see Figure 9 and Figure 10). These cones help protect raptors and prevent raptors from preying on sage grouse and other wildlife which may be in the area.
- All power poles will utilize BLM-approved raptor deterrents.
- Ormat will obtain and comply with an Underground Injection Control (UIC) permit, as appropriate.
- During well drilling, the reserve pits would be fenced on three sides, per the Gold Book standard. Once drilling has been completed, the fourth side would be fenced. Fencing would prevent access by persons, wildlife or livestock. In addition to this fence, Ormat would install a smaller-mesh barrier/wildlife deterrent fence. This fence helps exclude smaller mammals and also provides a measure of protection to human safety. All fencing would remain in place until reserve pit reclamation begins.
- Speed limits of 20-25 mph would be maintained for Project related travel through the Project Area (USDI and USDA 2007, p. 25-26).
- Noise would be minimized through operational practices using best available control technology (BACT). Vinyl fencing slats would be used, and the plant design would be reviewed for opportunities to reduce noise.
- Cooling fans utilized in the air-cooled power plants would be designed to minimize power plant noise.
- Wildland Fire Management and Mitigation Plans, Spill or Discharge Contingency Plan and Hydrogen Sulfide Contingency Plan have been submitted and would be complied with.
- A reclamation plan describing interim and final reclamation procedures for this Project has been submitted (Appendix B) and would be complied with.
- As a condition of approval, Ormat would obtain and comply with provisions of a waiver from the Nevada State Water Engineer (Nevada Department of Water Resources) for the use of the Lancaster B well to obtain a maximum of 30.6 acre feet of water for construction purposes.

2.2 ALTERNATIVES

NEPA requires that a reasonable range of alternatives to the Proposed Action be considered that could feasibly meet the objectives of the Proposed Action as defined in the purpose and need for the project [40 CFR 1502.14(a)]. The range of alternatives required is governed by a “rule of reason” (i.e., only those feasible alternatives necessary to permit a reasoned choice need be considered). Reasonable alternatives are those that are practical or feasible based on technical and economic considerations [46 Federal Register 18026 (March 23, 1981), as amended; 51 Federal Register 15618 (April 25, 1986)].

Alternatives to the Proposed Action must be considered and assessed whenever there are unresolved conflicts involving alternative uses of available resources (BLM 1988 and BLM 2008a). An alternative to the Proposed Action has been identified which may reduce or avoid potential effects to sensitive species.

Alternative 1 differs from the Proposed Action only in the location of the southern half of the transmission line corridor (see Figure 12). In the NE1/4SE1/4, Section 34, T.20N., R.45E., the Alternative 1 transmission line route diverges from the Proposed Action route and trends generally west and south, terminating in the SW1/4NE1/4, Section 1, T.19N., R.44E. Under this alternative, a new approximately 5 acre switching station would need to be constructed (Willow Creek switching station). There would also be an approximately 0.75 mile “line fold” which would trend southeast and tie into the existing Fort Churchill/Frontier 230 kV SPPCo. transmission line in the SE1/4SE1/4 Section 1. The line fold would consist of two parallel transmission lines running from a break in the existing 230 kV line to the switching station and back. The Alternative 1 transmission line route is approximately 5.5 miles long. All geothermal components would remain the same as the Proposed Action. Estimates of the short and long term surface disturbance comparing the Proposed Action and Alternative 1 are summarized in Table 5 below. Alternative 1 was not selected as the Proposed Action due to the high costs associated with construction of a new switching station, which would also serve to create line inefficiencies.

2.3 OTHER ALTERNATIVES DROPPED FROM DETAILED ANALYSIS

Additional alternatives to the proposed action were considered for their ability to reduce impacts to sensitive species, but were eliminated from detailed consideration for the reasons discussed below (see Figure 13).

One Alternative transmission line alignment ran east (from the power plants) and due south, terminating at the existing Frontier substation. It was determined, however, that the sage-grouse habitat along this route was of good quality, and development of this alignment could result in greater impacts to sage-grouse. Another alternative considered was the “undergrounding” of the entire transmission line. This alternative was dropped from further consideration because it would create an excessive amount of surface disturbance and it would be cost prohibitive.

2.4 SURFACE DISTURBANCE SUMMARY

Table 5 identifies the long term surface disturbance and short term surface disturbance associated with the construction and operation of the Proposed Action and Alternative 1. For purposes of this analysis, long term disturbance is defined as surface area that would remain disturbed during the approximately 35 year period that includes project construction and operations (30 years), project decommissioning and final reclamation (approximately 5 years to ensure that reclamation is successful, as determined by the appropriate agencies). Short term disturbance is defined as that surface disturbance which would undergo interim reclamation, in accordance with the Project reclamation plan (see Appendix B).

Table 5: Surface Disturbance Summary, Proposed Action and Alternative 1

	Proposed Action		Alternative 1	
	Short Term (ac.) ¹	Long Term (ac.) ¹	Short Term (ac.) ¹	Long Term (ac.) ¹
<i>Geothermal Components, BLM-Managed Lands</i>				
Well Pads	7.6	68.0	7.6	68.0
Pipelines	41.8	20.9	41.8	20.9
Power Plants	0.0	32.9	0.0	32.9
Access Roads	1.3	5.3	1.3	5.3
<i>SUB-TOTAL</i>	<i>50.7</i>	<i>127.1</i>	<i>50.7</i>	<i>127.1</i>
<i>Geothermal Components, Private Lands</i>				
Well Pads	1.0	20.0	1.0	20.0
Pipelines	2.1	1.1	2.1	1.1
Power Plants	0.0	0.0	0.0	0.0
Access Roads	0.0	0.0	0.0	0.0
<i>SUB-TOTAL</i>	<i>3.1</i>	<i>21.1</i>	<i>3.1</i>	<i>21.1</i>
<i>Transmission Line/Fiber Optic Line Corridor, BLM-Managed Lands (N-88978 and N-88979)</i>				
Tangent Pole Placement	1.2	0.1	0.2	0.1
Angle Pole Placement	0	0	0	0
Stringing Sites	2.8	0	0	0
Access Road Maintenance	0.6	0	0	0
Substation	0	0	0	0
<i>SUB-TOTAL</i>	<i>4.6</i>	<i>0.1</i>	<i>0.2</i>	<i>0.1</i>
<i>Transmission Line/Fiber Optic Line Corridor, National Forest System Lands</i>				
Tangent Pole Placement	2.5	0.1	1.6	0.1
Angle Pole Placement	1.4	0.1	2.2	0.1
Stringing Sites	4.2	0	3.5	0
Access Road Maintenance	2.2	0	0	0
Substation	0	0	0	5.0
<i>SUB-TOTAL</i>	<i>10.3</i>	<i>0.2</i>	<i>7.3</i>	<i>5.2</i>
<i>TOTAL</i>	<i>68.7</i>	<i>148.5</i>	<i>61.3</i>	<i>153.5</i>

¹ All acreages of surface disturbance have been rounded to the nearest tenth of an acre.

Total long term surface disturbance is approximately 5.0 acres greater with Alternative 1.

If the Proposed Action or Alternative 1 are selected, the reclamation plan will be implemented following completion of the Project. Following successful reclamation, surface disturbance would be zero.

2.5 NO ACTION ALTERNATIVE

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

It should be recognized that Ormat has a geothermal lease for the lease unit. Purchase of that lease comes with certain rights, including the right to conduct geothermal exploration activities, subject to the lease stipulations. With that understanding, Ormat applied for and received approval to begin geothermal exploration activities on the lease unit. To date, that exploration consists of the drilling of eight geothermal wells from seven well pads and the construction of associated access roads on the federal leases. In addition, five geothermal wells and well pads and associated access roads have been constructed on the private Lake Ranch lease. This has resulted in 33.9 acres of surface disturbance on public lands and 23.2 acres of surface disturbance on private lands.

To date, the geothermal exploration activities on public lands have resulted in 33.9 acres of disturbance to various resources through direct and indirect impacts. Those impacts were analyzed in the BLM's McGinness Hills Geothermal Exploration EA, dated January, 2009 (NV063-EA08-093). For a more detailed description of the exploration impacts, you may request a copy of that EA from the Mount Lewis Field Office. That EA and its impact analysis are incorporated by reference into this document.

The federal geothermal lease approval allows Ormat up to 10 years of exploration activities. Thus, Ormat has approximately seven years remaining on their lease to continue geothermal exploration activities. Any additional geothermal exploration activities above those currently analyzed in the Exploration EA (BLM 2009) and the associated approvals will require additional NEPA documentation.

Under the No Action Alternative, DOE would not issue a loan guarantee to John Hancock Life Insurance Company for construction and startup of the Project. While the facilities might be built with other financing, for purposes of this analysis it is assumed that the project would not be completed or become operational.

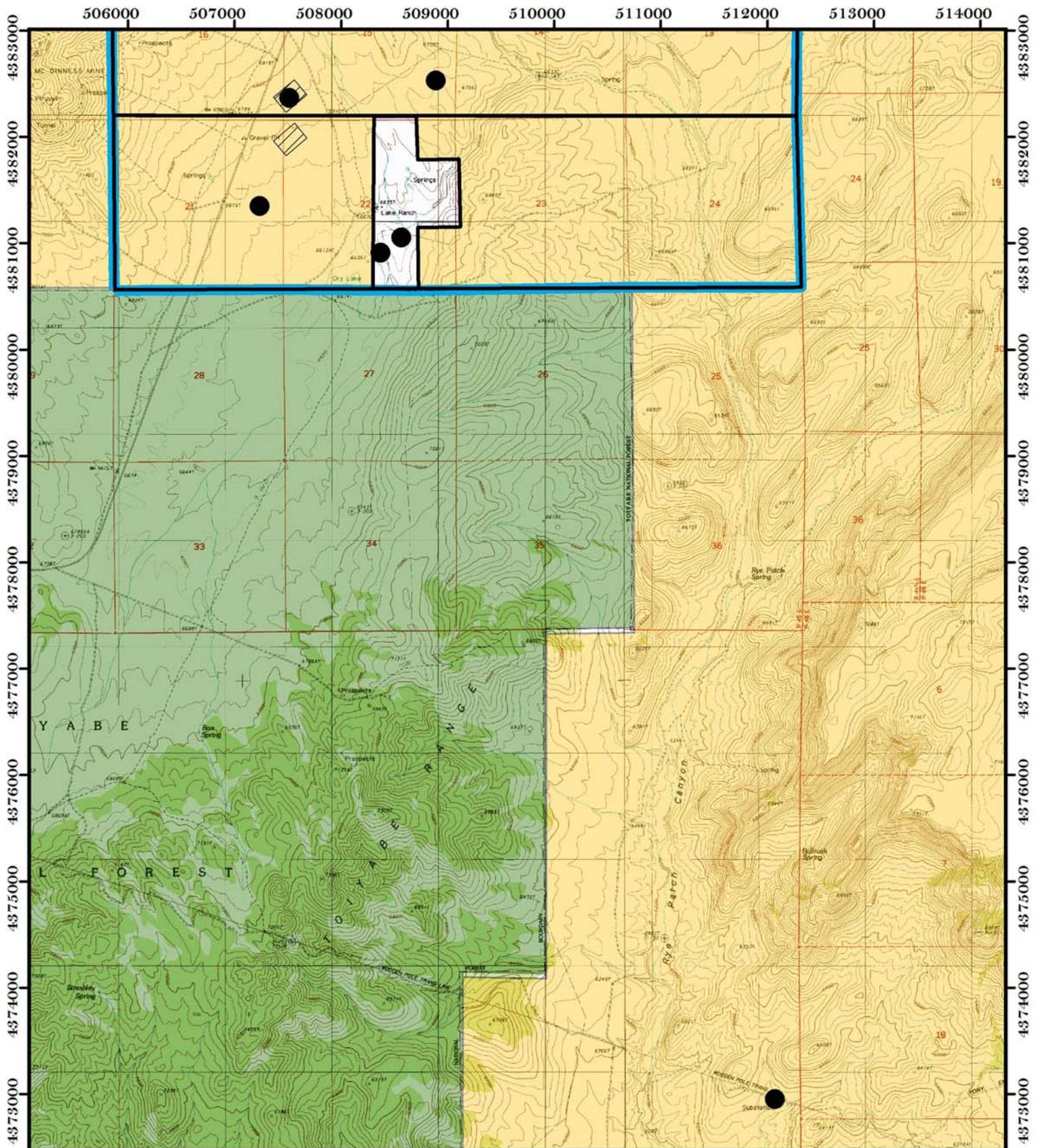


Figure 7: Construction Staging Areas

- Staging Areas
- ▨ Proposed Power Plants
- ▭ McGinness Hills Geothermal Unit Area
- ▭ Geothermal Lease Boundaries
- Bureau of Land Management Administered Land
- Forest Service Administered Land
- Private



0 0.5 1 Mile

United States Department of the Interior
 Bureau of Land Management
 Mount Lewis Field Office
 50 Gasilian Road
 Battle Mountain, NV 89820



* 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.
 The data shown on the map uses the Universal Transverse Mercator (Zone 11N) Coordinate system and uses the NAD83 projection.
 Map Date: 05/05/2011

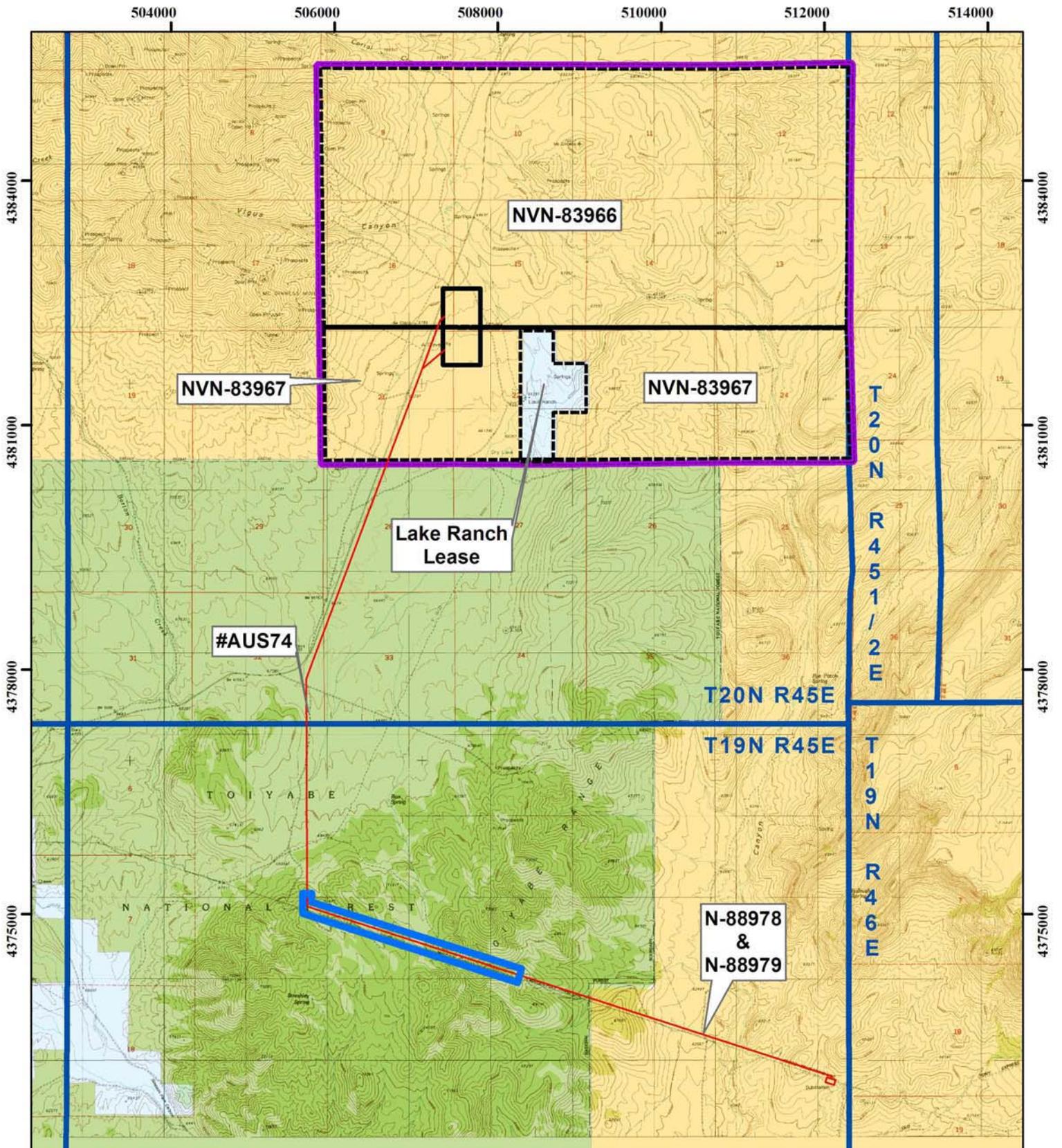
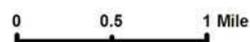


Figure 8: Helicopter Pole Placement

- 230 kV Transmission Line-Proposed
- Approximate Pole Placement Area
- Development Area
- McGinness Hills Geothermal Unit Area
- Geothermal Lease Boundaries
- Bureau of Land Management
- Forest Service
- Private

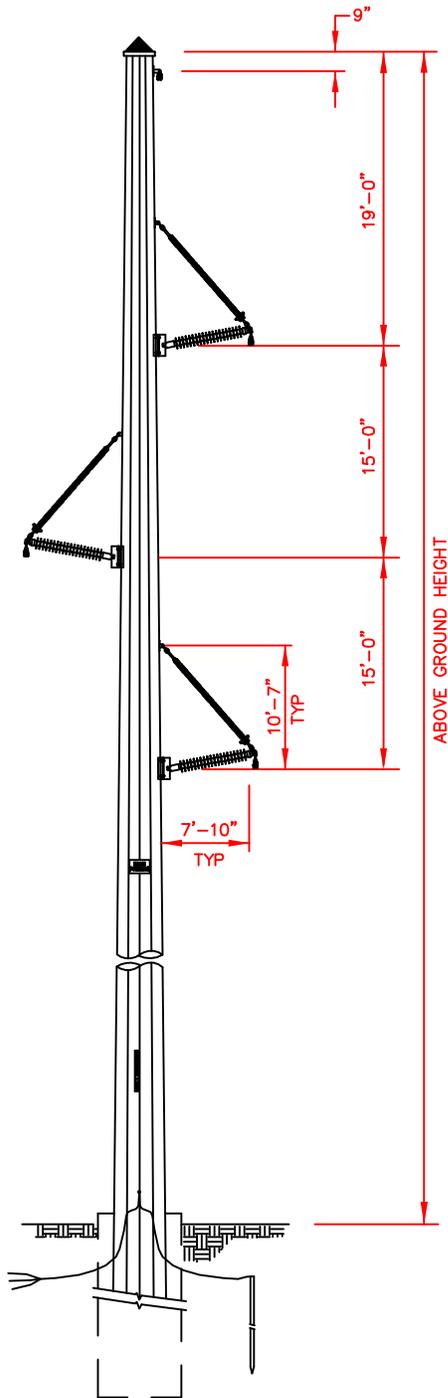


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 Map Date : 05/20/2011



NOTES:

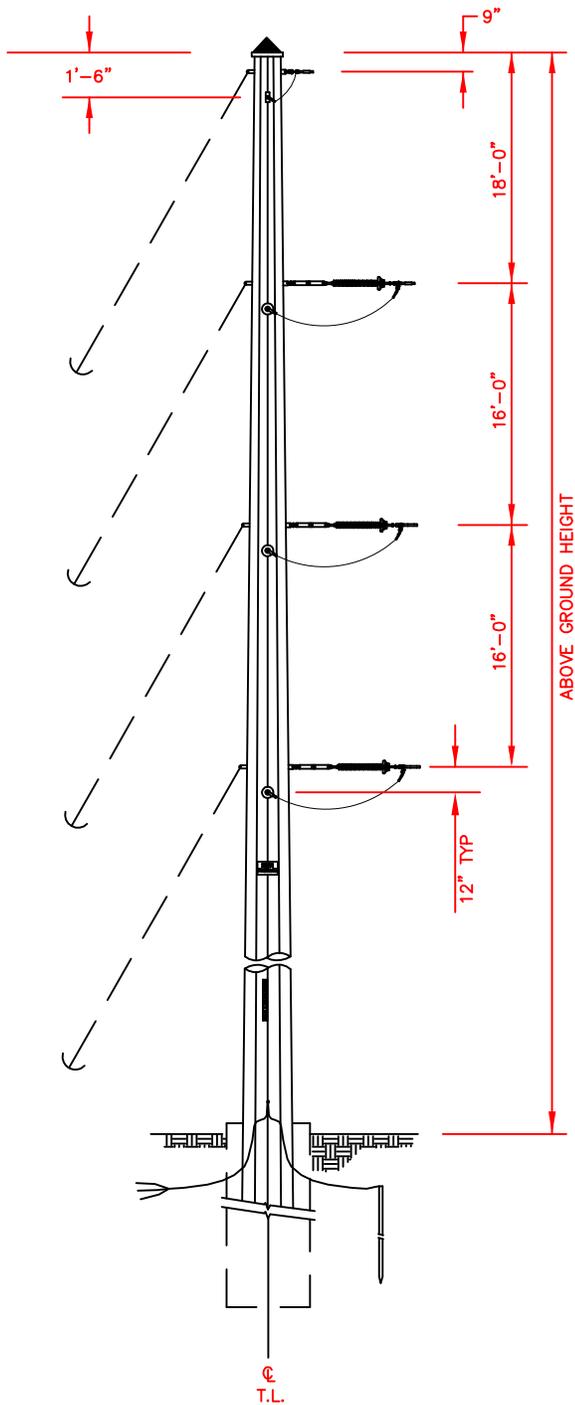
1. ALL DIMENSIONS ARE TO CENTERLINE OF ATTACHMENT.
2. EMBEDMENT DEPTH - 10% + 4'.
3. INSTALL POLE TOP CONE FOR ANTI-PERCHING AS REQUIRED. KADDAS ENTERPRISES TYPE KE1140 OR SIMILAR.

Total pole height will be 82 to 104 feet above ground



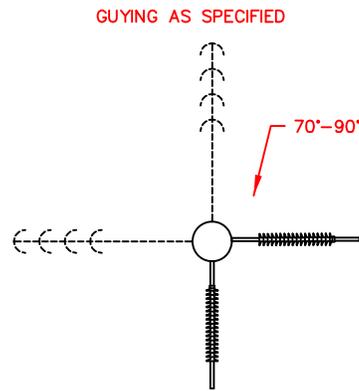
ORMAT McGINNESS HILLS 230KV LINE
SINGLE POLE STRUCTURE, TANGENT 0°-2°
Figure 9

REVISION NO.	DATE	TRISAGE CONSULTING	ENGINEER:	JIM BENGOCHEA
ORIGINAL ISSUE	09/07/10	5418 Longley Lane Suite A Reno, NV 89511 Ph: (775) 336-1300 Fax: (775) 336-1306	PHONE NUMBER:	(775) 336-1302
			PROJECT NUMBER:	MH_01
			PREPARED BY:	KLC
			CHECKED:	JMB
			APPROVED:	



NOTES:

1. ALL DIMENSIONS ARE TO CENTERLINE OF ATTACHMENT.
2. EMBEDMENT DEPTH - 10% + 2'.
3. INSTALL POLE TOP CONE FOR ANTI-PERCHING AS REQUIRED. KADDAS ENTERPRISES TYPE KE1140 OR SIMILAR.



PLAN VIEW

Total pole height will be 82 to 104 feet above ground



ORMAT McGINNESS HILLS 230KV LINE
SINGLE POLE STRUCTURE, HEAVY ANGLE 70°-90°
Figure 10

REVISION NO.	DATE
ORIGINAL ISSUE	09/07/10

TRISAGE
CONSULTING
5418 Longley Lane
Suite A
Reno, NV 89511
Ph: (775) 336-1300
Fax: (775) 336-1306

ENGINEER:	JIM BENGOCHEA
PHONE NUMBER:	(775) 336-1302
PROJECT NUMBER:	MH_01
PREPARED BY:	KLC
CHECKED:	JMB
APPROVED:	

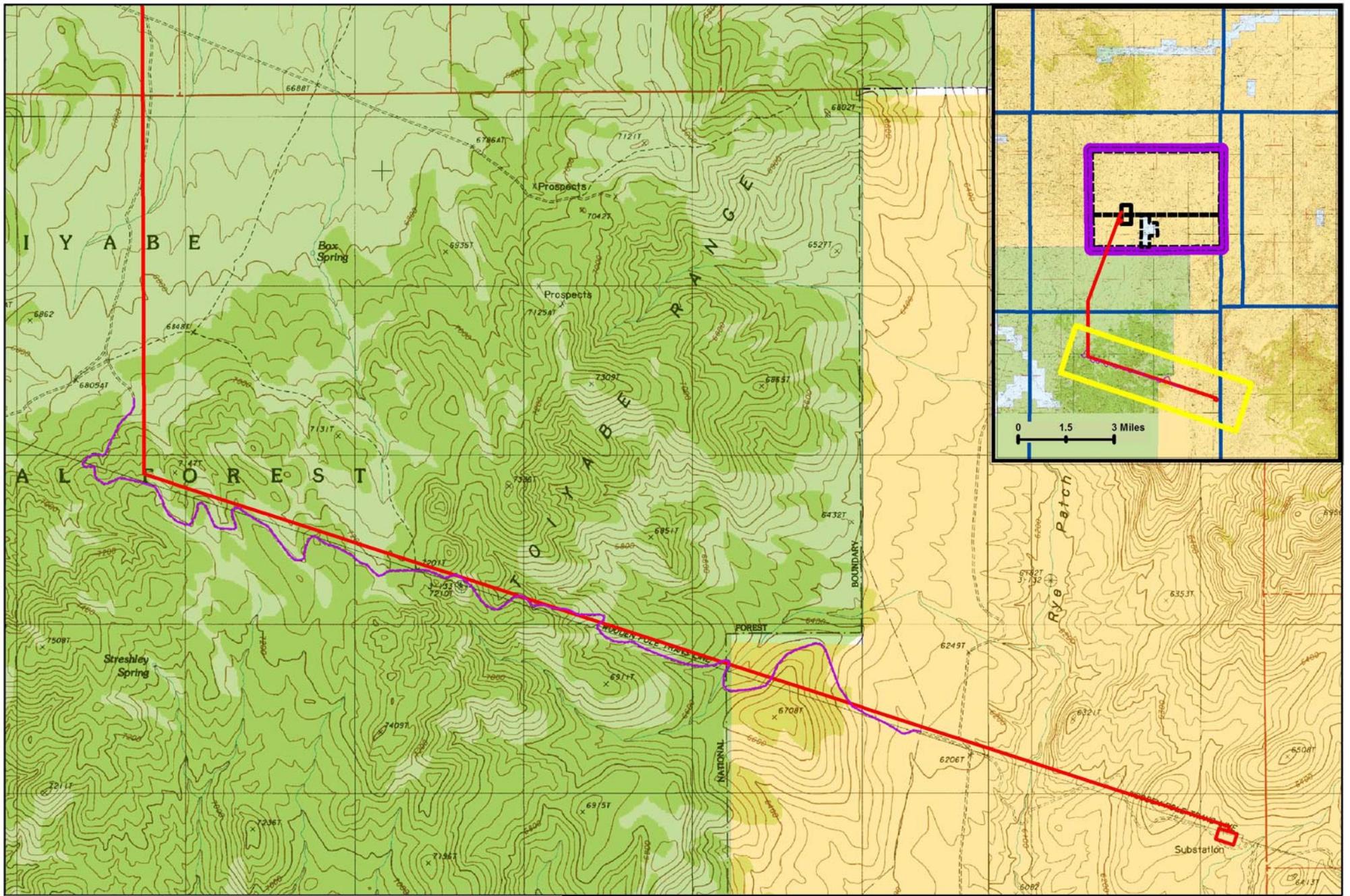
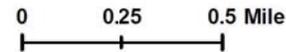
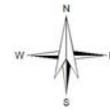
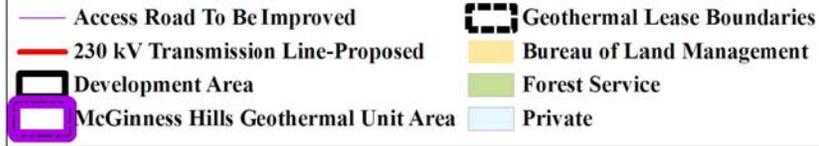


Figure 11: Transmission Line Access Road to be Improved



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Map Date: 05/05/2011

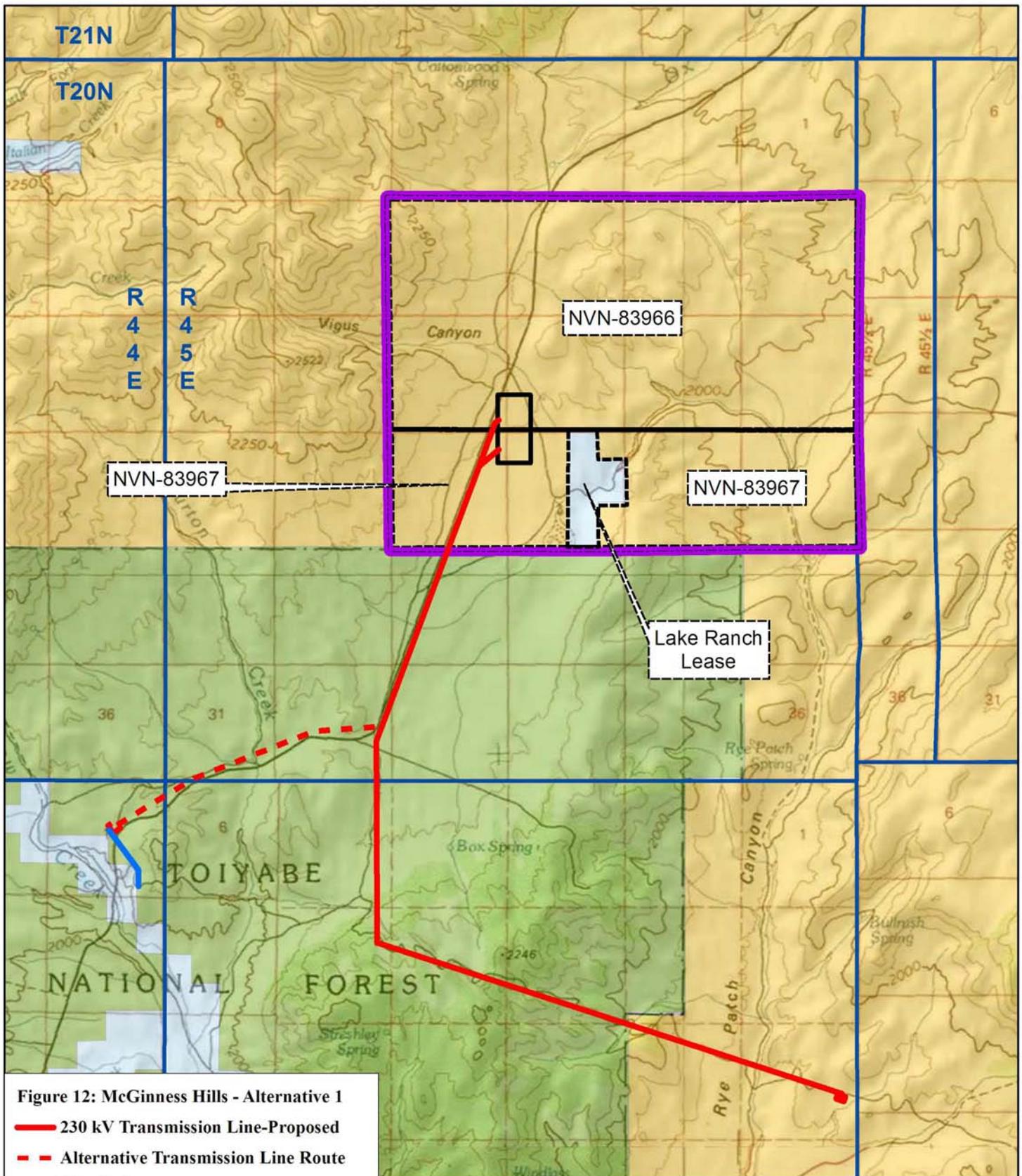


Figure 12: McGinness Hills - Alternative 1

— 230 kV Transmission Line-Proposed
- - - Alternative Transmission Line Route

— Line Fold

□ Development Area

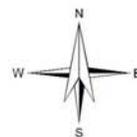
□ McGinness Hills Geothermal Unit Area

□ Geothermal Lease Boundaries

□ Bureau of Land Management

□ Forest Service

□ Private



0 0.45 0.9 Mile

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Map Date : 05/15/2011

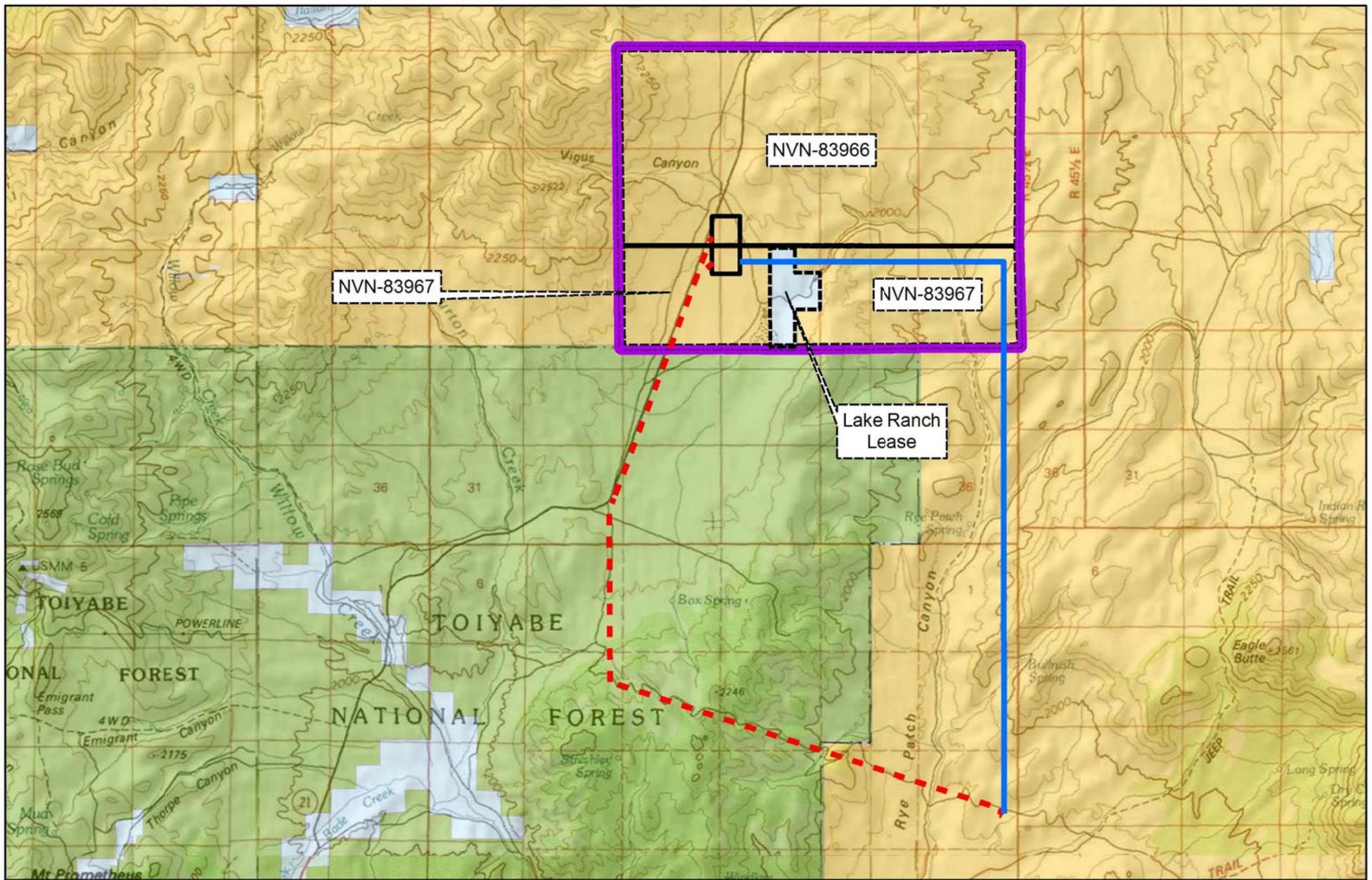
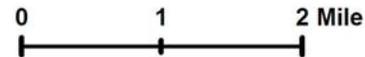
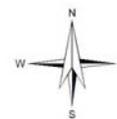


Figure 13: Alternatives Considered but Dropped from Analysis

- - - Underground Transmission Line Route
- Alternative Route - Dismissed
- Development Area
- McGinness Hills Geothermal Unit Area
- Geothermal Lease Boundaries
- Bureau of Land Management
- Forest Service
- Private



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The data shown on the map uses the Universal Transmator (Zone 11N) Coordinate system and uses the NAD83 projection.

Map Date : 05/06/2011

3 AFFECTED ENVIRONMENT/ENVIRONMENTAL CONSEQUENCES

3.1 TABLE OF SUPPLEMENTAL AUTHORITIES/SPECIFICALLY REQUIRED DISCLOSURES/OTHER RESOURCES

To comply with NEPA, the BLM and USFS are required to address specific elements of the environment that are subject to requirements specified in statute or regulation or by executive order (BLM 1988 and BLM 2008a). Table 6 and Table 7 outline the resources that must be addressed in all environmental assessments. In addition, the effects analysis is identified in Section 1.7 of the EA, as well as other resources deemed appropriate for evaluation by the BLM and USFS, and denote if the Proposed Action and Alternative 1 affect those elements.

Table 6: Supplemental Authorities/Specifically Required Disclosures

Element	Present Yes/No	Affected Yes/No	JUSTIFICATION
Air Quality; Clean Air Act	Yes	Yes	See Section 3.2
Cultural Resources; National Historic Preservation Act; Executive Order 13007	Yes	Yes	See Section 3.3
Environmental Justice; Executive Order 12898; Civil Rights, Women and Minorities	No	No	No minority or low income populations would be disproportionately affected by the Project.
Fish Habitat; Executive Order 12962	No	No	There is no fish habitat in the proposed Project Area.
Floodplains; Executive Order 11988	No	No	There are no FEMA-designated 100-year floodplains in the proposed Project Area.
Forests and Rangeland; Prime Farmland, Range Land and Forestland	Yes	Yes	See Section 3.14
Migratory Birds; Executive Order 13186	Yes	Yes	See Section 3.5
Native American Religious Concerns	Yes	Yes	See Section 3.4
Prime or Unique Farmlands	No	No	There are no prime or unique farmlands in or near the proposed Project Area.

McGinness Hills Geothermal Development Project
 Environmental Assessment: DOI-BLM-NV-B010-2011-0015-EA

Element	Present Yes/No	Affected Yes/No	JUSTIFICATION
Threatened, and/or Endangered, Species	No	No	According to the USFWS letter dated July 14, 2010, there are no Threatened and/or Endangered Species in the proposed Project Area.
Wastes, Hazardous or Solid	Yes	Yes	See Section 3.12
Water Quality (Surface and Ground)	Yes	Yes	See Section 3.10
Wetlands and Riparian Zones; Executive Order 11990	Yes	Yes	See Section 3.11
Wild and Scenic Rivers	No	No	There are no wild and scenic rivers in the proposed Project Area.
Wilderness	No	No	There are no wilderness areas or wilderness study areas within the proposed Project Area.
Wilderness Characteristics	No	No	A wilderness characteristics study was completed on 7/21/2010. That study indicated that the proposed Project Area does not meet the Secretarial Order (Number 3310) definitions of wilderness characteristics.

Other resources of the human environment that have been considered for this EA are listed in Table 7 below.

Table 7: Other Resources

Other Resources	Present Yes/No	Affected Yes/No	Comments
Geology and Minerals	Yes	No	Geology and Minerals would not be adversely affected by implementation of the Proposed Action. Geothermal resources are a leasable mineral and given that the resource is not consumed during plant operations, geothermal resources should not be affected.
Noise	Yes	Yes	See Section 3.7
Soils	Yes	Yes	See Section 3.8
Vegetation	Yes	Yes	See Section 3.9
Noxious Weeds, Invasive and Nonnative Species	Yes	Yes	See Section 3.6

Other Resources	Present Yes/No	Affected Yes/No	Comments
Wildlife Resources	Yes	Yes	See Section 3.5
Recreation	Yes	Yes	See Section 3.15
Visual Resources	Yes	Yes	See Section 3.16
Socio-Economic Values	Yes	Yes	See Section 3.17
Special Status Species	Yes	Yes	See Section 3.5
Health and Safety	Yes	Yes	See Section 3.12
Paleontology	Yes	Yes	See Section 3.13
Wild Horse and Burro	Yes	No	The Callahan Herd Management Area (HMA) is within the proposed Project Area. However, inventory data indicates that there is limited wild horse use in this portion of the HMA. Therefore, no direct impacts to Wild Horse and Burros are anticipated.

3.2 AIR QUALITY

3.2.1 Affected Environment

The Nevada Department of Conservation and Natural Resources (NDCNR), Division of Environmental Protection (NDEP), Bureau of Air Pollution Control (BAPC) has been delegated responsibility by both the federal Environmental Protection Agency (USEPA) and the State of Nevada to regulate air pollution and emissions of air pollutants in all areas of the State, other than Clark and Washoe Counties.

Air quality in Lander County has been designated as “attainment/unclassified” (which means it either meets, or is generally assumed to meet, the applicable federal ambient air quality standards) for all standard (“criteria”) air pollutants [ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, inhalable particulate matter (PM₁₀), fine particulate matter (PM_{2.5}), lead particles and hydrogen sulfide] (U.S. EPA 2010).

Neither the McGinness Hills Unit Area nor the transmission line corridor are located in or adjacent to any mandatory Federal Class I (most restrictive) air quality areas, U.S. Fish and Wildlife Service Class I air quality units, or American Indian Class I air quality lands.

3.2.2 Environmental Consequences

3.2.2.1 Proposed Action

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

environmental protection measures adopted by Ormat, water and gravel would be applied to the ground as necessary to control dust (see Section 2.1.11). This would minimize fugitive dust emissions during construction activities.

Fugitive dust which could be generated when drilling with air would be controlled by a separator/muffler, and only the air and water vapor would be discharged to the atmosphere.

An NDEP-BAPC Surface Area Disturbance Permit, documenting the areas of proposed disturbance and the best practical dust control methods to be used, will be required for the Project because the surface disturbed by the Project would be greater than 5 acres. Best practical dust control methods applicable to the project activities include use of water trucks to spray water on disturbed areas on a regular basis; pre-watering of areas to be disturbed; graveling of roadways, storage areas and staging areas; posting and limiting vehicle speeds to 20-25 miles per hour, and use of wind fences to reduce wind speeds and the generation of fugitive dust. Implementation of the applicable best practical dust control methods, through compliance with the Surface Area Disturbance Permit, would minimize fugitive dust emissions during construction, operation and reclamation of the Proposed Project.

Combustion emissions of criteria air pollutants [nitrogen dioxide (NO₂), sulfur dioxide (SO₂), carbon monoxide (CO), and particulate matter less than or equal to 10 microns in diameter (PM₁₀)], criteria air pollutant precursors [volatile organic compounds (VOCs)] and air toxics (small quantities of diesel PM, acetaldehyde, benzene, and formaldehyde) would be released during well drilling and construction activities from the diesel engines used.

Small quantities of naturally occurring non-condensable gases, such as carbon dioxide (CO₂), hydrogen sulfide (H₂S), nitrogen (N₂), and methane (CH₄), would be emitted to the air during geothermal well testing. Carbon dioxide is a greenhouse gas. Although the Proposed Action would contribute an increase in greenhouse gases in the atmosphere, these emissions would be extremely small relative to state, national, and global greenhouse gas emissions. Any resultant effects would also be extremely small and cannot be reliably estimated.

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

3.2.2.2 Alternative 1

The potential air quality impacts from construction, operation, maintenance and reclamation of Alternative 1 would be slightly greater than those described for the Proposed Action due to the disturbance of approximately 5.0 more acres during site construction.

3.2.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, additional exploration activities would disturb an additional 34 acres. If this were to occur, fugitive dust emissions from earthwork and vehicle emissions from construction machinery would continue. See the 2009 Geothermal Exploration EA for a complete analysis of potential air quality impacts.

3.3 CULTURAL RESOURCES

3.3.1 Affected Environment

The project area is associated with the Central Subregion of the Western Great Basin Region prehistoric culture area. The Central Great Basin cultural area is divided into time periods representing adaptive prehistoric strategies: Pre-Archaic, Early Archaic, Middle Archaic, and Late Archaic. Western Shoshone groups inhabited the area at the time of historic contact. Historically, the area was settled by cattle ranchers and gold and silver miners.

Class III cultural resource inventories of the Project Area were conducted by archaeologists from Kautz Environmental Consultants and Western Cultural Resource Management (WCRM) in four phases, as follows:

- 1) During the summer of 2008, approximately 485 acres of public lands managed by the BLM were surveyed (Kautz 2008);
- 2) Between August 26 and September 12, 2009, approximately 443 acres of public lands managed by the BLM were surveyed (WCRM 2010a);
- 3) Between December 1 and 7, 2009 and April 6 and 26, 2010, WCRM surveyed an additional 545 acres. This acreage included both public lands managed by the BLM and National Forest System lands managed by the US Forest Service (WCRM 2010b); and
- 4) Between April 25 and July 2, 2010, WCRM surveyed an additional 1,819 acres of public lands and National Forest System lands (WCRM 2010c).

Survey methods focused around the identification, recording and evaluation of all cultural resources within the survey area.

Based on the findings of the cultural resource surveys, a McGinness Hills Archaeological District (MHAD) has been proposed on selected public and private lands. There are a total of 173 loci (sites), of which 167 are on BLM land and 6 are on both BLM and National Forest System lands. Of the 173 loci, 36 have been determined to be, or are recommended as, contributing elements.

The MHAD has been recommended for eligibility on the National Register of Historic Places (NRHP) (WCRM 2010a, 2010b, 2010c).

In addition to the MHAD, 39 archaeology sites were recorded on, or partially on, National Forest System land. These were recorded and evaluated independently from the MHAD by the Forest Service. Of these, 38 are entirely on National Forest System land and one overlaps both National Forest System land and private lands. Fourteen of the 39 USFS sites are eligible to the NRHP and one is unevaluated. The majority of these archaeology sites are prehistoric lithic scatters, some are prehistoric camp sites, and a few are historic road or debris sites.

Additional surveys along approximately 1.5 miles of Forest Service Road 489 will likely reveal additional archaeological sites on National Forest System land. Since all currently unsurveyed portions of this road lie within 200 meters of the current survey area containing numerous sites, it is expected that any new sites discovered would be of the same types as those that are already known.

The Pony Express National Historic Trail is located south of the McGinness Hills project area and north of US Highway 50. The trail comes within approximately ½ mile of the existing SPPCo/NVE Frontier substation at the southern terminus of the proposed transmission line. In the vicinity of the Project Area the trail is a two-track dirt road, which is used for general public land access, access by grazing permittees, and by recreationalists.

3.3.2 Environmental Consequence

3.3.2.1 Proposed Action

Twenty eligible loci in the MHAD may be adversely affected by the Proposed Action. Of the 20 MHAD loci, two are located partially on BLM managed public land and National Forest System land.

Seven USFS sites outside of the MHAD and located entirely on National Forest System land may be adversely affected by the Proposed Action. These seven sites may be adversely affected by maintenance to or use of existing roads through the sites, overland travel, and/or powerline pole placements within the sites. Once the additional surveys on approximately 1.5 miles of road on National Forest System land is completed, there may be a slight increase to the number of sites adversely affected (estimate of 1-5).

Contributing loci and sites determined eligible for listing in the NRHP are formally designated as “historic properties” and any adverse effects to these resources as a result of a federal

undertaking must be mitigated. Mitigation is commonly conducted in phases to facilitate treatment of historic properties as well as minimize delays to the project schedule.

Section 106 Process – public lands managed by the BLM

Treatment/mitigation recommendations for all prehistoric and historic resource categories follow:

Mitigation Measure:

Those historic properties determined eligible for inclusion on the NRHP, or are unevaluated, will be avoided or else will be treated with an approved Historic Properties Treatment Plan (HPTP). Contributing elements/eligible sites that are near or adjacent to project activities will be buffered, and project activities will be monitored by a qualified archaeologist monitor.

Artifacts recovered from sites on federally managed lands will be curated in accordance with 36 CFR 79 at a facility in Nevada that meets federal standards.

If cultural resources, Native American remains, funerary items, sacred items, or objects of cultural patrimony are discovered, the proponent must cease operations in the vicinity of the discovery and ensure adequate protection of the discovery, then notify the BLM immediately, by telephone, with written confirmation to follow (43 CFR 10.4 (c), (d), (g); 43 CFR 7; Nevada State Protocol Agreement VIII(b)). For unanticipated discoveries on BLM-managed lands, notification should be made to the Mount Lewis Field Manager, 50 Bastian Road, Battle Mountain, NV 90820; telephone 775/635-4000. No activity in the vicinity of the discovery should resume until the proponent has been issued a Notice to Proceed (NTP) by the authorized officer. NRS 383.150 through 383.190 applies to Native American burials on private lands. NRS 440.025 applies to human remains found on private lands. In addition, ARPA provides for the assessment of criminal and/or civil penalties for damaging cultural resources.

Section 106 Process – National Forest System Lands

As 1.5 miles of Forest Service Road 489 are surveyed, it is expected that new archaeological sites would be discovered based upon adjacent site density. The Forest Service would mitigate any of the new sites that may be left unevaluated or determined eligible for the NRHP. Mitigation methods would be similar to those already in place for adjacent sites.

Artifacts recovered from sites on federally managed lands will be curated in accordance with 36 CFR 79 at a facility in Nevada that meets federal standards.

If previously unidentified cultural resources, Native American remains, funerary items, sacred items, or objects of cultural patrimony are discovered, the proponent must cease operations in the vicinity of the discovery and ensure adequate protection of the discovery, then notify the Forest Service immediately, by telephone, with written confirmation to follow (43 CFR 10.4 (c), (d),

(g); 43 CFR 7). For unanticipated discoveries on National Forest System land, notification should be made to the Austin District Ranger, P.O. Box 130, Austin, Nevada (775) 964-2671. No activity in the vicinity of the discovery should resume until the proponent has been issued a Notice to Proceed (NTP) by the authorized officer. NRS 383.150 through 383.190 applies to Native American burials on private lands. NRS 440.025 applies to human remains found on private lands. In addition, ARPA provides for the assessment of criminal and/or civil penalties for damaging cultural resources.

Portions of the extreme southern end of the proposed transmission line would be visible from some locations on the Pony Express National Historic Trail. Where visible, the transmission line would be located from ½ to 1 ½ miles away from the trail. Although visible, this portion of the transmission line would be adjacent and parallel to an existing transmission line. The existing NVE Frontier substation is also visible from the trail in this area. Thus, construction of the transmission line would not create a new contrasting visual intrusion into the viewshed from the trail.

3.3.2.2 Alternative 1

Sixteen eligible loci in the MHAD could be impacted by construction of the Alternative 1.

Two sites outside of the MHAD and on National Forest System land along the Alternative 1 transmission line corridor could be impacted by construction of the transmission line. Impacts may occur by maintenance to or use of existing roads through the sites, overland travel, and/or transmission line pole placements within the sites.

The mitigation measures and the section 106 process requirements recommended for the Proposed Action would also be applicable for Alternative 1.

3.3.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. The April 2009 Geothermal Exploration EA calls for complete avoidance of impacts to cultural resources. Therefore, continued exploration under the No Action Alternative would not cause any direct or indirect impacts to cultural resources. See the April 2009 Geothermal Exploration EA for a complete analysis of potential effects to cultural resources.

3.4 NATIVE AMERICAN RELIGIOUS CONCERNS

3.4.1 Affected Environment

Located within the traditional territory of the Western Shoshone Tribes, the BLM Battle Mountain District Office administrative boundary contains spiritual/traditional/cultural resources, sites, and social practices that aid in maintaining and strengthening social, cultural, and spiritual integrity. Recognized tribes with known interests within the BLM Battle Mountain District Office administrative boundary are the Te-Moak Tribe of Western Shoshone (Elko, South Fork, Wells, and Battle Mountain Bands), Duck Valley Sho-Pai Tribes of Idaho and Nevada, Duckwater Shoshone Tribe, Ely Shoshone Tribe, Yomba Shoshone, the Timbisha Shoshone Tribe, and various other Tribal groups, community members, and individuals. The proposed Project Area lies well within the lands traditionally inhabited by Western Shoshone people.

Though archaeological data and theory states that the Western Shoshone (Newe) began to inhabit the Great Basin area around 600 years ago, contemporary Western Shoshone contend they were here since “time immemorial.” Social activities that define the culture took place across the Great Basin. Pine nut gathering, edible and medical plant gathering, hunting and fishing, spiritual/ceremonial practices, and trade occurred as the Great Basin peoples practiced a mobile hunting and gathering lifestyle. As with the delicate and sensitive nature of the fragile resources of the Great Basin, the native cultures appeared to be heavily impacted by social, cultural, and environmental change, which rapidly accompanied the non-native migration from east to west. Confined to reservations and “encouraged” to participate in a more sedentary lifestyle (farming and cattle ranching), the Western Shoshone and other Great Basin tribes continued to practice certain cultural/spiritual/traditional activities, visited their sacred sites, and hunted and gathered the available game and medicinal/edible plants. Through oral history, the practice of handing down knowledge from the elders to the younger generations, many Western Shoshone and Paiute continue to maintain a world view not unlike that of their ancestors.

Such sites of importance include, but are not limited to: existing antelope traps; certain mountain tops used for vision questing and prayer; medicinal and edible plant gathering locations; prehistoric and historic village sites and gravesites; sites associated with creation stories; hot and cold springs; material used for basketry and cradle board making; locations of stone tools such as points and grinding stones (mano and metate); chert and obsidian quarries; hunting sites; sweat lodge locations; locations of consistent pine nut harvesting and ceremonies, traditional gathering, and camping; boulders used for offerings and medicine gathering; tribally identified Traditional Cultural Properties (TCP’s); TCP’s found eligible to the National Register of Historic Places; rock shelters; “rock art” locations; lands that are near, within, or bordering current reservation boundaries; lands that conflict with tribal land acquisition efforts that involve the Nevada Congressional Delegation, water sources in general, which are considered the “life blood of the Earth and all who dwell upon it.”

In accordance with the National Historic Preservation Act (P.L. 89-665), the National Environmental Policy Act (P.L. 91-190), the Federal Land Policy and Management Act (P. L.94-

579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601) and Executive Order 13007, the BLM and USFS must also provide affected tribes an opportunity to comment and consult on the proposed Project. BLM and USFS must attempt to limit, reduce, or possibly eliminate any negative impacts to Native American traditional/cultural/spiritual sites, activities, and resources.

On August 3, 2010, BLM and USFS initiated coordination/consultation activities with the Fallon Paiute Shoshone Tribe, Battle Mountain Band Council, Duckwater Shoshone Tribe, Yomba Shoshone Tribe, Te-Moak Tribal Council, Elko Band Council, South Fork Band Council, Ely Shoshone Tribe, and Timbisha Shoshone Tribe. Members of the Western Shoshone Defense Project and the Western Shoshone Descendants of Big Smoky have been contacted and been given an opportunity to provide information to the BLM and USFS. Various meetings/field visits have occurred and future opportunities for tribal input and participation have been extended. Coordination/consultation will be ongoing until completion of the Project. However, depending on any site specific mitigation or monitoring agreements/commitments, coordination/consultation opportunities may continue throughout the life of the Project. Of all the tribal entities contacted, Duckwater and Yomba Shoshone Tribal representatives have been the most active. Meetings and field visits have occurred on the following dates with various tribal entities: September 22, 2008 (exploration site visit); August 13, 2010 (council meeting); November 10, 2010 (site visit); December 22, 2010 (meeting); and January 26, 2011 (site visit).

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

Concerns raised, to date, include avoidance of identified cultural resources within the proposed Project Area, potential impacts to water sources (adjacent cold springs complex), opportunities for tribal monitors/observers during construction, cultural resources data recovery, new surface disturbance and also impacts to sage-grouse as the tribes attach great significance to sage-grouse and mimic their courtship and strutting through their dances.

Adopted environmental protection measures and mitigations have been proposed which address these concerns and include avoidance, as practical, of all NRHP-eligible and unevaluated cultural resource sites and treatment of all eligible and unevaluated cultural resources sites according to the provisions of an accepted HPTP. In addition, qualified archaeologist monitors would monitor project activities that are near or adjacent to contributing elements, NRHP eligible or unevaluated properties. Sage grouse mitigations include seasonal restrictions (see Appendix C). Additionally, although the water chemistry data suggests that there is essentially no interaction between the cold water springs in the Unit Area and the thermal fluid in the geothermal reservoir (see Section 3.10), continuing the current program of monitoring a selected number of these cold water springs for flow (water level), chemistry and temperature during Project construction and operation would provide data which would either confirm the absence of any connection between the cold water springs and the geothermal reservoir, or provide documentation of adverse changes and information to develop effective correction measures. Potential corrective measures could include providing produced cold water to replace reduced spring flows, or

implementing appropriate geothermal reservoir management techniques to reduce and/or reverse these adverse affects to the cold water springs.

Vehicles, equipment, and personnel used for development purposes can have negative impacts to areas utilized by native peoples and associated artifacts as identified in Section 3.3.1. Long and short term noise and visual impacts can have a detrimental impact to existing cultural/traditional/spiritual activities that may occur in certain areas. Sacred sites such as prayer, sweat lodge, and vision quest sites, along with edible/medicinal plant gathering sites and activities, must remain quiet and undisturbed.

The physical remains of past cultural and subsistence practices and activities (antelope traps, points, flakes, stone tools, grinding stones, etc) are also considered to be extremely important and sacred due to such artifacts having been made by the ancestors and considered the evidence of thousands of years of native inhabitation. Construction activities, and personnel working in close proximity to cultural sites, can destroy artifacts, thus eliminating not only the physical evidence of native occupation, but also archaeological data, which can produce a better understanding of past and present cultures. Archaeological data along with native oral history can reveal information pertaining to past cultural activities and associated social practices, trade routes, subsistence activities, environmental changes, etc.

Also, the act of drilling wells (regardless of the data being sought) is often viewed by traditional practitioners and believers as being harmful to “mother earth” due to impacts to underground and surface waters, which are considered the “life blood of the Earth and all who dwell upon it.” Other than consumption by people, wildlife, and plant species, certain hot and cold spring locations are also used for healing and spiritual purposes.

During the Project activities, if any cultural properties, items, or artifacts (stone tools, projectile points, etc) are encountered, it must be stressed to those involved in the proposed Project activities that such items are not to be collected. Cultural and archaeological resources are protected under the Archaeological Resources Protection Act (16 U.S.C 470ii) and the Federal Land Management Policy Act (43 U.S.C. 1701). The above language is applicable to previously identified artifacts and site locations, surface artifacts possibly missed during the original survey, and any subsurface artifacts (below ground).

Though the possibility of disturbing Native American gravesites within most Project Areas is extremely low, inadvertent discovery procedures must be noted. Under the Native American Graves Protection and Repatriation Act, section (3)(d)(1), it states that the discovering individual must notify the land manager in writing of such a discovery. If the discovery occurs in connection with an authorized use, the activity, which caused the discovery, is to cease and the materials are to be protected until the land manager can respond to the situation. NRS 383.150 through 383.190 applies to Native American burials on private lands. NRS 440.025 applies to human remains found on private lands.

If any traditional cultural properties or artifacts are identified before or during development activities, a protective “buffer zone” may be acceptable, where physical avoidance is an issue,

and if doing so satisfies the needs of the BLM, the proponent, and affected Tribe. The size of any “buffer zone” would be determined through coordination/consultation and communication between all participating entities. Those significant cultural sites that were identified during the cultural resources inventory (pre-historic and historic) would be avoided or treated consistent with the approved Historic Properties Treatment Plan.

Native American consultation is ongoing.

3.4.2.2 Alternative 1

The potential impacts to Native American Religious Concerns from the construction, operation, maintenance and reclamation of Alternative 1 would be essentially the same as those described for the Proposed Action.

3.4.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. The April 2009 Geothermal Exploration EA calls for complete avoidance of impacts to cultural resources. Therefore, continued exploration under the No Action Alternative would not cause any direct or indirect impacts to cultural properties that are important to Native Americans. See the 2009 Geothermal Exploration EA for a complete analysis of potential effects to Native American Religious Concerns.

3.5 WILDLIFE (INCLUDING SPECIAL STATUS SPECIES- PLANTS AND ANIMALS, AND MIGRATORY BIRDS)

3.5.1 Affected Environment

This section covers wildlife and plant resources present in the Project Area and includes the following: general wildlife resources, which include big game and those species that are relatively abundant and are not classified as special status species; migratory birds; BLM special status species (SSS), which encompasses (1) species that are listed as threatened or endangered or proposed or candidates for listing under the Endangered Species Act of 1973 as amended (60 CFR 17.11 [listed animals], 50 CFR 1712 [listed plants], and subsequent notices published in the Federal Register), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for further listing under the ESA, which are designated as Bureau sensitive by the [Nevada] State Director (BLM IM NV-2003-097, BLM Manual 6840 2008); and USFS Intermountain (R4) Regional Forester Sensitive Species (RFSS; USFS 2011), which encompasses individual species with significant current or predicted

downward trends in: (1) population numbers or density, or (2) habitat capability that would reduce a species' existing distribution (USFS 1990).

The area of analysis for all wildlife and plant resources includes all components of the Project (see Figure 4 and Figure 6).

A biological survey of the Project Area was conducted by Great Basin Ecology (GBE) on July 2 and 3, 2010, and sections of the Project were surveyed on November 16, 2010 (GBE 2010).

3.5.1.1 Proposed Action

General Wildlife

The variety of vegetation communities within the Project Area and vicinity provide habitat for a diversity of wildlife species. A number of species have been documented through sightings or sign by the Nevada Department of Wildlife (NDOW), Nevada Natural Heritage Program (NNHP), or GBE (see Table 8). A number of these species are listed as special status or sensitive by the BLM and/or USFS and will be further covered under the Special Status or Sensitive – Wildlife Section below.

Table 8: Wildlife Species with Recorded Occurrence at the McGinness Hills Project Area

Mammals			
<i>Scientific Name</i>	<i>Common Name</i>	<i>Scientific Name</i>	<i>Common Name</i>
<i>Antilocapra americana</i>	Pronghorn ^{2,4}	<i>Myotis ciliolabrum</i>	Western small-footed myotis ²
<i>Brachylagus idahoensis</i>	Pygmy rabbit ^{1,2,4}	<i>Neotamias dorsalis</i>	Cliff chipmunk ²
<i>Canis latrans</i>	Coyote ^{3,4}	<i>Neotoma cinerea</i>	Desert packrat or Bushy-tailed woodrat ^{2,4}
<i>Corynorhinus townsendii</i>	Townsend's big-eared bat ²	<i>Odocoileus hemionus</i>	Mule deer ^{2,3,4}
<i>Eutamias minimus</i>	Least chipmunk ³	<i>Peromyscus truei</i>	Pinon deermouse ²
<i>Lemmyscus curtatus</i>	Sagebrush vole ⁴	<i>Puma concolor</i>	Mountain lion ²
<i>Lepus californicus</i>	Black-tailed jackrabbit ^{3,4}	<i>Spermophilus sp.</i>	Ground squirrel ^{2,3}
<i>Lynx rufus</i>	Bobcat ^{2,4}	<i>Sylvilagus Nuttallii</i>	Mountain cottontail ^{3,4}
<i>Marmota flaviventris</i>	Yellow-bellied marmot ³	<i>Vulpes macrotis</i>	Kit fox ²
<i>Mustela sp.</i>	Weasel ^{2,4}		
Birds			
<i>Scientific Name</i>	<i>Common Name</i>	<i>Scientific Name</i>	<i>Common Name</i>
<i>Accipiter cooperii</i>	Cooper's hawk ^{1,2}	<i>Colaptes auratus</i>	Northern flicker ³
<i>Accipiter gentilis</i>	Northern goshawk ^{1,2}	<i>Corvus corax</i>	Common raven ³

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<i>Accipiter striatus</i>	Sharp-shinned hawk ¹	<i>Dendragapus obscurus</i>	Blue grouse ²
<i>Alectoris chukar</i>	Chukar ^{2,3}	<i>Dendroica coronata</i>	Yellow-rumped warbler ²
<i>Amphispiza belli</i>	Sage sparrow ³	<i>Ermophila alpestris</i>	Horned lark ³
<i>Amphispiza bilineata</i>	Black-throated sparrow ³	<i>Falco columbarius</i>	Merlin ^{1, 2}
<i>Anas acuta</i>	Northern pintail ²	<i>Falco mexicanus</i>	Prairie falcon ^{1, 2,3}
<i>Anas platyrhynchos</i>	Mallard ²	<i>Falco sparverius</i>	American kestrel ^{1,2}
<i>Anthus rubescens</i>	American pipit ^{2,3}	<i>Haliaeetus leucocephalus</i>	Bald eagle ²
<i>Aphelocoma californica</i>	Western scrub-jay ²	<i>Lanius ludovicianus</i>	Loggerhead shrike ³
<i>Aquila chrysaetos</i>	Golden eagle ^{1,2,3}	<i>Oporornis tolmiei</i>	MacGillivray's warbler ²
<i>Athene cunicularia</i>	Western burrowing owl ³	<i>Oreoscoptes montanus</i>	Sage thrasher ³
<i>Bubo virginianus</i>	Great horned owl ^{1, 2,3}	<i>Pipilo maculatus</i>	Spotted towhee ^{2,3}
<i>Buteo jamaicensis</i>	Red-tailed hawk ^{1, 2,3}	<i>Salpinctes obsoletus</i>	Rock wren ³
<i>Buteo lagopus</i>	Rough-legged hawk ^{1, 2}	<i>Sphyrapicus ruber</i>	Red-breasted sapsucker ²
<i>Buteo regalis</i>	Ferruginous hawk ^{1, 2}	<i>Spizella breweri</i>	Brewer's sparrow ³
<i>Buteo swainsoni</i>	Swainson's hawk ^{1, 2}	<i>Sturnella neglecta</i>	Western meadowlark ³
<i>Callipepla californica</i>	California quail ²	<i>Tachycineta thalassina</i>	Violet-green swallow ²
<i>Carpodacus mexicanus</i>	House finch ³	<i>Troglodytes aedon</i>	House wren ²
<i>Cathartes aura</i>	Turkey vulture ³	<i>Turdus migratorius</i>	American robin ²
<i>Centrocercus urophasianus</i>	Greater sage-grouse ^{1,2,3,4}	<i>Vermivora celata</i>	Orange-crowned warbler ²
<i>Chondestes grammacus</i>	Lark sparrow ³	<i>Vireo gilvus</i>	Warbling vireo ²
<i>Chordeiles minor</i>	Common nighthawk ³	<i>Vireo solitarius</i>	Solitary vireo ²
<i>Circus cyaneus</i>	Northern harrier ^{1, 2,3}	<i>Zenaida macroura</i>	Mourning dove ³
Amphibians and Reptiles			
Scientific Name	Common Name	Scientific Name	Common Name
<i>Bufo boreas</i>	Western toad ²	<i>Phrynosoma platyrhinos</i>	Desert horned lizard ^{2,3}
<i>Callisaurus draconoides</i>	Zebra-tailed lizard ²	<i>Pituophis catenifer deserticola</i>	Great Basin gophersnake ²
<i>Charina bottae</i>	Northern rubber boa ²	<i>Pituophis melanoleucus</i>	Gopher snake ²
<i>Gambelia wislizenii</i>	Long-nosed leopard lizard ^{2,3}	<i>Sceloporus graciosus</i>	Sagebrush lizard ³

<i>Phrynosoma hernandesi</i>	Greater short-horned lizard ²	<i>Sceloporus occidentalis</i>	Western fence lizard ^{2,3}
<i>Phrynosoma platyrhinos</i>	Desert horned lizard ²	<i>Thamnophis elegans</i>	Western garter snake ³

Source: Nevada Department of Wildlife Sighting Data¹, Nevada Natural Heritage Program Sighting Data², Great Basin Ecology Survey Sighting³(2010), Great Basin Ecology Observed Sign⁴(2010)

Based on the habitat present in and around the Project Area (see Table 12), the vegetation that occurs provides food, water, and cover for many small mammals (e.g., jackrabbits, squirrels, woodrats, and rodent species), mesocarnivores (e.g., kit foxes, coyotes, and bobcats), avian species, and big game.

Pronghorn utilize a variety of habitats, including the cold desert shrublands and Great Basin sagebrush and grassland habitat types (Tsukamoto 1983). The McGinness Hills provide year-round habitat for pronghorn with concentrations being found in early spring, late summer, and early fall. As many as 30 pronghorn have been documented during post-season pronghorn surveys in the McGinness Hills (J. Lutz, NDOW, personal communication, March 28, 2011).

Mule deer occupy many types of habitats in mountains and lowlands, including various forests and woodlands, forest edges, shrublands, grasslands with shrubs, and residential areas. In winter, mule deer tend to be on warmer slopes or other areas with minimal snow cover (Natureserve 2010a). The mountain big sagebrush, pinyon-juniper, Wyoming big sagebrush, and the dwarf sagebrush communities are the primary habitats in the Project Area for this species. The riparian areas and meadows are also important to mule deer. NDOW has designated the Project Area to be included in winter use for mule deer, but concentrations are low in the area (J. Lutz, NDOW, personal communication, March 28, 2011).

Special Status Species – Plants

Sixteen USFS sensitive plant species were identified to occur in the Austin-Tonopah Ranger District, and eight BLM sensitive plant species were identified to occur in Lander County (U.S. Department of Agriculture Online Plant Database). Of these, 13 were eliminated from further consideration based on known habitat criteria and the lack of those criteria in the survey area (GBE 2010) and scoping information provided by USFWS (2010a) and NNHP (2010). The three SSS and/or RFSS plant species with the potential to occur in the survey area are identified and described below (see Table 9). Although none of the three species was observed during surveys of the Project Area, the surveys cannot be considered conclusive because of their timing and their incomplete coverage of suitable habitat within the Project Area.

Table 9: BLM Special Status or USFS Sensitive Plant Species with Potential Vegetation Habitat to Occur in the Project Area

Scientific Name	Plant Name	Listing Agency	Elevation (ft. amsl)	Vegetation Community	Habitat
<i>Asclepias eastwoodiana</i>	Eastwood milkweed	BLM USFS	4,680 to 7,080	Mixed desert shrub, sagebrush, and pinyon-juniper	In open areas on a wide variety of basic soils, generally barren and lacking competition, frequently in small washes or other moisture-accumulating microsites. Associated species are shadscale saltbush (<i>Atriplex confertifolia</i>), greasewood (<i>Sarcobatus vermiculatus</i>), littleleaf horsebrush (<i>Tetradymia glabrata</i>), bud sagebrush (<i>Picrothamnus desertorum</i>), and green molly (<i>Bassia americana</i>). The blooming period for Eastwood milkweed is from May through June. Known from the Ely and Austin/Tonopah RDs (all ranges).
<i>Astragalus toquimanus</i>	Toquima milkvetch	BLM USFS	6,200 to 7,500	Pinon-juniper, sagebrush	Gravelly hillsides with gentle slopes in basic or calcareous soils. Associated plants include shadscale saltbush, spiny hopsage (<i>Grayia spinosa</i>), and naked milkvetch (<i>Astragalus serenoii</i> var. <i>sordescens</i>). Known from Tonopah RDs (only from S. Toquima and S. Monitor). Flowers between May and June.
<i>Eriogonum esmeraldense</i> var. <i>toyabense</i>	Toiyabe buckwheat	USFS	7,200 to 9,200	Pinon-juniper, mountain sagebrush, mountain mahogany, and subalpine conifer	Found on generally steep, loose, sandy to gravelly or clay slopes derived from rhyolitic or andesitic volcanic materials, frequently on white ash deposits. Known from Austin/Tonopah RD (all ranges). Flowers late-spring to summer with the range of most frequent survey months from June and July (annual).

Suitable habitat is present for Eastwood milkweed in the Project Area. The nearest known location for this plant is approximately 13 miles west of the Project Area (BMDO 2010). This plant may occur in suitable habitat within the Project Area.

Suitable habitat is present for Toquima milkvetch in the Project Area. The nearest known location for this plant is approximately 65 miles south of the Project Area (BMDO 2010). This plant may occur in suitable habitat within the Project Area.

Although suitable vegetation is present for Toiyabe buckwheat in the Project Area, the specific soils/ash deposits where this species is found do not occur. The nearest known location for this plant is approximately 20 miles southwest of the Project Area (BMDO 2010). This species is not expected to occur within the Project Area.

Special Status Species – Wildlife

Seven wildlife species listed as sensitive or candidate species were identified by the USFS Austin-Tonopah Ranger District with potential to occur in and around the Project Area (GBE 2010). Eighteen wildlife species listed as BLM special status species were identified by the MLFO with potential or known occurrences in and around the Project Area (see Table 10).

Table 10: Special Status or Sensitive Species with Potential or Known Occurrence in the Project Area

Mammals					
<i>Scientific Name</i>	<i>Common Name</i>	<i>Agency Listing</i>	<i>Scientific Name</i>	<i>Common Name</i>	<i>Agency Listing</i>
<i>Brachylagus idahoensis</i>	Pygmy rabbit	BLM USFS	<i>Myotis ciliolabrum</i>	Western small-footed myotis	BLM
<i>Corynorhinus townsendii</i>	Townsend’s big-eared bat	BLM USFS	<i>Ovis canadensis nelsoni</i>	Desert bighorn sheep	BLM USFS
<i>Euderma maculatum</i>	Spotted bat	BLM USFS			
Birds					
<i>Scientific Name</i>	<i>Common Name</i>	<i>Agency Listing</i>	<i>Scientific Name</i>	<i>Common Name</i>	<i>Agency Listing</i>
<i>Accipiter gentilis</i>	Northern goshawk	BLM USFS	<i>Centrocercus urophasianus</i>	Greater sage-grouse	BLM USFS
<i>Aquila chrysaetos</i>	Golden eagle	BLM	<i>Falco mexicanus</i>	Prairie falcon	BLM
<i>Asio flammeus</i>	Short-eared owl	BLM	<i>Gymnorhinus cyanocephalus</i>	Pinyon jay	BLM
<i>Asio otus</i>	Long-eared owl	BLM	<i>Haliaeetus leucocephalus</i>	Bald eagle	BLM USFS
<i>Baeolophus griseus</i>	Juniper titmouse	BLM	<i>Lanius ludovicianus</i>	Loggerhead shrike	BLM
<i>Buteo regalis</i>	Ferruginous	BLM	<i>Poocetes</i>	Vesper	BLM

	hawk		<i>gramineus</i>	sparrow	
<i>Buteo swainsoni</i>	Swainson's hawk	BLM			

Pygmy Rabbit

Pygmy rabbits are typically found in islands of tall, dense sagebrush (*Artemisia* spp.) cover and are highly dependent on sagebrush to provide both food and shelter throughout the year (Himes and Drohan 2007, Larrucea and Brussard 2008). Their diet in the winter consists of up to 99 percent sagebrush (Green and Flinders 1980). The pygmy rabbit is believed to be one of only two Leporids in Northern America that digs its own burrows. Pygmy rabbit burrows are typically found in friable, loamy-type soils, and some preference for sites closer to perennial streams with deeper soils has been documented (Himes and Drohan 2007, Larrucea and Brussard 2008). They occasionally make use of burrows abandoned by other species and as a result, may occur in areas of shallower or more compact soils that support sufficient shrub cover (USFWS 2010b).

Generally, the survey area for the Project consists of sites with shallow soils or woodlands, or lacks the tall sagebrush islands suitable for pygmy rabbits (GBE 2010). Occupied and suitable pygmy rabbit habitat was found in isolated areas during surveys for the McGinness Hills Geothermal Exploration Project at T. 20 N., R. 45 E., Section 24, near the head of Rye Patch Canyon Creek and along the creek floodplain in Section 13 (GBE 2008). These areas are more than 2 miles from Project disturbance and thus will not be affected by the Project development. Occupied and suitable habitat was also found in the Burton Creek drainage of T. 20 N., R. 45 E., Section 31 (GBE 2010). This area is approximately 1 mile west of the proposed transmission corridor and therefore would not be affected by the Proposed Action. Habitat throughout the rest of the Project lacks either a soil component needed for burrows to exist and/or suitable vegetation (GBE 2010).

Townsend's Big-eared Bat, Spotted Bat, and Western Small-footed Bat

The western small-footed bat, spotted bat, and Townsend's big-eared bat are all likely to be present in the area. Each of these species is known to forage over one or more of the habitat types present in the Project Area. The small-footed bat and the spotted bat both roost in rock crevices that can be found in the small rock outcrops in the Project Area. Townsend's big-eared bat roosts primarily in caves and cave analogs (e.g. historic mine workings). None of this type of roosting habitat was observed during the survey (GBE 2010). Occurrence records exist for the western small-footed bat and Townsend's big-eared bat approximately 8 miles west of the transmission corridor (BMDO 2010). Only those individual bats utilizing the Project Area for foraging would be affected by project development.

Desert Bighorn Sheep

Bighorn sheep inhabit alpine meadows, grassy mountain slopes and foothill country near rugged, rocky cliffs and bluffs, allowing for quick escape. In winter, Bighorn sheep prefer slopes at elevations of 2,500 to 5,000 feet where annual snowfall is less than 60 inches a year because they

cannot paw through deep snow to feed. Their summer range is between 6,000 and 8,500 feet in elevation.

Bighorn sheep are found in the mountains west of the geothermal plant area and use some of the foothill areas as winter range as well as the area south of the Lake Ranch. No sign of this species was observed in the survey areas for the Project (GBE 2010), and no occurrence records of bighorn sheep are known in or around the proposed Project Area (BMDO 2010). The Project Area occurs in NDOW-designated bighorn sheep habitat, but bighorn sheep have not been observed and are not expected in the Project Area or vicinity (J. Lutz, NDOW, personal communication, 2011).

Northern Goshawk

The northern goshawk is widely distributed throughout North America and Eurasia. It is an uncommon permanent resident of the Great Basin montane forests requiring extensive mixed woodlands and large trees for nesting. The Northern goshawk is a year-round resident of Nevada and may be observed in mountainous terrain up to 9,000 feet during the warmer months and in lower foothills and valley habitats during winter. Goshawks are generalists in their prey selection (Squires and Reynolds 1997); over 50 prey species, including mammals, birds, and insects, are known to be taken by goshawks (GBE 2010). Foraging typically occurs in dense forests and more rarely in open habitat and along ecotones (Squires and Reynolds 1997).

The typical northern goshawk nest site in Nevada is located in aspen stringers near small perennial streams (normally within 100 yards) at approximately 7,400-7,800 feet in elevation. Aspen is the most commonly used nesting tree in Nevada. Nests are large, 30 inches or greater comprised of one and one-half inch diameter sticks. Pinyon and juniper trees are occasionally used for nest sites. Numerous nests (alternate nest sites) may be present within the territory (GBE 2010).

Based on the presence of pinyon-juniper along portions of the transmission line, this vegetation type could be considered habitat for northern goshawk. No active goshawk nests were located within the Project Area during field surveys (GBE 2010). Five recorded nest records exist within 10 miles of the Project, the nearest of which is greater than 4 miles from the nearest surface disturbance (NDOW 2011b). Therefore, foraging and nesting habitat may be affected, but no affect to known nest sites is expected.

Golden Eagle

Golden eagle habitat is generally open country, in prairies, arctic and alpine tundra, open wooded country and barren areas, especially in hilly or mountainous regions (Kochert et al. 2002). Golden eagles nest on rock ledges, cliffs or large trees. Pairs may have several alternate nests, and may use some in consecutive years or shift to alternate nests used in different years (Natureserve 2010b). Golden eagles use a wide range of habitats for foraging. Golden eagle sightings have been documented within and surrounding the Project Area (BMDO 2010, S.

Cooper personal observation). The salt desert shrub, sagebrush, and meadow habitats in the Project Area are all suitable foraging habitats for golden eagles.

Nesting habitat generally consists of rock ledges on large rock outcrops or cliffs. This type of habitat does not occur in the disturbance area of the Project and few potential nesting sites are present in the surrounding area (GBE 2010). No documented golden eagle nests are known to exist within a 10-mile buffer of the Project Area (NDOW 2011b). GIS analysis, using slope, viewshed, and Gap Analysis Program, of the surrounding habitat identified very isolated pockets of potential nesting habitat, the nearest of which is greater than 2 miles from any proposed disturbance (GBE 2010). Based on this, while golden eagles frequent the area for foraging, the Project Area appears to lack suitable nesting habitat. Therefore, golden eagle foraging habitat is likely to be affected, but nesting habitat will not be.

Short-eared Owl

Short-eared owls tend to be found in open habitats, including grasslands, prairies, wet meadows, and lowland riparian areas, where small mammals and other prey species may be hunted (Wiggins et al. 2006, Floyd et al. 2007). Short-eared owl nest sites are located on the ground typically on dry knolls, ridges, or hummocks but occasionally in wet areas (Wiggins et al. 2006).

No nest locations are known in the vicinity of the Project, but sightings have been made during site visits (S. Cooper, personal observation, April 2011). Due to the seasonality of the sightings, potential nesting and foraging habitat may occur in proximity to the Project.

Long-eared Owl

Long-eared owl habitat includes deciduous and evergreen forests, orchards, wooded parks, farm woodlots, river woods, desert oases and is typified by open shrubland and sparsely forested habitat (Marks et al. 1994). Wooded areas with dense vegetation are needed for roosting. Nest sites vary throughout their range, including thick, brushy riparian areas, willows, junipers, in old nests of crows, squirrels, hawks, magpies, or herons, sometimes in tree cavities, and rarely on the ground (Marks et al. 1994, Natureserve 2010c).

The pinyon-juniper woodlands and riparian areas in and surrounding the Project represent potential habitat for long-eared owls. One documented observation exists in the general area of the Project more than 5 miles from the edge of any proposed disturbance (BMDO 2010). Use of the Project Area by long-eared owls has been rare. Therefore, long-eared owls are not expected to be affected by Project development.

Juniper Titmouse

Juniper titmice are associated with pinyon-juniper woodlands in Nevada (Cicero 2000). Nest sites include natural tree holes, woodpecker-excavated cavities, and artificial sites, such as nest boxes and fence posts (Cicero 2000). Suitable habitat occurs in the Project Area along segments of the transmission corridor that run through pinyon-juniper woodlands. One documented

observation exists in the general area of the Project more than 5 miles from the edge of any proposed disturbance (BMDO 2010). Therefore, both nesting and foraging habitat for juniper titmice occur along the proposed transmission corridor.

Ferruginous Hawk

Ferruginous hawks are typically found in open habitats, such as grasslands, sagebrush, salt desert shrub, and deserts, and are dependent on these habitats for foraging (Bechard and Schmutz 1995). In Nevada, this species generally nests in isolated juniper or pinyon pine trees that are near the wooded-shrubland interface or along a stringer of trees. When trees are not available, this species may occasionally nest on the ground (Bechard and Schmutz 1995).

Although no ferruginous hawks or nest sites were observed during baseline surveys (GBE 2010), the entire Project Area and vicinity provides suitable foraging habitat and potential nest sites. Three documented ferruginous hawk nests are known to exist within a 10-mile buffer of the Project (NDOW 2011b). One nest area is approximately 2 miles from the nearest proposed disturbance; its current condition and status are unknown. The other two nests are within one mile of each other and less than one mile from the proposed transmission corridor and the Alternative 1 transmission corridor; their current condition and status are unknown. Therefore, the Project may affect both foraging habitat and nesting habitat for ferruginous hawks.

Swainson's Hawk

Swainson's hawks are typically found in habitats consisting of grass-dominated vegetation, open shrublands, and small, open woodlands and have also adapted to agricultural and developed fields (Bechard et al. 2010). Primary prey species include small mammals, birds, reptiles, and invertebrates (Bechard et al. 2010). Suitable foraging habitat and prey species occur in the Project Area.

Swainson's hawk nests are typically found in a solitary tree or bush along a riparian corridor and may occasionally be found on a manmade structure, such as a power pole (Bechard et al. 2010). Preference for sites near agricultural or developed fields has been documented (Bechard et al. 2010). Suitable nesting habitat is not found in the Project Area, but one documented nest location is known approximately 6.5 miles south of the transmission corridor, near private land with developed fields. Therefore, foraging habitat may be affected by the Project development, but nesting habitat is not expected to be affected.

Greater Sage-Grouse

The Geothermal Unit Area is located in the greater sage-grouse Toiyabe Population Management Unit (PMU; 1,127,000 acres) as designated by the South Central Planning Team (South Central Planning Team 2004). The NDOW has designated all of the habitat in the Toiyabe PMU as sage-grouse summer range, the majority (972,000 acres) of the habitat as sage-grouse winter range, portions (420,000) as nesting habitat, and portions (222,750 acres) as core-breeding habitat (NDOW 2011c, BLM 2010; Doherty et al. 2010; see also Figure 14). The entire Unit Area,

production plants, injection and production pipelines, and transmission line occur in NDOW-designated sage-grouse summer and winter range (NDOW 2011e and 2011f). The majority of the Unit Area, production plants, injection and production pipelines, and 3.0 miles of the proposed transmission line occur in sage-grouse core-breeding habitat (see Figure 14).

Sage-grouse are sagebrush obligates; they require sagebrush for different life cycle and foraging needs throughout the year (Schroeder et al. 1999). Both the big sagebrush species and dwarf sagebrush types (e.g., low sagebrush [*Artemisia arbuscula*], black sagebrush [*Artemisia nova*]) provide seasonal habitat requirements. Winter habitat use varies depending on snow depth but includes habitats with both big sagebrush and dwarf sagebrush species (Crawford et al. 2004), and is primarily used November through February. Lekking typically occurs in areas with sparse vegetation that are surrounded by the taller sagebrush with greater canopy cover and density of grasses and forbs needed for suitable nesting (Connelly et al. 2000, Crawford et al. 2004). Brood-rearing habitat (i.e., sagebrush, riparian, and wet meadow habitats) is variable as chicks grow but consists of those habitats that provide forage in the form of forbs, invertebrates, and sagebrush (Crawford et al. 2004). Sage-grouse fall habitat use includes sagebrush habitat in the transition zone between brood-rearing and winter habitat but may overlap with brood-rearing and winter habitats.



Photo 3: Typical Sagebrush Community at the McGinness Hills Geothermal Unit Area

Suitable habitat exists throughout and around the Project Area for all seasonal uses (i.e. winter, lek/breeding/nesting, brood rearing, and fall) by sage-grouse. Sage-grouse have been documented in the Project Area throughout the year through field surveys (GBE 2010),

observational records (BMDO 2010), and telemetry data collection (NDOW 2011; see Figure 14).



Photo 4: Low Sagebrush Site Typical of Lek Habitat

To account for habitat fragmentation and indirect effects from Project activities and disturbance, a 2 mile buffer was placed around the components of the Project. This buffer encompasses 38,023 acres. The entire Project occurs within the NDOW-designated winter and summer habitat. Thus, 4% of the NDOW-designated winter habitat and 3% of NDOW-designated summer habitat for sage-grouse in the Toiyabe PMU occurs within 2 miles of the Project. A similar percentage of fall habitat also occurs in the Project buffer. Sage-grouse telemetry data document sage-grouse use of habitat near portions of the Project facilities during the lekking/nesting, brood-rearing, and winter seasons (see Figure 14; NDOW 2011d, 2011e and 2011f). No fall use of the Project vicinity has been documented by the telemetry data (see Figure 14; NDOW 2011). The extent of connectivity and movement corridors between sage-grouse metapopulations of the Toiyabe PMU is unknown.

Active (or occupied) leks are those traditional display areas attended by ≥ 2 male sage-grouse in ≥ 2 of the previous five years (Connelly et al. 2000). Four active leks known to occur within 2 miles of the Project Area, which accounts for 12% of the known active leks ($n=33$) in the Toiyabe PMU (see Figure 14). During 2011 lek surveys, strutting males were located at all four of these leks. In addition, strutting males were located at 3 other locations within the 2-mile buffer. Status for these leks is currently considered unknown until surveys are completed in additional years to designate the lek as active or inactive. Although no surface disturbance or direct impacts are proposed at any known active lek locations, indirect impacts may affect these leks (see Section 3.5.2).

Sage-grouse nesting habitat occurs in and around the Project Area in suitable sagebrush stands. In this analysis, sage-grouse core-breeding habitat will be used for further evaluation of impacts to sage-grouse nesting habitat. Core-breeding habitat has been identified based on high-density breeding areas and habitat suitability (Doherty et al. 2010). Within the 2-mile Project buffer, 14,530 acres of sage-grouse core-breeding habitat occurs and may be affected by Project development (see Figure 14). This accounts for 7% of the core-breeding habitat in the Toiyabe PMU.



Photo 5: Typical Sage-Grouse Nesting Habitat at McGinness Hills

Brood-rearing is expected throughout the sagebrush habitat and is likely concentrated on seeps, springs, wet meadow, and riparian areas in the Project Area. No surface-disturbing activities have been proposed directly on seeps, springs, wet meadow, or riparian areas, but several of these areas exist in either close proximity to the development or within the 2-mile Project buffer (see Figure 19). Therefore, these areas with expected concentrated brood-rearing habitat may be affected to various degrees based on proximity to Project development (see Section 3.5.2).

The section of transmission line for the Proposed Action that traverses National Forest lands includes approximately two miles of pinyon-juniper woodland mixed with sagebrush. The NDOW included this as summer and winter distribution areas, but sage-grouse use of woodlands is unlikely. Therefore, the segment of the transmission line running through woodland habitat is not considered sage-grouse habitat.

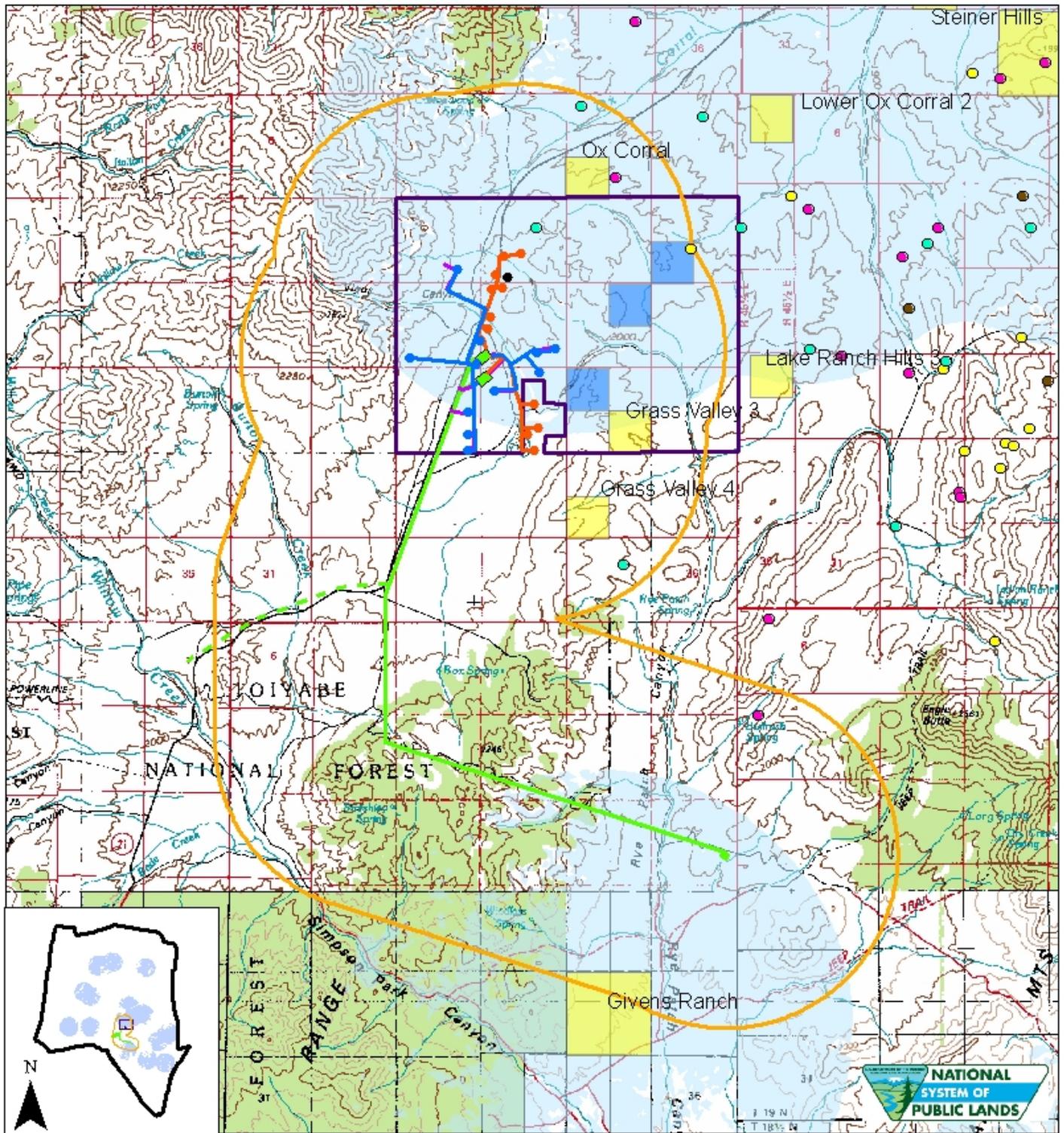


Figure 14: Greater Sage-Grouse Seasonal Habitat Use from Telemetry Data (NDOW 2008) and Core-Breeding Habitat (BLM 2010).

Seasonal Locations

- Winter
- Fall
- Lekking, Nesting
- Brood-Rearing
- Area with Active Sage-Grouse Lek
- Area with Unknown Sage-Grouse Lek

- Monitoring Well
- Injection Pipeline and Wells
- Production Pipeline and Wells
- Proposed Access Roads
- 2-Mile Proposed Project Buffer
- Power Plants
- Geothermal Unit Area
- Toiyabe Sage-Grouse PMU

1:94,475
0 0.4 0.8 1.6 2.4 3.2 Miles

*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.

The data shown on the map uses the Universal Transmercator (Zone 11N) Coordinate system and uses the NAD83 projection. Map date: 03/25/2011.

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Prairie Falcon

Prairie falcon habitat is characterized by cliffs and canyons surrounded by open sagebrush, salt desert shrub, plains, and deserts (Steenhof 1998). This species generally nests on ledges in cliffs and escarpments (Steenhof 1998).

Suitable nesting habitat does not occur in the disturbance area of the Project and very few potential nesting sites are present in the surrounding area (GBE 2010). One documented nest is greater than 4 miles from any proposed disturbance. The Project Area and surrounding habitat is suitable for foraging although very few prairie falcon sightings have been documented (BMDO 2010, NDOW 2011a). Because of their low occurrence in and around the Project, a negligible effect to those individual birds using the Project Area and vicinity is expected.

Pinyon Jay

Pinyon jays are gregarious, flocking birds typically found in and around the edges of pinyon-juniper woodlands but may also be found in sagebrush and other scrub or conifer species (Balda 2002). Pinyon jays are highly dependent on pine seeds for foraging and develop large seed caches to store excess seeds (Balda 2002). Arthropods, reptiles, and small mammals are potential prey species for pinyon jays (Balda 2002). Nest sites are typically in the upper portions of pinyon or juniper trees and consist of an open cup built of grass and twigs (Balda 2002).

Suitable foraging and nesting habitat exist in and around the Project Area, especially along the transmission corridor.

Bald Eagle

During the breeding season, bald eagles are closely associated with water occurring along coasts, lake shores, or riverbanks, where they feed primarily on fish. Bald eagles typically nest in large trees, primarily cottonwoods (*Populus* sp.) and conifers, although they have also been known to nest on prominent rock outcrops and cliff ledges (Buehler 2000). Due to the large size of their nests, bald eagles usually build these structures in a tree which is the largest or stoutest in the immediate vicinity. Breeding territories, including the nest tree and favored nearby perches, are defended against other eagles. Alternate nests are also common within the territory. Breeding territories are typically 250 to 500 acres in size (Buehler 2000).

During winter, bald eagles concentrate where food is available, typically in areas with open water, where fish and waterfowl can be caught (Buehler 2000). Bald eagles can live away from water and in the absence of fish. In such cases, they feed on carrion or hunt land prey. Black-tailed jackrabbits taken as carrion can be quite important in these situations (GBE 2010).

Communal winter roosts are common and located in forested stands that provide protection from the weather. Winter roosting sites are not necessarily in the immediate vicinity of foraging areas. Stalmaster and Gessaman (1984) found bald eagles expended less energy by flying one to two

miles to roost in upland conifers than they would by roosting along exposed river habitats where they foraged by day. Keister and Anthony (1983) note that where bald eagles winter in basins, the birds may travel considerable distances between roosting and feeding areas. The drainages and open water areas are generally at lower elevations within the drainage and act as cold air sinks. Therefore, roosting away from the water may provide a warmer roosting site (GBE 2010).

No large open bodies of water occur in or near the Project Area, but there is potential upland winter habitat. The nearest documented sighting occurred 10 miles from the Project Area (BMDO 2010), but there are no known concentrations or nesting pairs of bald eagles in or near the Project Area. Because bald eagles rarely occur in and around the Project Area, a negligible effect to those individual birds using the Project Area and vicinity is expected.

Loggerhead Shrike

Loggerhead shrikes' habitat use throughout the year is associated with open habitats, especially areas that have been developed by humans, such as agricultural fields, mowed roadsides, and pastures (Yosef 1996). Loggerhead shrikes are often found perching on fence lines, transmission lines, and power poles, and they use these vantage points for scouting prey species, such as arthropods, reptiles, and birds (Yosef 1996). Nest sites are variable but may include trees, shrubs, and brush, including sagebrush (Yosef 1996). Therefore, foraging and nesting habitat in and around the Project Area may be affected.

Vesper Sparrow

Vesper sparrows are considered habitat generalists and are known to forage and nest in open habitats, including sagebrush, grasslands, shrublands, agricultural fields, and pastures (Jones and Cornely 2002). Vesper sparrows have been record during bird counts in the habitat surrounding the Project (BMDO 2010). Therefore, the sagebrush habitat in the Project Area provides foraging and nesting opportunities for vesper sparrows and may be affected by Project development.

Migratory Birds

Migratory birds may be found in the Project Area as seasonal residents or as migrants. Provisions of the Migratory Bird Treaty Act (MBTA; 16 USC 701-718h) prohibit the "take" of migratory birds, their feathers, or nests. Take is defined in the MBTA to include by any means or in any manner, any attempt at hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof, without a permit. Executive Order 13186, titled "Responsibilities of Federal Agencies to Protect Migratory Birds," was signed on October 1, 2001 to further enhance and ensure the protection of migratory birds.

Nongame migratory bird species utilize the various habitats present in the Project Area throughout the year to meet seasonal life requirements. The habitat in and around the Project provides foraging and nesting habitat for migratory birds. The suite of birds dependent on sagebrush to meet their life requirements will be the group most highly affected. Migratory birds utilizing habitat near the Project area are expected to be directly and indirectly affected through

surface disturbance and Project activities during Project construction and maintenance. Details on special status and sensitive species are covered under the Special Status or Sensitive – Wildlife Section.

3.5.1.2 Alternative 1

General Wildlife

General wildlife species in the Alternative Area are the same as in the Proposed Area. Affected habitat is slightly smaller because the acres disturbed with the Alternative (214.8) are fewer than the Proposed Action (217.2). The primary difference in affected environment between Alternative 1 and the Proposed Action is less pinyon-juniper habitat would be affected by Alternative 1 (approximately 0 miles) than the Proposed Action (approximately 2.3 miles). The transmission line would run through similar amounts of sagebrush habitat with Alternative 1 and the Proposed action (approximately 7 miles).

Special Status and Sensitive Species - Plants

Special status and sensitive plant species are the same in the Alternative Area as in the Proposed Area.

Suitable habitat is present for Eastwood milkweed along isolated areas of the southeast end of transmission line alternative 1.

Suitable habitat is present for Toquima milkvetch in the Alternative Area. The nearest known location for this plant is approximately 65 miles south of the Project (BMDO 2010). This plant may occur in suitable habitat within the Alternative Area.

Although suitable vegetation is present for Toiyabe buckwheat in the Alternative Area, the specific soils/ash deposits where this species is found do not occur. The nearest known location for this plant is approximately 20 miles southwest of the Project Area (BMDO 2010). This species is not expected to occur within the Alternative Area.

Special Status and Sensitive Species – Wildlife

Special status and sensitive wildlife species are the same in the Alternative Area as in the Proposed Area.

The affected environment for the following species is expected to be similar for Alternative 1 and the Proposed Area: Townsend's big-eared bat, spotted bat, western small-footed bat, desert bighorn sheep, golden eagle, short-eared owl, long-eared owl, ferruginous hawk, Swainson's hawk, prairie falcon, bald eagle, loggerhead shrike, and vesper sparrow.

Because pinyon-juniper habitat would not be affected if Alternative 1 is selected, impacts to nesting habitat for the following species would be negligible: northern goshawk, juniper titmouse, and pinyon jay. Foraging habitat for northern goshawk may still be affected.

Pygmy Rabbit

Occupied and suitable habitat for pygmy rabbits was found in the Burton Creek drainage of T. 20 N., R. 45 E., Section 31 (GBE 2010). The Alternative 1 transmission line crosses through this area. Therefore, pygmy rabbits and suitable habitat would be impacted by Alternative 1.

Greater Sage-Grouse

The affected environment for sage-grouse is the same for Alternative 1 and the Proposed Action unless otherwise noted. Approximately 0.3 miles of the Alternative 1 transmission line occurs in sage-grouse core-breeding habitat. This part of the transmission line is the portion closest to the power plants and Project pipelines and would also be affected by the Proposed Action.

Three of the four previously identified leks would be affected by Alternative 1, and these all occur near the power plants and Project pipelines. No additional leks would be impacted by the Alternative transmission line. The affected nesting and brood-rearing habitat are expected to be similar for Alternative 1 and the Proposed Action.

Migratory Birds

The affected environment for migratory birds would be similar for Alternative 1 and the Proposed Action.

3.5.2 Environmental Consequences

3.5.2.1 Proposed Action

This section analyzes effects from the Proposed Action and Alternative 1 of Project development to wildlife and plant species occurring in the Project Area. Impacts considered and evaluated include direct, indirect, short-term, and long-term and the effect these may have on wildlife and plant species. Impacts will be mitigated by taking specific means, measures or practices to reduce or eliminate effects of the Proposed Action or the Alternative as defined in the BLM NEPA Handbook (BLM 2008a).

General Effect and General Wildlife

Surface disturbance required for construction of the drilling pads, power plant sites, pipelines, transmission line, substation, and access roads would result in the loss of wildlife habitat and direct displacement of wildlife. Direct effects to wildlife may include injury and mortality during surface-clearing activities. More mobile species, such as game and bird species, may avoid injury and mortality by leaving the area. However, less mobile species, such as rodents, small

mammals, and lizards, especially nocturnal species or species that utilize burrows may be injured or killed during surface-clearing activities. These impacts are expected to affect individuals and would not impact local or regional wildlife populations.

Combined habitat loss through short-term and long-term disturbance is approximately 217 acres. This loss would affect those individuals of various wildlife species using the habitat removed. It is also expected that Project-generated noise and human activity would deter some wildlife from using the area surrounding the Project. This noise and human activity would result in the disruption of normal behavioral patterns of some wildlife. This effect is expected to be greatest during construction when surface disturbance and drilling is peaking in activity (see also Section 3.7), and this heightened effect is expected to be temporary, primarily lasting for the duration of construction. Wildlife may also avoid or tolerate habitat affected by the longer-term noise generated by the production plants and wellheads. These effects may displace individuals or reduce breeding success of species sensitive to noise and human activity. These impacts are expected to affect individuals and would not impact local or regional wildlife populations.

Increased vehicular traffic during construction is expected. Increased wildlife mortality and injury from collisions may occur during this period. Of particular concern would be species that commonly utilize or cross roads during travel, such as mesocarnivores, lagomorphs, and big game species. These impacts are expected to affect individuals and would not impact species at a local or regional population level. These impacts will be further minimized by the 20-25 mph Project Area speed limit agreed to by the Operator in their environmental protection measures (see Section 2.1.11).

The transmission line poles would provide perching and nesting sites for raptors and corvids. The approximately 9.01-mile-long transmission line would also increase the potential for bird collisions, electrocution, and mortality. Occurrence of perching and nesting corvids and raptors and mortalities and injuries from collisions and electrocution will be minimized by the Operator's environmental protection measures, which include line spacing of greater than 60 inches (APLIC 2006) and installation of a cone (Kaddas Enterprises type KE1140 or equal) on each transmission line pole along the entirety of the transmission line (see Section 2.1.11).

Habitat fragmentation effects from Project development are expected to be greatest near the power plants, production and injection pipelines, and wells, as this is the area with the most concentrated surface disturbance. Some species, such as mesocarnivores, lagomorphs, lizards, and rodents may be able to utilize sections of the pipeline raised enough to go under. Monitoring of pipelines at other projects has indicated that coyotes will go under pipelines and prefer pipelines less than 36 inches from the ground (Dunne et al. 2007). Therefore, smaller species are expected to exhibit similar behavior.

Pronghorn and mule deer would also be affected by habitat fragmentation caused by Project development. These effects are expected to be minimal and affect individuals and local groups of animals using or migrating through the area. Both species are expected to respond primarily by avoiding the area of development and fragmented habitat. NDOW has stated that due to the small

footprint of the proposed facilities, it is unlikely that there will be a significant impact to mule deer (NDOW, personal communication, August 17, 2010).

Effects to all wildlife (General, Special Status, and Sensitive species) are expected due to reduced access to seeps, springs, wet meadow, and riparian areas. Any Project development effects would be minimized by burying sections of pipeline near seeps, springs, wet meadows, and riparian areas to allow access to wildlife. Although access may not be completely eliminated, reduced use by wildlife to springs 1 – 9 and wet meadow 1 and 2 is still likely (34 acres; Figure 20). Further mitigation measures will be required in the form of offsite projects to compensate at 3 to 1 ratio for this loss (34 acres*3 = 102 acres, Appendix C).

Reduction of some impacts from the Project footprint is inherent in its design and layout. The number of new roads being proposed has been minimized by utilizing already existing roads; only 2.19 miles of new long-term road is proposed to be constructed. Many of the features being proposed will also be directly adjacent to existing roads. This includes the 8.98 miles of proposed injection and production pipelines, the power plants' location less than 0.5 miles from Grass Valley County Road, and the transmission line along existing road and transmission corridors.

Special Status Species – Plants

Potential habitat for Eastwood milkweed is extremely limited in the Project Area, and this species was not observed during ground survey (GBE 2010). Therefore, impacts to the Eastwood milkweed from Project development are expected to be isolated to suitable habitat. Because survey results (GBE 2010) cannot be considered conclusive due to their timing and incomplete coverage of suitable habitat within the Project Area, mitigation measures will be implemented for Eastwood milkweed (see below).

Suitable habitat for the Toquima milkvetch was present during ground survey although no plants were observed. Therefore, impacts to the Toquima milkvetch from Project development are expected to be isolated to suitable habitat. Because survey results (GBE 2010) cannot be considered conclusive due to their timing and incomplete coverage of suitable habitat within the Project Area, mitigation measures will be implemented for Toquima milkvetch (see below).

Although suitable habitat types for the Toiyabe buckwheat were present in the Project Area, suitable soils were lacking. Therefore, this species is unlikely to occur and no impacts to the Toiyabe buckwheat are expected from Project development.

Mitigation Measure:

Clearance surveys by a BLM-approved specialist in coordination with the USFS Botanist using agency-approved protocols will be conducted for special status and sensitive plant species in species-specific suitable habitat within the Project Area prior to surface-disturbing activities. Surveys will be completed at the appropriate time of year to best detect and identify target species. If target species are identified in areas subject to direct

and/or indirect impacts from surface-disturbing activities, the following actions will be taken:

- If avoidance of special status and/or sensitive plants is practicable, the occurrences will be buffered, and the buffer perimeter will be visibly marked (e.g., with staking, flagging, or fencing) in the field and identified on construction drawings. Direct impacts associated with construction will avoid identified areas. Buffer distances will be determined by the BLM Wildlife Biologist and (if on USFS land) the USFS Botanist and implemented by a BLM-approved specialist.
- If indirect impacts are expected to special status and/or sensitive plants, BLM Wildlife Biologist and (if on USFS land) the USFS Botanist will develop practicable measures to avoid or minimize such impacts. Measures will be implemented by a BLM-approved specialist. Some examples of potential minimization measures include, but are not limited to, increasing the buffer around plants, installing silt fencing or other erosion control devices, slightly shifting minor project features, etc.
- If target species cannot be avoided, potential mitigation measures include, but are not limited to, the following: seed collection from plants to be impacted, followed by reseedling; seed collection from plants to be impacted, followed by propagation and outplanting; and enhancement of habitat for non-impacted portions of impacted populations. Measures would be implemented by a BLM-approved specialist with oversight of by the BLM Wildlife Biologist and (if on USFS land) the USFS Botanist. All reseedling/outplanting/enhancement will be completed in suitable habitat within the Project CESA.

Special Status Species – Wildlife

Pygmy Rabbit

Because surface-disturbing activities are not proposed in suitable pygmy rabbit habitat and soils, impacts to pygmy rabbits from the construction, operation, and maintenance of the Project are not anticipated through development of the Proposed Action.

Townsend's Big-eared Bat, Spotted Bat, and Western Small-footed Bat

No known roosting habitat for these bat species exists in or surrounding the Project Area. Therefore, no effects to roosting habitat from Project construction would occur. Impacts to foraging habitat would be similar to the general effects described under the General Effects and General Wildlife Section. These impacts would affect only individual bats and would not impact the local or regional bat population.

Desert Bighorn Sheep

Bighorn sheep are not likely to be impacted by Project development because suitable habitat does not occur within the Project Area and no bighorn sheep have been documented in or surrounding the Project Area.

Northern Goshawk

Impacts to northern goshawk foraging and nesting habitat may occur due to Project development.

Impacts to foraging habitat are expected to occur in the pinyon-juniper habitat where the proposed transmission corridor would be built. A small amount of direct habitat loss is expected (217 acres). Because the proposed transmission corridor would parallel an existing transmission corridor, additional effects from the new transmission line would be negligible. The opening in the forested habitat may also provide vantage points for foraging goshawks to view prey. The environmental protection measures that Ormat will employ along the transmission line will further minimize impacts to northern goshawks (see Section 2.1.11).

Although impacts to nest sites are not likely based on occurrence records and observations from biological surveys (GBE 2010), suitable northern goshawk nesting habitat does occur in the pinyon-juniper habitat along the proposed transmission corridor of the Proposed Action and Alternative 1. The total acreage expected to be disturbed along the transmission corridor is approximately 15 acres. Because the proposed transmission corridor would parallel an existing transmission corridor, additional effects from the new transmission line would be diminished. In addition, pinyon-juniper habitat is not preferred for nesting goshawks. Therefore, although potential nesting habitat for northern goshawks will be affected, negative impacts are expected to be minimal based on current knowledge of goshawk nest sites in Nevada. Potential impacts will be minimized by employing the following mitigation measure.

Mitigation measure for raptor species:

All ground-disturbing activities will be conducted outside the raptor nesting season (01 March – 31 July). If ground-disturbing activities cannot be avoided during this time period, pre-construction nest surveys will be conducted by a BLM-approved specialist with the following guidelines:

- **Surveys will cover all potential nesting habitat, including previously documented nest sites, for northern goshawks, ferruginous hawks (known nest location: T20N R45E Section 32), and short-eared owls in and within 0.5-mile area to be disturbed.**
- **If active nests are detected, a 0.5-mile no-disturbance buffer zone will be established. Nest locations will be mapped and submitted to the BLM and/or USFWS as needed.**
- **If nests of other species identified in the EA as special status or sensitive are found, a 0.5-mile no-disturbance buffer will be established. Nest locations will be mapped and submitted to the BLM and/or USFWS as needed.**

Following the implementation of this mitigation measure, destruction and disturbance to nesting northern goshawks would be avoided.

Golden Eagle

Impacts to golden eagles would include the reduction of foraging habitat. Given the limited surface disturbance and area of habitat fragmentation, impacts to golden eagle foraging habitat would be minimal and concentrated around the plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road or existing transmission corridor. Further effects of the transmission line to golden eagles will be minimized by Ormat's agreement to employ environmental protection measures as described by the APLIC (2006). Because the habitat surrounding the Project Area is relatively undisturbed, golden eagles would be expected to shift their foraging efforts away from the Project development to the more undisturbed habitat. These impacts are expected to affect individuals of the local golden eagle population, but no effect to the regional population is expected.

Due to the lack of suitable golden eagle nesting habitat, impacts to nesting golden eagles are not anticipated.

Short-eared Owl

Impacts to short-eared owls would include the reduction of foraging habitat. Given the limited surface disturbance and area of habitat fragmentation, impacts to short-eared owl foraging habitat would be minimal and concentrated around the plants, production and injection pipelines, and wells. Additional impacts may occur through surface and noise disturbance. To minimize these effects, see Mitigation Measure for raptor species under northern goshawk section. Following the implementation of this mitigation measure, destruction and disturbance to nesting short-eared owls would be avoided.

Long-Eared Owl

Due to the limited use of the habitat in and surrounding the Project Area, impacts to long-eared owls are expected to occur only to individual birds traveling through the area. Individuals will likely avoid habitat that has been disturbed and shift movements away from Project facilities. No impacts to nesting long-eared owls are expected.

Juniper Titmouse

Suitable foraging and nesting habitat occur along the sections of the transmission corridor going through pinyon-juniper habitat. Overall surface disturbance is small (217 acres) and effects from the proposed transmission line would be diminished because of its location parallel to an existing transmission corridor. Greatest effects to juniper titmice would be short-term, primarily occurring during transmission line construction. Overall effects are expected to be limited to individuals, and no effect to the local or regional population of juniper titmice is expected. These impacts will be minimized by the implementation of mitigation (See Mitigation Measure under Migratory Birds Section).

Ferruginous Hawk

Impacts to ferruginous hawks would include the reduction of foraging habitat. Given the limited surface disturbance and area of habitat fragmentation impacts to ferruginous hawk foraging habitat would be minimal and concentrated around the plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road or existing transmission corridor. Further effects of the transmission line to ferruginous hawks will be minimized by Ormat's agreement to employ environmental protection measures as described by the APLIC (2006; see Section 2.1.11). Because the habitat surrounding the Project Area is relatively undisturbed, ferruginous hawks would be expected to shift their foraging efforts away from the Project development to less disturbed or undisturbed habitat. These impacts are expected to affect individuals of the local ferruginous hawk population, but no effect to the regional population is expected.

Impacts to ferruginous hawks would potentially include disturbance to nesting hawks and nesting habitat. Potential ferruginous hawk nesting habitat would be reduced by a maximum of 217 acres from surface-disturbing activities. Given this limited amount of affected suitable habitat, this impact would not affect ferruginous hawks at the local or regional population level. Individual birds and nest sites may also be impacted by Project development. To minimize these effects, see **Mitigation Measure** for raptor species under northern goshawk section. Following the implementation of this mitigation measure, destruction and disturbance to nesting short-eared owls would be avoided.

Swainson's Hawk

Impacts to Swainson's hawks would include the reduction of foraging habitat. Given the limited surface disturbance and area of habitat fragmentation, impacts to Swainson's hawk foraging habitat would be minimal and concentrated around the plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road or existing transmission corridor. Further effects of the transmission line to Swainson's hawks will be minimized by the Operator's agreement to employ environmental protection measures as described by the APLIC (2006; see Section 2.1.11). Because the habitat surrounding the Project Area is relatively undisturbed, Swainson's hawks would be expected to shift their foraging efforts away from the Project development to the more undisturbed habitat. These impacts are expected to affect individuals of the local Swainson's hawk population, but no effect to the regional population is expected.

Due to the lack of suitable Swainson's hawk nesting habitat, impacts to nesting Swainson's hawks are not anticipated.

Greater Sage-Grouse

Impacts to sage-grouse include the reduction of foraging and nesting habitat. Actual surface disturbance and direct habitat loss is small (217 acres). Effects from habitat fragmentation from this habitat loss would be concentrated around the plants, production and injection pipelines, and wells.

Impacts may occur through Project development to sage-grouse movement corridors between metapopulations. Sage-grouse may respond by either traveling through the Project or adjust movement corridors to avoid the development. Effects are expected at the individual level, and sage-grouse are expected to adjust movement patterns. Although no impact to the connectivity of metapopulations is expected due to the small and limited footprint of the project, monitoring of potential effects to connectivity will be conducted by analyzing sage-grouse genetic variation (see Appendix C). If through monitoring it is determined that habitat connectivity has been affected by Project development, subsequent mitigation measures will be required as necessary (see Appendix C).

The primary impact from the proposed transmission line is the increased occurrence of corvids, which increases sage-grouse mortality risks and predation to sage-grouse nests (Lammers and Collopy 2005, Bui et al. 2010). Corvid occurrence will be minimized by Ormat's utilization of a single-pole design and cone deterrents along the entirety of the transmission line in accordance with recommended environmental protection measures (APLIC 2006; see Section 2.1.11). Actual surface disturbance from the transmission route has been minimized by its placement along existing roads and an existing transmission corridor. Thus, very little previously undisturbed habitat will be utilized in construction of the transmission line. In addition, corvid occurrence and attraction to the Project will be minimized by implementing a Common Raven Monitoring, Mitigation, and Management Plan (see Appendix D).

Specific impacts and disturbance to seasonal sage-grouse life cycles are discussed in more detail below.

Fall and Winter – The main impacts to sage-grouse utilizing the Project Area during the fall and winter is displacement of these birds due to 1) habitat reduction and fragmentation, and 2) effects from Project noise, construction, and human activities. The impacts from these effects would be greatest in the vicinity of the production plants, pipelines, and wellheads. Sage-grouse may discontinue use of this area during construction. Time lags in sage-grouse response to development have been detected at other developments (Harju et al. 2010). Sage-grouse use of the Project Area in fall and winter after construction is completed is difficult to predict but may resume in equal or reduced rates to pre-construction use or may discontinue completely. Winter habitat in a 2-mile buffer of the Project represents 4% of the NDOW-designated winter habitat in the Toiyabe PMU. Therefore, Project impacts are expected to affect individuals from the local metapopulation of sage-grouse but greater effects to the Toiyabe population or regional population are not expected. To reduce these impacts, offsite mitigation will be required (see Appendix C).

Lekking - No surface-disturbing activities at actual lek locations are proposed through Project development. Therefore, impacts to leks will be a result of indirect effects, which include visual and auditory impacts. Of the four active leks known to occur within 2 miles of the Project, three occur less than 1 mile from proposed structures or construction activities (see Figure 14). The southernmost lek, the Givens Ranch lek, is more than 1.5 miles from the edge of the proposed transmission corridor, and topography would block visual impacts to this lek. Noise impacts to this lek are not expected because 1) it is located more than 6 miles from where persistent noise and activity will occur, and 2) mitigation measures that limit surface-disturbing activities and sound pressure levels during the lekking season will be required (see Appendix C). The Grass Valley 3 and Grass Valley 4 leks are between 0.5-1 mile from proposed production pipelines and wells. Topographical features would block construction activities and facilities from view at these leks, but depending on decibel levels, noise impacts would be expected to affect these leks. Visual effects from the Project to the northernmost lek, the Ox Corral lek, are likely to be negligible because the topography between will block the construction activities and structures from view at the lek. In addition, this lek is also located less than 0.5 miles from the Grass Valley Country Road, so birds attending this lek may already be habituated to vehicular traffic and human disturbance. In addition to the 5 active leks, 3 leks with unknown status are also located within 2 miles of the Project.

Research has indicated that noise impacts above certain decibel levels can have detrimental effects to sage-grouse leks (Holloran 2005, Walker et al. 2007, Harju et al. 2010). Many conservation plans recommend minimizing sound pressure levels to below 49 dBA at lek locations to reduce noise effects to sage-grouse leks (MTSGWG 2005, NDGFD 2005, WYSGWG 2006). Responses vary but may include lowered male lek attendance, shifting lek locations away from the noise source, and loss of lek locations (Holloran 2005, Walker et al. 2007, Harju et al. 2010). Based on these results, if sound pressure levels from the Project exceed 49 dBA at lek sites, negative effects to active leks would be expected. To mitigate impacts to leks and their associated nesting habitat, measures to limit surface-disturbing activities and sound pressure levels during the lekking season will be required (see Appendix C).

Nesting – Actual direct and long term impacts to sage-grouse nesting habitat from Project development are small (217 acres). Core-breeding habitat does occur within 2 miles of Project components and accounts for 7% of what occurs in the entire Toiyabe PMU. Impacts to nesting sage-grouse are expected from indirect effects due to noise, human activity, and habitat fragmentation. Greatest impacts to nesting sage-grouse are expected during Project construction due to nest destruction or abandonment. To minimize effects to nesting sage-grouse, mitigation measures will be required (see Appendix C).

Brood-rearing – Several springs, seeps, wet meadow, and riparian areas occur in close proximity to components of the Project. Although it is unknown to what extent these areas are being utilized by sage-grouse, any use by sage-grouse of these areas would likely be reduced or discontinued during and after Project development. These impacts are expected to affect individuals from the local metapopulation of sage-grouse but greater effects to the Toiyabe population or regional population are not expected. To offset impacts to brood-rearing habitat affected by Project Development, offsite mitigation will be required (see Appendix C).

Prairie Falcon

Impacts to prairie falcons would include the reduction of foraging habitat. Given the limited surface disturbance (217 acres) and area of habitat fragmentation, impacts to prairie falcon foraging habitat would be minimal and concentrated around the plants, production and injection pipelines, and wells. Additional impacts from the transmission corridor construction would also be minimal because the majority of the corridor is proposed to be built along an existing road or existing transmission corridor. Further effects of the transmission line to prairie falcons will be minimized by Ormat's agreement to employ environmental protection measures described by the APLIC (2006; see Section 2.1.11). Because the habitat surrounding the Project Area is relatively undisturbed, prairie falcons would be expected to shift their foraging efforts away from the Project development to the more undisturbed habitat. These impacts are expected to affect individuals of the local prairie falcon population, but no effect to the regional population is expected.

Due to the lack of suitable prairie falcon nesting habitat, impacts to nesting prairie falcons are not anticipated.

Pinyon Jay

Suitable foraging and nesting habitat for pinyon jays would especially be affected along the transmission corridor in and around the pinyon-juniper habitat. Overall surface disturbance is small (217 acres), and effects from the proposed transmission line would be diminished because of its location parallel to an existing transmission corridor. Greatest effects to pinyon jays would be short-term, primarily occurring during transmission line construction. Overall effects are expected to be limited to individuals, and no effect to the local or regional population of pinyon jays is expected. These impacts will be minimized by the implementation of mitigation (See Mitigation Measure under Migratory Birds Section).

Bald Eagle

There are no records of bald eagles nesting in or around the Project Area, and suitable nesting habitat for bald eagles is lacking. Therefore, no impacts to nesting bald eagles or nesting habitat are expected from Project development.

No local populations of bald eagles are known in or around the Project area. Documented observation of bald eagles in the vicinity of the Project is limited to one winter sighting. Therefore, impacts from Project development to foraging bald eagles would be negligible and limited to individual birds. No impact to local or regional bald eagle populations is expected from Project development.

Loggerhead Shrike

Impacts to loggerhead shrikes include the reduction of foraging and potential nesting habitat due to Project construction and operations. These impacts are limited to the 217 acres of habitat that

will be disturbed due to Project development and the associated habitat fragmentation. The greatest impacts will occur during Project construction when increased noise and activity may deter loggerhead shrikes from using the Project Area and its vicinity. Loggerhead shrikes may benefit from Project development, especially along the transmission corridor where increased perching sites on the transmission line will be available. These impacts are expected to affect individual birds utilizing the habitat within and around the Project, but no effect to the local or regional population of loggerhead shrikes is expected. These impacts will be minimized by the implementation of mitigation (See Mitigation Measure under Migratory Birds Section).

Vesper Sparrow

Impacts to vesper sparrows include the reduction of foraging and potential nesting habitat due to Project construction and operations. These impacts are limited to the 217 acres of habitat that will be disturbed due to Project development and the associated habitat fragmentation. The greatest impacts will occur during Project construction when increased noise and activity may deter vesper sparrows from using the Project Area and its surrounding habitat. These impacts are expected to affect individual birds utilizing the habitat within and around the Project, but no effect to the local or regional population of vesper sparrows is expected. These impacts will be minimized by the implementation of mitigation (See Mitigation Measure under Migratory Birds Section).

Migratory Birds

Impacts to migratory birds include the reduction of foraging and potential nesting habitat due to Project construction and operations. These impacts are limited to the 217 acres of habitat that will be disturbed due to Project development and the associated habitat fragmentation. These impacts would be on-going for the life of the Project and until reclamation is completed. Direct mortalities or injuries during surface-disturbing activities are not expected due to the highly mobile nature of migratory birds. The Project would not restrict bird migration through Grass Valley, thus no impact to migration is expected. The greatest impacts will occur during Project construction when increased noise and human activity may deter migratory birds from using the Project Area and its surrounding habitat. These impacts may displace migratory birds and/or reduce breeding success of some birds, especially those most sensitive to disturbance. To minimize these impacts, the following mitigation measure will be employed:

Mitigation Measure for migratory bird species:

All ground-disturbing activities will be conducted outside the migratory bird nesting season (15 March – 31 July). If ground-disturbing activities cannot be avoided during this time period, pre-construction nest surveys will be conducted by a BLM-approved specialist with the following guidelines:

- **Surveys will cover all potential nesting habitat in and within 250 feet of the area to be disturbed.**

- **Surveys must be conducted between sunrise and 3 hours post-sunrise when birds are most active.**
- **Surface-disturbing activity must be conducted within 10 days of surveys or additional surveys may be required to “re-clear” the area.**
- **If active nests are detected, a species-specific no-disturbance buffer zone (as determined by USFWS Reno [Fish and Wildlife Biologist, 775-861-6300]) will be established. Nest locations will be mapped and submitted to the BLM as needed.**

Following the implementation of this mitigation measure, destruction and disturbance to nesting migratory birds would be avoided.

3.5.2.2 Alternative 1

General Effects and General Wildlife

The impacts to general wildlife from construction, operation, maintenance and reclamation of Alternative 1 would be slightly less than those described for the Proposed Action due to the disturbance of approximately 2.4 fewer acres of surface disturbance

Special Status Species – Plants

The impacts to special status and sensitive plant species from construction, operation, maintenance and reclamation of Alternative 1 would be slightly less than those described for the Proposed Action due to the disturbance of approximately 2.4 fewer acres during site construction. The same mitigation measure for Alternative 1 and the Proposed Action would be required (See 3.5.1.1 Special Status Species – Plants).

Special Status Species – Wildlife

The impacts to the following species are expected to be similar for Alternative 1 and the Proposed Action: Townsend’s big-eared bat, spotted bat, western small-footed bat, desert bighorn sheep, golden eagle, short-eared owl, long-eared owl, ferruginous hawk, Swainson’s hawk, prairie falcon, bald eagle, loggerhead shrike, and vesper sparrow. No impacts to nesting northern goshawks, juniper titmice and pinyon jays are expected if Alternative 1 is selected. Potential impacts to nesting raptors would be reduced by implementing the same mitigation measure as identified for the Proposed Action during the raptor nesting season (See 3.5.1.1 *Short-eared owl*).

Pygmy rabbit

Impacts to pygmy rabbits from construction, operation, maintenance and reclamation of Alternative 1 would be greater than those associated with the Proposed Action. During the current biological survey, pygmy rabbits were located in the Burton Creek drainage at T.20N., R.45E., Section. To avoid impacts to pygmy rabbits during transmission line construction, the following mitigation will be employed:

Mitigation Measure:

Complete avoidance (no surface disturbance) of occupied and suitable pygmy rabbit habitat along the Burton creek drainage at T. 20 N., R. 45 E., Section 31, SE ¼ during transmission line construction and maintenance activities.

By implementing this mitigation measure, impacts to pygmy rabbits and occupied habitat would be avoided.

Greater sage-grouse

The impacts to sage-grouse from construction, operation, maintenance and reclamation of Alternative 1 would be similar to those associated with the Proposed Action. Alternative 1 would impact less identified core-breeding habitat. The same Monitoring and Mitigation Plan would be implemented for Alternative 1 as for the Proposed Action (see Appendix C).

Migratory Birds

The impacts to migratory birds from construction, operation, maintenance and reclamation of Alternative 1 would be slightly less than those described for the Proposed Action due to the disturbance of approximately 2.4 fewer acres during site construction. The same mitigation measure as identified for the Proposed Action would be required for migratory birds if Alternative 1 is selected (See 3.5.1.1– Migratory Birds).

3.5.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. If this were to occur, additional wildlife habitat would be fragmented or lost. See the 2009 Geothermal Exploration EA for a complete analysis of potential impacts to wildlife, including special status species and migratory birds.

3.6 NOXIOUS WEEDS, INVASIVE AND NONNATIVE SPECIES

3.6.1 Affected Environment

Noxious weeds and invasive species are typically nonnative plants that infest and/or invade areas of fresh soil/ground disturbance. Noxious weed species typically have attributes which allow them to rapidly out-compete native vegetation for vital natural resources. Noxious weeds, invasive and nonnative species impact native ecosystems by reducing overall biodiversity, by altering local hydrologic and soil characteristics and can immediately increase fire intensity. On

a smaller scale, noxious weeds interfere with native plant successional pathways by competing for pollinators, being prolific seed producers and inundating the surrounding soil with weed seed, displacing rare plant species, serving as reservoirs of plant pathogens and converting complex plant communities into simple plant communities.

Noxious weed, invasive and nonnative species seed or vegetative plant parts are carried, transported or deposited into and infest weed-free areas by people, equipment, livestock/wildlife or by abiotic means (wind, water).

As of 2010, the State of Nevada under Nevada Administrative Code 555.010 listed 47 species on the Nevada Noxious Weed List.

A noxious weed, invasive and nonnative species inventory was conducted during the biological survey of the proposed Project Area. Two noxious weed species were identified along portions of Grass Valley Road: hoary cress (*Cardaria draba*) and bull thistle (*Cirsium vulgare*) (GBE 2010).

3.6.2 Environmental Consequences

3.6.2.1 Proposed Action

The proposed Project could contribute to the spread of noxious weeds, invasive and nonnative species within the McGinness Hills Unit Area and along the transmission line corridor through the proposed surface disturbing activities and the number of construction and drilling vehicles involved.

Ormat has adopted environmental protection measures to help minimize the spread of noxious weeds (see Section 2.1.11) and will also conform with all applicable geothermal resources special lease stipulations found in Appendix A of this EA. Additionally, a completed reclamation plan can be found in Appendix B. Following the implementation of these environmental protection measures, there would remain the potential for the spread of noxious weeds, invasive and nonnative species (seed and vegetative plant parts) within the McGinness Hills Unit Area and along the transmission line corridor, which would be a residual impact of the Proposed Action.

3.6.2.2 Alternative 1

The impacts associated with invasive, nonnative species from the construction, operation, maintenance and reclamation of Alternative 1 would be slightly greater than those described for the Proposed Action due to the disturbance of approximately 5.0 more acres during site construction.

3.6.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This additional disturbance could contribute to the spread of noxious weeds, invasive and nonnative species. See the 2009 Geothermal Exploration EA for a complete analysis of potential effects of noxious weeds and invasive species.

3.7 NOISE

3.7.1 Affected Environment

Unwanted sound or noise is most often measured in decibels (dB), which is a unit of measurement of the relative loudness of sound or sound pressure level (SPL). The decibel symbol is often qualified with a suffix, that indicates which reference quantity or frequency weighting function has been used. Examples of sound pressure levels for common situations include 30-35 dBA (whispered conversations at 6 feet and quiet libraries), 40-50 dBA (rural to suburban residential areas during daytime), 60 dBA (normal conversation at 3 feet), and 70 dBA (a vacuum cleaner at 10 feet) (Harris and Dines 1997).

Because the human ear is more sensitive to particular sound frequencies, sound measurements can be filtered to approximate the average human ear. Units of sound pressure level are termed “A-weighted” (dBA) when filtered to approximate the human ear. “B-weighted (dBB) and C-weighted (dBC) measurements are also used. These symbols denote the use of different weighting filters. These measurements provide an objective means of evaluating noise and its effects on humans and animals. These measurements provide a basis to measure the effects of noise and develop mitigation measures or other environmental protection measures to minimize noise impacts.

Noise is evaluated by determining the effect of noise generated by sources relative to receptors. Human receptors in the Project Area are limited. There are no public buildings, campgrounds, or habitations in the vicinity. Occasional recreational or casual users may be affected. Sound levels in the environment fluctuate over time. In these settings, a time-averaged noise level measured in dBA and expressed as “ L_{eq} ” is often used to characterize the noise environment at a given location. The “ L_{eq} ” is a single value of sound level for any desired duration (JBR 2011). Sound diminishes with distance from the source of the sound. While the rate at which sound attenuates with distance is a constant, there are many factors, including: topography, ground surface, vegetation, wind direction, air turbulence, humidity and temperature that can have an effect on the noise level at any particular location in an environmental setting.

Ambient sound level is the level of sound absent the noise source. For the Project Area ambient noise levels can be expected to be similar to rural environments, where ambient sound levels can range from below 30 dBA to above 50 dBA. Atmospheric conditions can affect sound transmission. For example, sound generally travels farther as the temperature declines and as the humidity rises. Ambient noise, especially during days with mild to moderate winds, will alter the effects of power plant noise on the surrounding environment (JBR 2011).

3.7.2 Environmental Consequences

3.7.2.1 Proposed Action

Short-term noise impacts resulting from the Proposed Action include noise from well drilling, construction activity, reclamation, and decommissioning. These impacts are highly variable, intermittent, and periodic in nature. These impacts are mitigated by implementing noise control practices such as reducing hours of operation, scheduling work activity to avoid sensitive times of the day, implementing best available control technology and utilizing barriers to confine or re-direct noise.

To determine the potential noise impacts resulting from the long-term aspects of the Project, sound data was collected from Ormat's Desert Peak geothermal facility (JBR 2011). Data regarding Project components (including two electrical production plants, injection and production pipelines, and wells) was input into a mathematical model to predict the potential noise impact on receptors near the proposed McGinness Hills Geothermal Development Project.

The noise modeling software used was SoundPLAN 7.0 – Kernel version: 12/23/2010. Atmospheric conditions were assumed at 800 mbar air pressure, 50% relative humidity and temperature of 55°F (13°C). The ground was modeled as 40 percent acoustically absorptive to represent the existing ground coverage. The model also assumed that the receptor is 0.3 meters above the ground. The maximum search distance used was 7,000 meters (4.3 miles). This represents the greatest distance from the receiver that a noise source is considered in the model, as noise sources beyond 7,000 meters are considered negligible (negligible refers to sound levels that cannot be discernibly detected above typical ambient levels).

The modeling results are based upon an air cooling system for the power plants. Several iterations of the sound model were completed to account for changes in the project equipment including quieter fans for the air cooling system that Ormat is proposing to reduce noise levels (JBR 2011). The model includes specific noise sources such as two geothermal plants, fans, steam turbine, generator, and 12 production wellheads. The results of the modeling are shown as noise isolines in decibels (see Figure 15 and Figure 16).

Noise receptors in the vicinity of the proposed action that require evaluation would include noise-sensitive locations. Typically noise-sensitive locations include residences, schools, or similar locations where unwanted sound affects human activity. However, in the Project Area the only known noise-sensitive receptors are Greater sage-grouse leks.

Noise receptors identified for study using the noise model include known active and inactive Greater sage-grouse leks. The noise prediction model used the data collected from the Desert Peak geothermal facility to calculate sound attenuation to predict environmental noise at a distance from the sources. The results are provided as “ L_{dn} ” and “ L_{eq} ” for both A-weighted and C-weighted sound. The “ L_{dn} ” is the A- or C-weighted sound level for a 24-hour period where an additional ten dB is imposed on the equivalent sound levels for night-time hours (10 p.m. to 7 a.m.). C-weighting allows for a larger range of sound measurements especially in the low frequency range. Modeled C-weighted results would represent a worst-case scenario, since low frequency sounds travel farther and thus higher levels would be realized farther from the noise sources. The results of the modeling are shown on Figure 15 and Figure 16. Twelve lekking sites were analyzed in the noise model; The Givens Ranch lek was not included in the model. The inactive McGinness Mine lek was determined to receive noise levels in excess of 49 dBA. Considering the worst-case scenario, the Grass Valley 3, the Lake Ranch Hills 2, and the McGinness Mine leks would receive noise levels in excess of 49 dBC.

For a discussion of potential impacts to sensitive species and recreational users from Project-generated noise, see Sections 3.5 and 3.15, respectively.

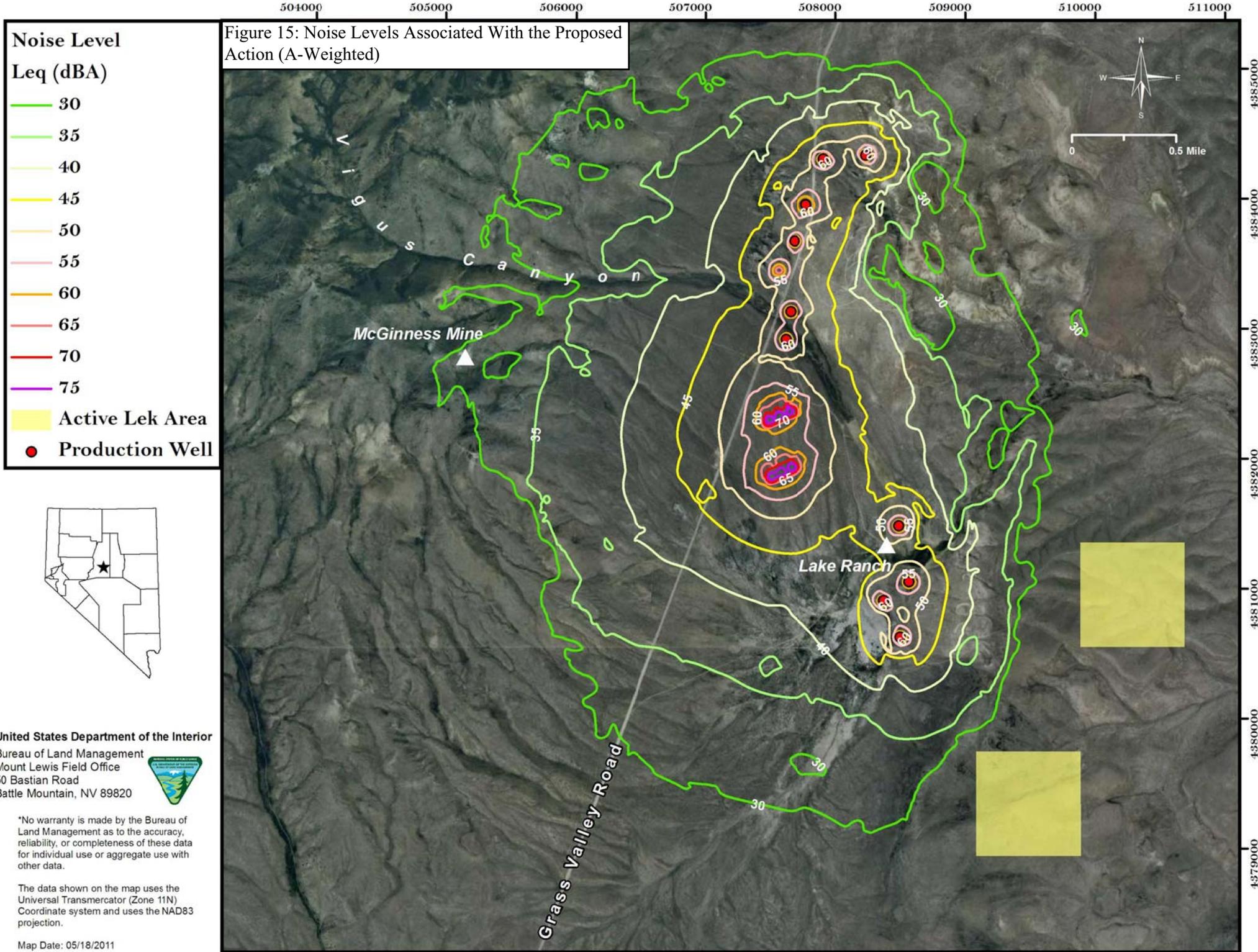
3.7.2.2 Alternative 1

The impacts associated with noise from the construction, operation, maintenance and reclamation of Alternative 1 would be the same as those described for the Proposed Action.

3.7.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. If this were to occur, noise would continue to be generated by exploration activities and equipment. See the 2009 Geothermal Exploration EA for a complete analysis of potential noise impacts.



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The data shown on the map uses the Universal Transmsercator (Zone 11N) Coordinate system and uses the NAD83 projection.

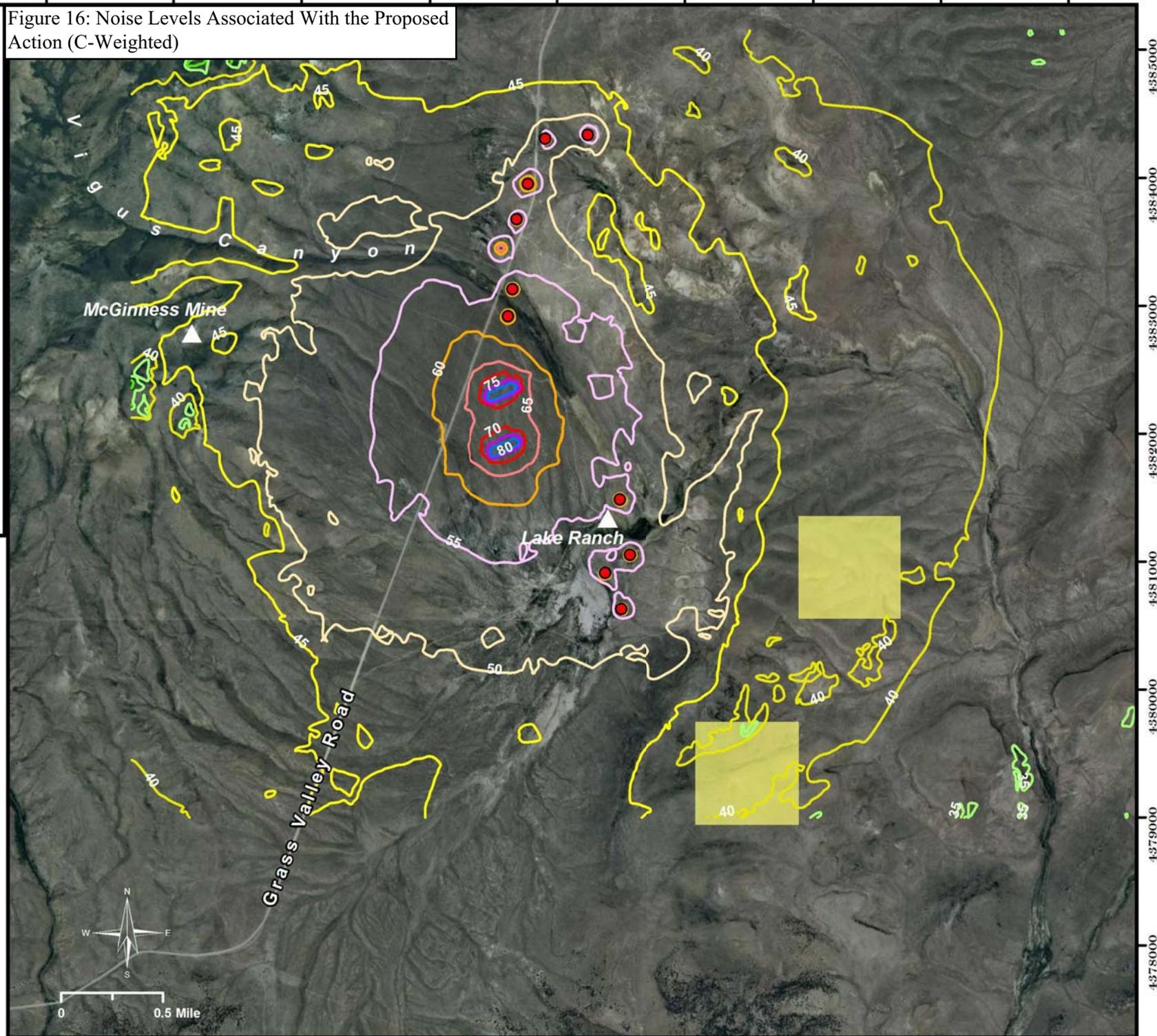
Map Date: 05/18/2011

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Noise Level Leq (dBC)

- 30
- 35
- 40
- 45
- 50
- 55
- 60
- 65
- 70
- 75
- 80
- Active Lek Area
- Production Well

Figure 16: Noise Levels Associated With the Proposed Action (C-Weighted)



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Map Date: 05/18/2011



0 0.5 Mile

3.8 SOILS

3.8.1 Affected Environment

Soil associations within the McGinness Hills Unit Area and along the BLM-managed public land portions of the transmission line corridor have been mapped by the USDA, Natural Resource Conservation Service (NRCS) in the Lander County, South Part, soil survey, and are depicted in Figure 17. Soils data for the National Forest System lands has not been mapped by the NRCS .

Soil associations within the McGinness Hills Unit Area and along the BLM-managed public land portions of the transmission line corridors are: 121, Akerue-Simpark-Punchbowl; 702, Orovada-Creemon; 703, Orovada fine sandy loam, 0 to 2 percent slopes; 998, Sonoma-Paranat; 1146, Wedane-Sonoma-Valmy; 2011, Glyphs-Muni; 2031, Muni-Orovada-Unius; 2061, Oxcorel-Zaidy-Grassval; 2095, Punchbowl-Robson-Rock outcrop; 2096, Punchbowl-Locane-Nobuck; 2101, Grassval-Oxcorel; 2554, Laped-Hooplite-Osoll, 3001, Barrier-Kobeh, 3050, Novacan cobbly loam; 3071, Allor-Wieland; 3081, Zaidy-Allor; 3122, Walti-Sumine-Softscrabble; 3151, Robson-Ninemile-Ravenswood; 3200, Dewar gravelly loam; 3421, Belate-Softscrabble-Torro; 3562, Locane-Coztur-Punchbowl association; 3741, Kelk-Settlemyer; 3851, Decram-Hapgood; 3960, Pineval gravelly loam, 2 to 4 percent slopes; 3964, Pineval-Orovada; 3991, Settlemyer-Pineval; 3992, Settlemyer complex; and 4041, Hymas-Xine-Attella.

The majority of the soils on BLM-managed public lands are clay loams. Additionally, several calcareous soils are also present. These soils range from very low to high available water capacity. The soils are generally shallow to deep, ranging from rock outcrops to 80 inches deep.

3.8.2 Environmental Consequences

3.8.2.1 Proposed Action

Approximately 217.4 acres of total disturbance are anticipated for this Project. Approximately 55.3 acres of short term disturbance and 127.2 acres of long term disturbance are anticipated on public lands managed by the BLM. Approximately 10.3 acres of short term disturbance and 0.2 acres of long term disturbance are anticipated on National Forest System Lands. For purposes of this analysis, long term disturbance is defined as surface area that would remain disturbed during the approximately 35 year period that includes project construction and operations (30 years), project decommissioning and final reclamation (approximately 5 years to ensure that reclamation is successful, as determined by the appropriate agencies). Short term disturbance is defined as that surface disturbance which would undergo interim reclamation, in accordance with the Project reclamation plan (see Appendix B).

The potential for wind erosion within the Project Area is relatively low. The water runoff potential for the soil associations is generally moderate to high.

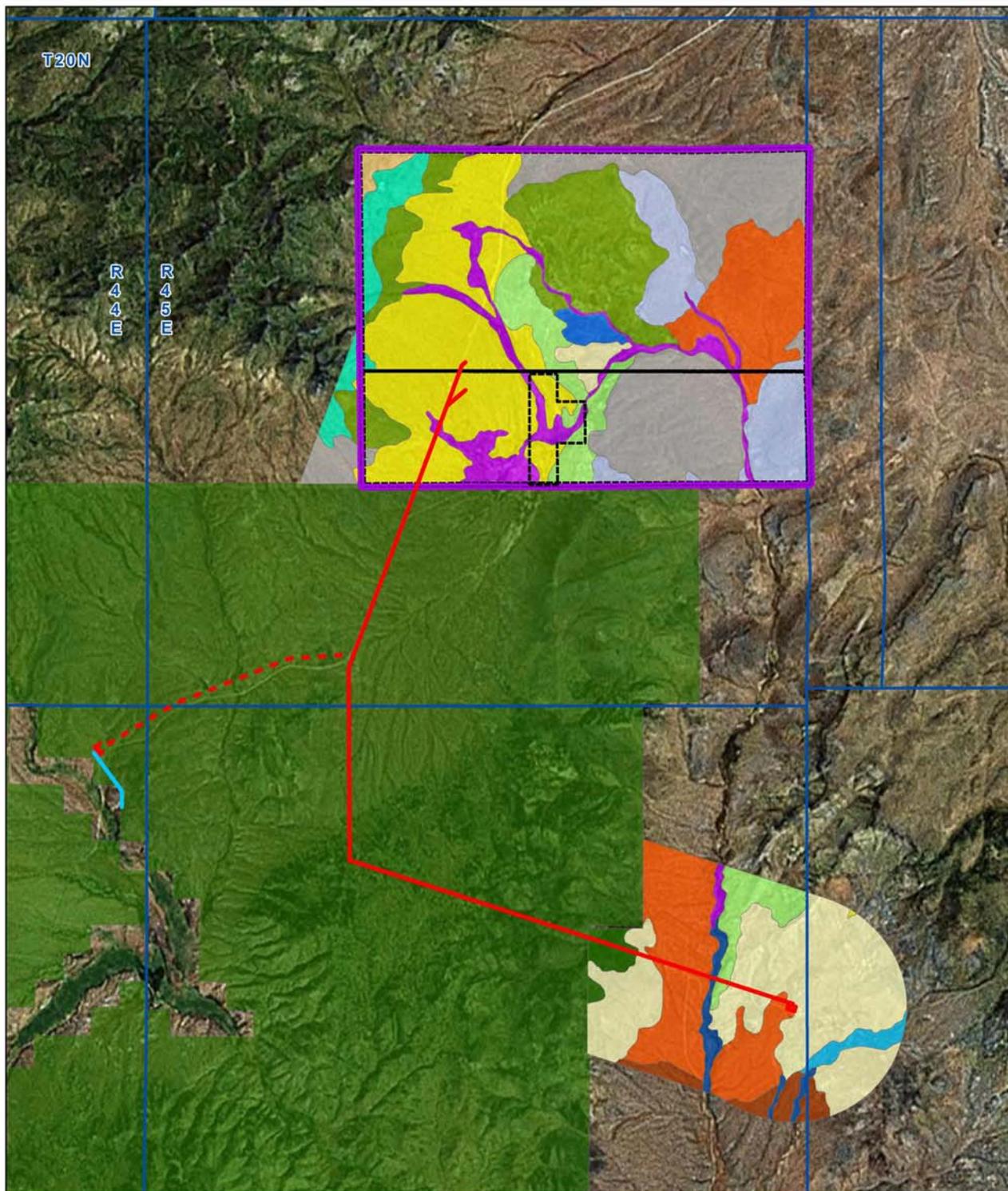
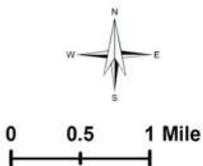


Figure 17: Soils Associations (Source: N.R.C.S.)



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Map Date : 05/17/2011

Surface disturbance and vegetation removal during construction of proposed project facilities within the Project Area would increase the potential for erosion through exposure of denuded surfaces. Additionally, soil will be compacted during construction activities due to heavy vehicle travel and heavy equipment use.

To minimize erosion from storm water runoff, access roads would be maintained consistent with best management practices. Storm water would be intercepted and channeled to dissipate energy as necessary to minimize erosion around the power plant (USDI and USDA 2007, p. 16). Based on implementation of environmental protection measures specified by Ormat, water would be applied to the ground during construction as necessary to control dust. Each of the well pads, access roads and the power plant site would be surfaced with aggregate which would minimize dust and stabilize erosive soils. Additionally, disturbed areas would be reclaimed (see Section 2.1.11 and Appendix B).

An NDEP-BAPC Surface Area Disturbance (SAD) Permit, documenting the areas of proposed disturbance and the best practical dust control methods to be used, will be required for activities conducted within the Project Area because the surface disturbed would be greater than 5 acres (see Section 3.2). Implementation of the applicable best practical dust control methods would minimize fugitive dust emissions and soil erosion from wind and water during all phases of the proposed Project.

3.8.2.2 Alternative 1

The construction, operation and maintenance of Alternative 1 would differ from the Proposed Action only by the increase (5.0 acres) in the total long term surface disturbance. The impacts of Alternative 1 to soils would not be different from that of the Proposed Action.

3.8.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This would result in additional impacts to soils from exposure to erosion and compaction. See the 2009 Geothermal Exploration EA for a complete analysis of potential soils impacts.

3.9 VEGETATION

3.9.1 Affected Environment

The Project Area is within typical plant communities within the Great Basin and Range physiography and a precipitation zone of 7 to 15 inches. The primary plant communities include pinyon juniper, basin big sagebrush, low sagebrush, Wyoming big sagebrush and meadows.

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A list of plant species by life form that were observed during the biological survey is provided in Table 11 below.

Table 11: Plants Observed at McGinness Hills

Plants	Scientific Name	Life Form			
		Grass	Forb	Shrub	Tree
Arrowleaf balsamroot	<i>Balsamorhiza sagittata</i>		x		
Biscuitroot	<i>Lomatium</i> sp.		x		
Bitterroot	<i>Lewisia rediviva</i>		x		
Black greasewood	<i>Sarcobatus vermiculatus</i>			x	
Black sagebrush	<i>Artemisia nova</i>			x	
Bladder pod	<i>Lesquerella</i> sp.		x		
Bluebunch wheatgrass	<i>Pseudoroegneria spicata</i>	x			
Bottlebrush squirreltail	<i>Elymus elymoides</i>	x			
Bulbus bluegrass	<i>Poa bulbosa</i>	x			
Bur buttercup	<i>Ceratocephala testiculata</i>		x		
Cheatgrass	<i>Bromus tectorum</i>	x			
Cushion desert buckwheat	<i>Eriogonum caespitosum</i>		x		
Death camas	<i>Zigadenus venenosos</i>		x		
Desert yellow fleabane	<i>Erigeron linaris</i>		x		
Douglas rabbitbrush	<i>Chrysothamnus viscidiflorus</i>			x	
False dandelion	<i>Agoseris glauca</i>		x		
Fennel desert parsley	<i>Lomatium foeniculaceum</i>		x		
Foxtail barley	<i>Hordeum jubatum</i>	x			
Giant lomatium	<i>Lomatium dissectum</i>		x		
Great Basin desert buckwheat	<i>Eriogonum desertorum</i>		x		
Great Basin wildrye	<i>Leymus cinereus</i>	x			
Halogeton	<i>Halogeton glomeratus</i>		x		
Hawksbeard	<i>Crepis accuminata</i>		x		
Idaho fescue	<i>Fescue idahoensis</i>	x			
Indian paintbrush	<i>Castilleja angustifolia</i>		x		
Indian ricegrass	<i>Achnatherum hymenoides</i>	x			
Inland salt grass	<i>Distichlis spicata</i>	x			
Iris	<i>Iris</i> sp.		x		
Juniper	<i>Juniperus osteosperma</i>				x
Kentuck bluegrass	<i>Poa pratensis</i>	x			
Large-fruited biscuitroot	<i>Lomatium macrocarpum</i>		x		
Larkspur	<i>Delphinium</i> sp.		x		
Littleleaf Horsebrush	<i>Tetradymia glabrata</i>			x	
Low fleabane	<i>Erigeron pumilus</i>		x		
Low sagebrush	<i>Artemisia arbuscula</i> ssp. <i>longiloba</i>			x	
Lupine	<i>Lupinus</i> sp.		x		
Mat muhly	<i>Muhlenbergia richardsonis</i>	x			
Meadow foxtail	<i>Alopercurus pratensis</i>	x			
Milkvetch	<i>Astragalus</i> sp.		x		
Mountain big sagebrush	<i>Artemisia tridentata</i> ssp. <i>vaseyana</i>			x	
Mountain brome	<i>Bromus carinatus</i>	x			

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Plants	Scientific Name	Life Form			
		Grass	Forb	Shrub	Tree
Mountain mahogany	<i>Cercocarpus ledifolius</i>				x
Mules ear	<i>Wyethia</i>		x		
Munroe globemallow	<i>Sphaeralcea munroana</i>		x		
Needle-and-thread grass	<i>Stipa</i> sp.	x			
Nevada desert parsley	<i>Lomatium nevadense</i>		x		
Oval leaf desert buckwheat	<i>Eriogonum ovalifolium</i>		x		
Penstemon	<i>Penstemon</i> sp.		x		
Phlox	<i>Phlox</i> sp.		x		
Pinyon pine	<i>Pinus monophylla</i>				x
Prickly pear cactus	<i>Opuntia</i> sp.			x	
Puccoon	<i>Lithospermum ruderale</i>		x		
Rayless daisy	<i>Erigeron aphanactis</i>		x		
Rubber rabbitbrush	<i>Ericameria nauseosa</i>			x	
Rushes	<i>Juncus</i> sp.	x			
Salsify	<i>Tragopogon dubius</i>		x		
Sandberg bluegrass	<i>Poa sandbergii</i>	x			
Sedges	<i>Carex</i> sp.	x			
Sego lily	<i>Calochortus nuttallii</i>		x		
Snakeweed	<i>Xanthocephalum</i> sp.			x	
Spiny hopsage	<i>Grayia spinosa</i>		x	x	
Thurber's needlegrass	<i>Achnatherum thurberianum</i>	x			
Vetch	<i>Astragalus</i> sp.		x		
Western wheatgrass	<i>Paxcopyrum smithii</i>	x			
Whorled buckwheat	<i>Eriogonum heracleoides</i>		x		
Willow	<i>Salix</i> sp.				x
Winterfat	<i>Krascheninnikovia lanata</i>			x	
Wyoming big sagebrush	<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>			x	

Based on field surveys (see Section 3.5), 21 different vegetation community types are within one mile of the Project Area. Seventeen of the vegetation community types occur on BLM managed lands, 7 occur on National Forest System lands, and 3 occur on both BLM and National Forest System lands (see Figure 18 and Table 12).

There has been one recorded fire in the proposed project area. The fire occurred in 1985 and burned approximately five acres. Outside the project area, the nearest fire was the Iowa Complex fire (Silver Creek) of 2006 which burned about 1,740 acres. This fire was approximately four miles west of the proposed Project Area.

A discussion of sensitive plant species can be found in Section 3.5.

Table 12: Vegetation Communities Within One Mile of Project Components

	Vegetation Type	Proposed Action		Alternative 1	
		Short Term (ac) ¹	Long Term (ac) ¹	Short Term (ac) ¹	Long Term (ac) ¹
<i>Geothermal Components</i>					
Wells	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	7.8	68.0	7.8	68.0
	Black sagebrush-Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	0.2	8.0	0.2	8.0
	Black sagebrush/Indian ricegrass	0.2	4.0	0.2	4.0
	Black sagebrush-Low sagebrush/Indian Ricegrass-Bluebunch wheatgrass	0.2	4.0	0.2	4.0
	Basin big sagebrush-Wyoming big sagebrush/Basin wildrye	0.2	4.0	0.2	4.0
	SUBTOTAL	8.6	88.0	8.6	88.0
Pipelines	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass1	37.1	18.7	37.1	18.7
	Basin big sagebrush-Wyoming big sagebrush-rubber rabbitbrush/Basin wildrye5	5.2	2.4	5.2	2.4
	Black sagebrush-Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass2	0.7	0.4	0.7	0.4
	Black sagebrush/Indian ricegrass3	0.7	0.4	0.7	0.4
	Black sagebrush-Low sagebrush/Indian ricegrass-Bluebunch wheatgrass	0.2	0.1	0.2	0.1
	SUBTOTAL	43.9	22.0	43.9	22.0
Power Plants	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	0	32.9	0	32.9
	SUBTOTAL	0.0	32.9	0.0	32.9
Access Roads	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	1.0	4.1	1.0	4.1
	Black sagebrush-Wyoming big sagebrush/Indian Ricegrass-Thurber's Needlegrass	0.1	0.4	0.1	0.4
	Black sagebrush/Indian ricegrass	0.1	0.4	0.1	0.4
	Basin big sagebrush-Wyoming big sagebrush-Rubber rabbitbrush/Basin wildrye	0.1	0.4	0.1	0.4
	SUBTOTAL	1.3	5.3	1.3	5.3
<i>Transmission Line Components</i>					
Tangent Pole Placement	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	2.4	0.1	1.2	0.2
	Pinyon-Juniper/Big sagebrush-Low sagebrush/Bluebunch wheatgrass	1.0	0.1	0.5	0.0
	Black sagebrush/Indian ricegrass	0.3	0.0	n/a	n/a
	Low sagebrush	n/a	n/a	0.1	0.0
	SUBTOTAL	3.7	0.2	1.8	0.2

	Vegetation Type	Proposed Action		Alternative 1	
Angle Pole Placement	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	0.7	0.1	1.5	0.1
	Pinyon-Juniper/Big sagebrush-Low sagebrush/Bluebunch wheatgrass	0.7	0.0	n/a	n/a
	Low sagebrush	n/a	n/a	0.7	0.0
	SUBTOTAL	1.4	0.1	2.2	0.1
Stringing Sites	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	4.0	0.0	2.5	0.0
	Pinyon-Juniper/Big sagebrush-Low sagebrush/Bluebunch wheatgrass	2.0	0.0	n/a	n/a
	Black sagebrush/Indian ricegrass	1.0	0.0	n/a	n/a
	Low sagebrush	n/a	n/a	1.0	0.0
	SUBTOTAL	7.0	0.0	3.5	0.0
Access Roads	Wyoming big sagebrush/Indian ricegrass-Thurber needlegrass	0.3	0.0	n/a	n/a
	Pinyon-Juniper/Big sagebrush-Low sagebrush/Bluebunch wheatgrass	1.5	0.0	n/a	n/a
	SUBTOTAL	2.8	0.0	0.0	0.0
Substation	Black sagebrush/Indian ricegrass	n/a	n/a	0.0	5.0
	SUBTOTAL	n/a	n/a	0.0	5.0
TOTAL		68.7	148.5	61.3	153.5
1 Acreages are approximate.					

3.9.2 Environmental Consequences

3.9.2.1 Proposed Action

Surface disturbance associated with the proposed Project activities within the McGinness Hills Unit Area and along the transmission line corridor would result in the loss of vegetation (see Table 12). For purposes of this analysis, long term disturbance is defined as surface area that would remain disturbed during the approximately 35 year period that includes project construction and operations (30 years), project decommissioning and final reclamation (approximately 5 years to ensure that reclamation is successful, as determined by the appropriate agencies). Short term disturbance is defined as that surface disturbance which would undergo interim reclamation, in accordance with the Project reclamation plan (see Appendix B).

Approximately 68.7 acres of the proposed disturbance within the Project Area is “short term” (see Table 5), and would undergo interim reclamation, in accordance with the Project reclamation Plan (see Appendix B). Approximately 148.5 acres of proposed disturbance within the Project Area is “long term” (see Table 5) would remain disturbed during the approximately 35 year period that includes project construction and operations (30 years), project decommissioning and final reclamation (approximately 5 years to ensure that reclamation is successful, as determined by the appropriate agencies).

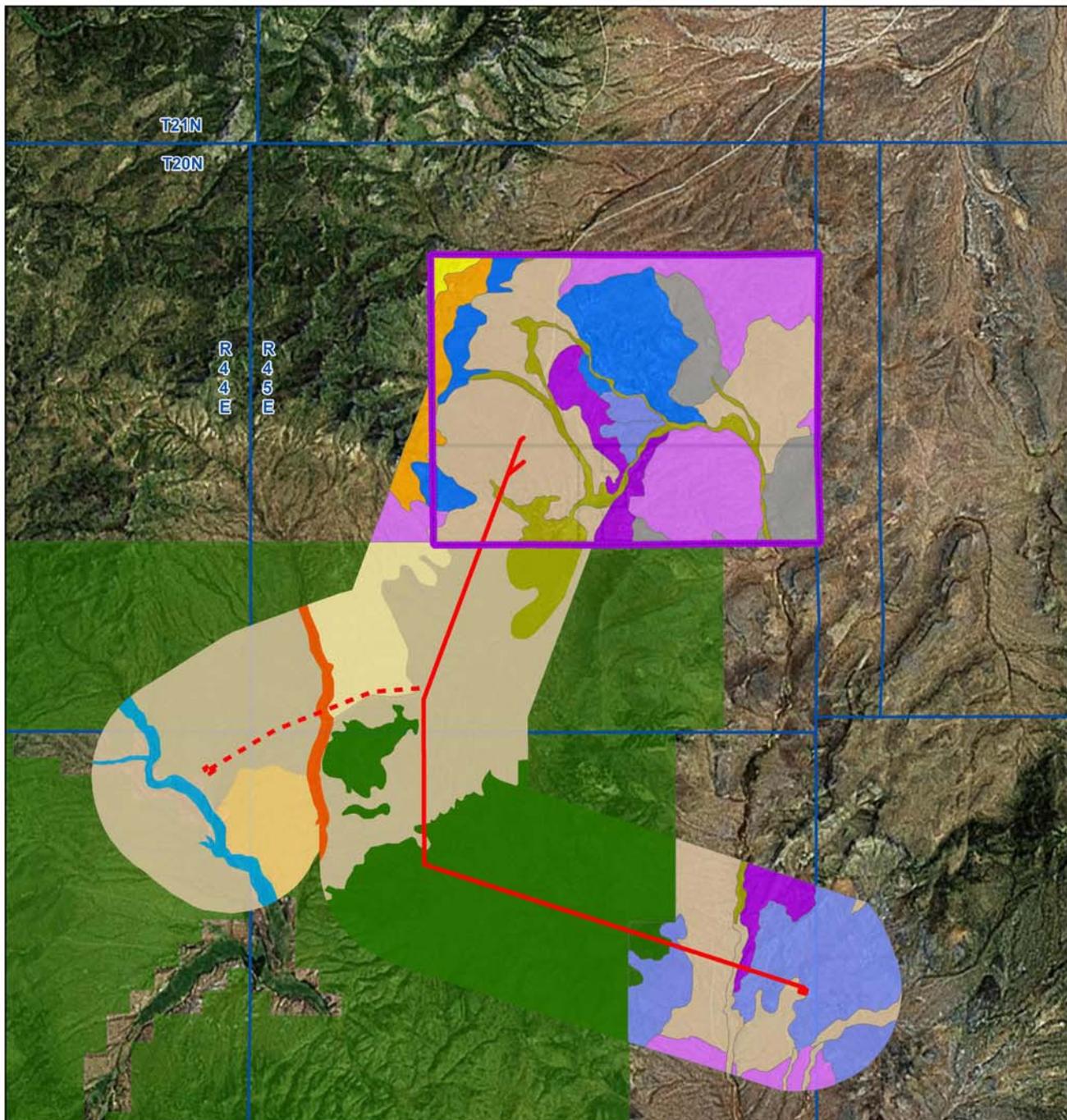
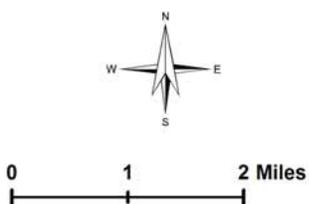


Figure 18: Vegetation Communities Within One Mile of the Project Components.

- | | |
|--|---|
| <ul style="list-style-type: none"> — 230 kV Transmission Line-Proposed - - - Proposed Powerline Alternative McGinness Hills Geothermal Unit Area Geothermal Lease Boundaries Forest Service Lands U.S Forest Service Administered Lands Pinion Juniper-Big Sagebrush-Low Sagebrush, Bluebunch Wheatgrass Wyoming Big Sagebrush, Indian Ricegrass-Thurber's Needlegrass Low Sagebrush-Wyoming Big Sagebrush Meadow Basin Big Sagebrush-Wyoming Big Sagebrush-Rubber Rabbitbrush, Basin Wildrye Basin Big Sagebrush-Rubber Rabbitbrush Low Sagebrush | <ul style="list-style-type: none"> B.L.M. Administered and Private Lands Major Shrub(s), Major Grass(es) Basin Big Sagebrush-Wyoming Big Sagebrush-Rubber Rabbitbrush, Basin Wildrye Black Sagebrush, Indian Ricegrass Black Sagebrush-Low Sagebrush, Indian Ricegrass-Bluebunch Wheatgrass Black Sagebrush-Wyoming Big Sagebrush, Indian Ricegrass Black Sagebrush-Wyoming Big Sagebrush, Indian Ricegrass-Thurber's Needlegrass Low Sagebrush-Black Sagebrush, Idaho Fescue-Mountain Brome Low Sagebrush-Mountain Big Sagebrush, Bluebunch Wheatgrass-Idaho Fescue Pinion-Juniper-Big Sagebrush-Low Sagebrush, Bluebunch Wheatgrass Wyoming Big Sagebrush, Indian Ricegrass-Thurber's Needlegrass Wyoming Big Sagebrush-Black Sagebrush, Thurber's Needlegrass-Bluebunch Wheatgrass |
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The data shown on the map uses the Universal Transmencator (Zone 11N) Coordinate system and uses the NAD83 projection.

Map Date : 05/17/2011

Disturbed areas could have an increase in cheatgrass compared to non-disturbed areas (see Section 3.6).

As part of the Project, disturbed areas would be reclaimed in accordance with applicable BLM requirements, that are consistent with Ormat’s adopted environmental protection measures (see Section 2.1.11). The following mitigation measures, applied to BLM grazing allotments by pasture or use area, would initiate revegetation of disturbed areas and minimize the spread of invasive, nonnative species.

Mitigation Measures:

Disturbed areas would be treated with a pre-emergent herbicide for the control of cheatgrass following the application of the seed mix and prior to plant emergence. Treatment would be by application of PLATEAU, or an equivalent herbicide (Imazipic is the active ingredient) following the reseeding, at an application rate of 2 -12 ounces/acre.

Seeding of disturbed areas within the Unit Area (Lake Ranch Pasture/Use Area) would be completed using the following BLM-approved native seed mixture and application rate:

Grass	Scientific Name	Pounds/acre (bulk)
Indian ricegrass	<i>Achnatherum hymenoides</i>	5.5
Needleandthread	<i>Hesperostipa comata</i>	6
Bottlebrush squirreltail	<i>Sitanion hystrix</i>	2.5
Forb		Pounds/acre (bulk)
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	1
Western yarrow	<i>Achillea millefolium</i>	1
		16.0 lbs

Seeding of disturbed areas associated with the transmission line (Rye Patch Pasture/Use Area and Lake Ranch Pasture/Use Area) would be completed using the following BLM-approved native seed mixture and application rate:

Grass	Scientific Name	Pounds/acre (bulk)
Indian ricegrass	<i>Achnatherum hymenoides</i>	4
Needleandthread	<i>Hesperostipa comata</i>	5
Bluebunch wheatgrass*	<i>Pseudoroegneria spicata</i>	4.5
Forb		Pounds/acre (bulk)
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	1
Sulfur flower	<i>Eriogonum umbellatum</i>	1
		15.5 lbs

* The cultivar of Bluebunch Wheatgrass used to seed disturbed areas would not be the Snake River Bluebunch wheatgrass (*Elymus wawawaiensis*)

All seeding on public lands managed by the BLM would be reviewed and approved by the Mount Lewis Field Manager prior to implementation, to include seed mixtures, seeding rates, methods and timing. All seeding on USFS managed lands will be reviewed and approved by the USFS prior to implementation, to include seed mixtures, seeding rates, methods and timing.

The application of seed is prohibited from May 15 to September 15. Fall seeding is preferred and recommended. Seeding will be conducted after September 15 and prior to ground freezing. Shrub species will be seeded separately and will be seeded during the winter.

Implementation of the Proposed Action would increase the potential for human caused fires during the construction and operation of the proposed Project. Accidental discharge during transportation and storage of flammable materials or chemicals (such as pentane or fuel) could accelerate the ignition of fires along the County Road or at the power plant site. Impacts from these fires would vary based on fire size and could result in the destruction of structures, livestock forage and wildlife habitat.

A hazardous material handling, storage and transportation plan has been produced and would reduce the potential for fires (see Section 3.12). Ormat has also proposed environmental protection measures to further reduce the potential for human caused fires (see Section 2.1.11). Additionally, the Project includes the development of a wildland fire prevention and control plan, as identified in the Utilization Plan and Operations Plan, which describes prevention measures and the actions Ormat would take in the event of fire.

Power transmission lines have been known to start fires either from arcing or electrocution of birds. Installation of anti-electrocution perching sites on power poles and maintenance of roads and/or constructing fuel breaks along the ROW would also reduce potential impacts.

Mitigation Measure:

To reduce the threat of fire from project operations and to protect project infrastructure from severe fires, an annual fuels monitoring program would be implemented. Fuel loads within the project area would be monitored using the "Stereo Photo Series for Qualifying Natural Fuels Volume IV: Pinyon-Juniper, Chaparral, and Sagebrush Types in the Southwestern United States" or other BLM-approved method. Maximum acceptable fuel loads are:

- **10 tons per acre of total above-ground biomass or less in Pinyon-Juniper habitats**
- **2 tons per acre of total above ground biomass or less in sagebrush habitats**
- **800 pounds per acre of fine fuels in grasses**

Should monitoring determine that project area fuel loads exceed these levels, then appropriate fuel treatments would be required. These may consist of mowing, mastication, high intensity and short term grazing, hand thinning, chemical treatment, etc. If required,

the specific fuel treatment program and area would be determined in coordination with and approved by the BLM or Forest Service authorized officer, as appropriate.

3.9.2.2 Alternative 1

The construction, operation and maintenance of Alternative 1 would differ from the Proposed Action only by the increase (5.0 acres) in the total long term surface disturbance. The impacts of Alternative 1 to vegetation would be slightly greater than that of the Proposed Action. The mitigation measures recommended for the Proposed Action would be equally applicable to Alternative 1.

3.9.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This would result in additional loss of vegetation. See the 2009 Geothermal Exploration EA for a complete analysis of potential effects to vegetation.

3.10 WATER QUALITY AND QUANTITY

3.10.1 Affected Environment

The proposed Project area includes two watersheds. The Grass Valley Hydrographic Area (Basin 138) covers only the extreme north end and a small portion of the northeast corner. The Big Smoky Valley – Northern Part Hydrographic Area (Basin 137B) covers the remainder of the Project area. Both watersheds are located within the Central Hydrographic Region. The water well from which water for construction activities will be obtained is located in Basin 138.

Basin 137B is a “designated” ground water basin, while Basin 138 is not. Ground water basins are “designated” by the Nevada State Engineer, Department of Conservation and Natural Resources, Division of Water Resources (NDCNR-DWR) when permitted ground water rights approach or exceed the estimated average annual recharge and the water resources are being depleted or require additional administration. Designation of Basin 137B occurred in 1983.

On average, Basin 137B receives about six inches of precipitation annually (Rush and Schroer, 1971). The northern part of the Basin is topographically closed so there is no external surface water inflow or outflow (Rush and Schroer, 1971). Within the Project area, surface water generally flows from the north to the south and ground water generally flows to the playa south of the Project area.

Basin 138 is also topographically and hydrologically closed with principal surface and ground water movement toward the playa in the northern part of the valley (Everett and Rush, 1966). Most of the groundwater is contained in the alluvium and occurs under both artesian and water-table conditions (Everett and Rush, 1966).

Approximately ten un-named cold springs and Canyon Cold Spring occur within the Project area (see Figure 19). The flow from these springs vary with the seasons, being highest in the spring and lowest in the fall, when some are dry (7Q10, Inc. 2010). Monitoring of these springs for flow (water level), chemistry and temperature began in early 2010 and is ongoing (7Q10, Inc. 2010). No known thermal (hot) springs occur in or near the Project area (Garside and Schilling 1979).

The NDCNR-DWR water rights and well drillers log databases show that there are two vested water rights in the proposed Project area. These vested water rights are for obtaining water for livestock from Ox Corral Creek (SE1/4, SW1/4, Section 15, T20N, R45E) and from an unnamed spring (SW1/4, SW1/4, Section 14, T20N, R45E) in the Project area.

A search of the NDCNR-DWR well log database for water wells drilled within the Project area showed that there are no on-line records of any water wells having been drilled in the Project area. The search was widened to find the water wells closest to the Project area reported to the NDCNR-DWR. This search identified a well, drilled in 1947, located approximately one-half mile north of the Project area in the Basin 138.

A search of the United States Geological Survey (USGS) Nevada ground-water levels database showed two water wells located within the Project area and one located approximately one-half mile north of the Project area. The USGS reported that this latter well, the same well identified in the NDCNR-DWR well log database, had a water level of 10 feet below ground level when measured in 1948, the only measurement reported (Basin 138). The former two wells were both located within Basin 137B. The water levels in these wells were also each measured only once (at 17 feet and 29 feet below ground level), with the most recent of the two measured in 1984. It is unknown whether any of these wells are still in existence. A search of the USGS Nevada ground water level and surface water databases showed no water flow rate information had been recorded by the USGS for springs in the Project area.

Past mineral exploration in or near the Project area indicated the presence of hot water resources. Exploration holes drilled 300 meters deep through the silica sinter cap near the middle of the Project area in 2004 intercepted near-boiling waters (up to 190°F [88°C]) with some geysering action observed in one hole. Samples of the artesian hot water collected from two drill holes yielded chemical “geothermometer” temperatures of 304°F and 380°F (151°C and 193°C) (NBMG 2008).

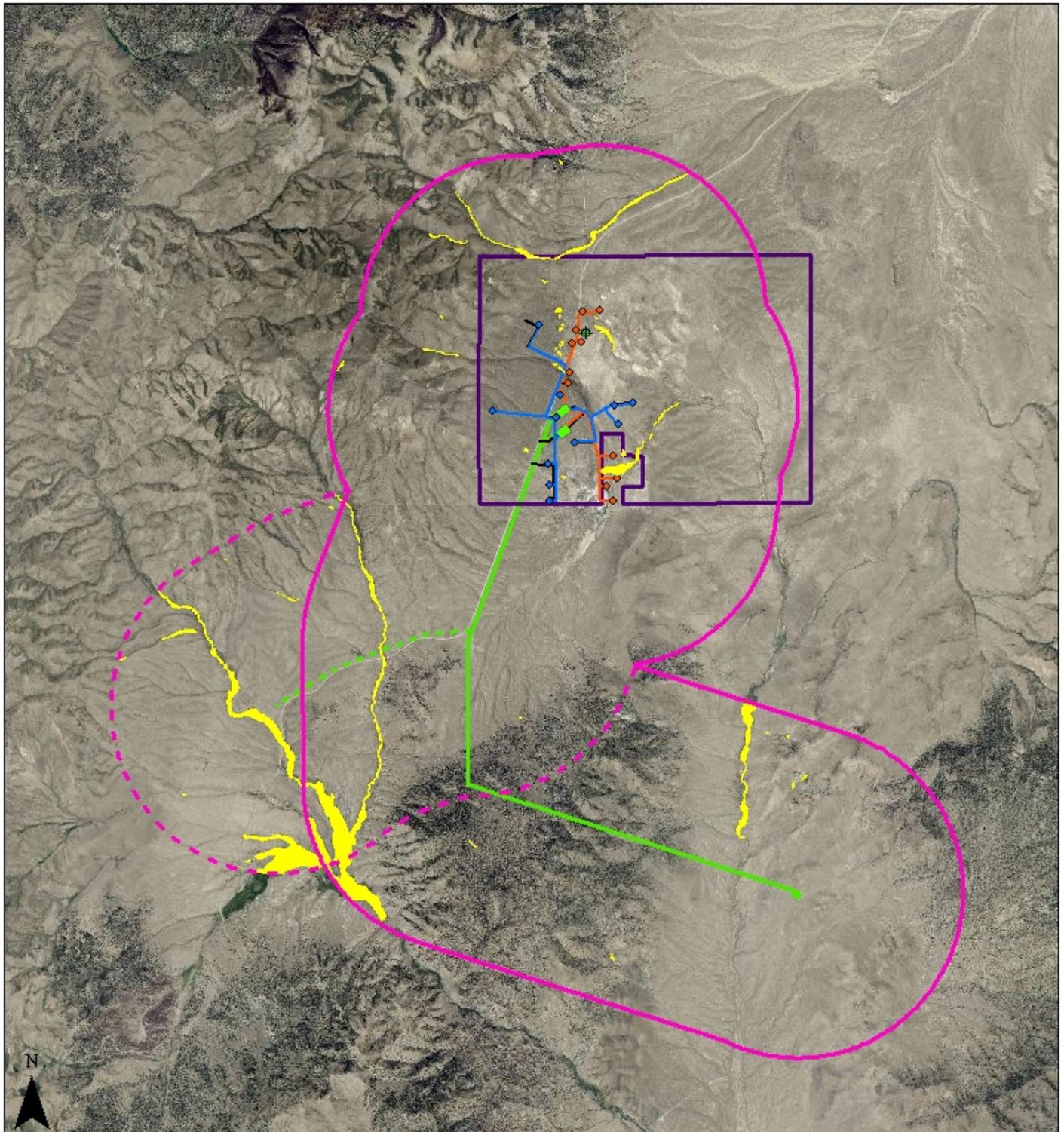
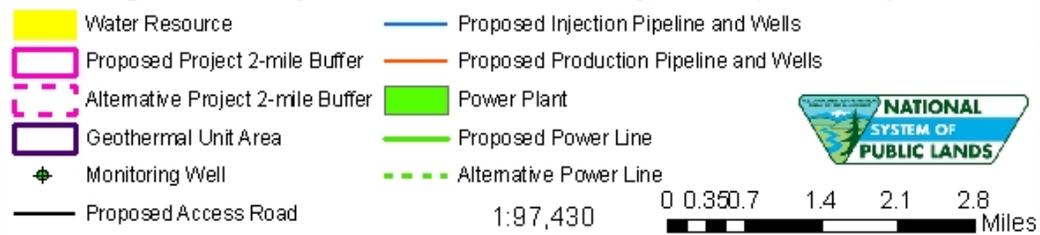


Figure 19: Springs, Seeps, Wet Meadows, and Riparian Areas Recorded through BLM Monitoring in the Vicinity of the McGinness Hills Project Area (BLM 2011).



*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.

The data shown on the map uses the Universal Transmencator (Zone 11N) Coordinate system and uses the NAD83 projection. Map date: 03/25/2011.

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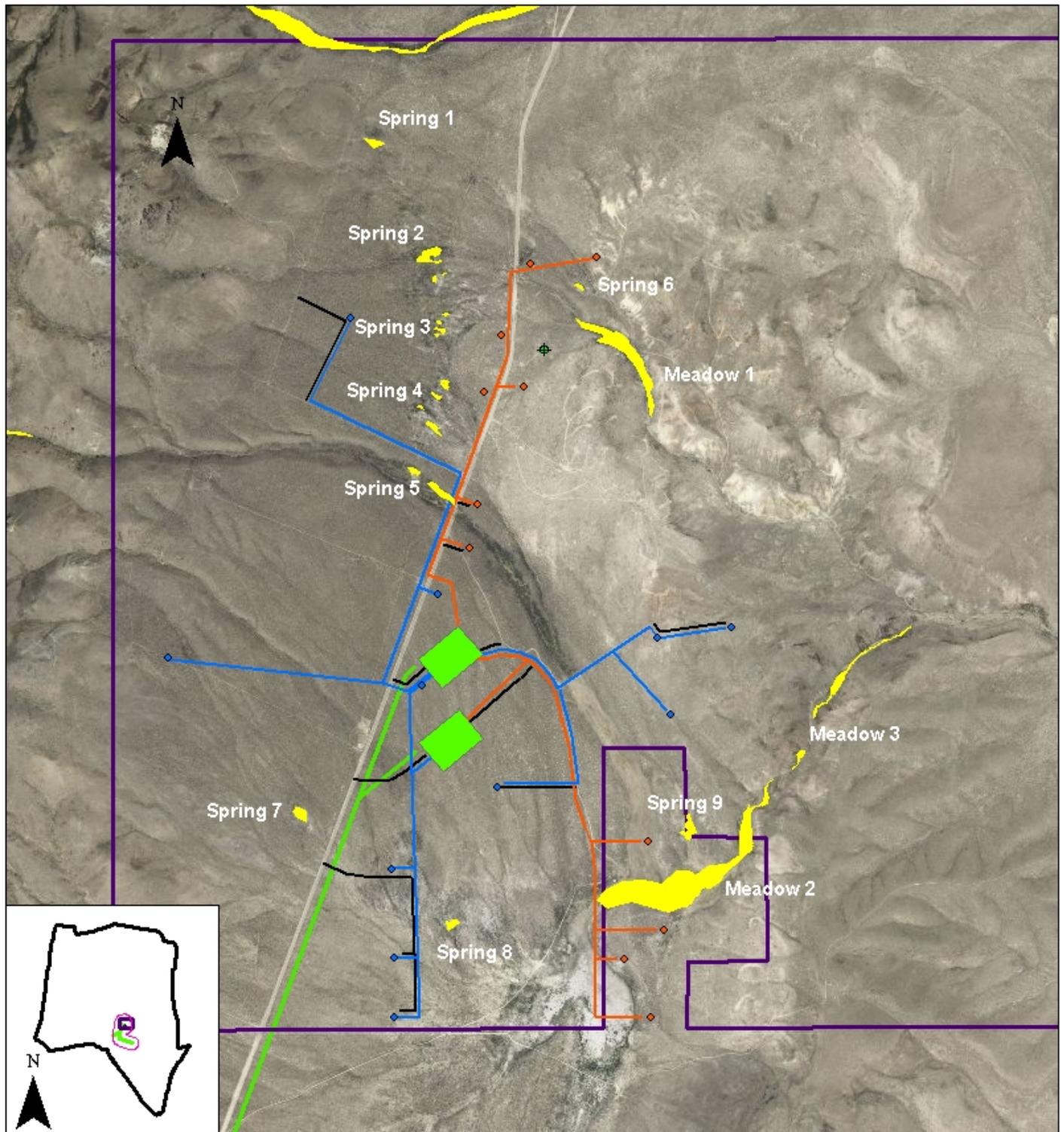
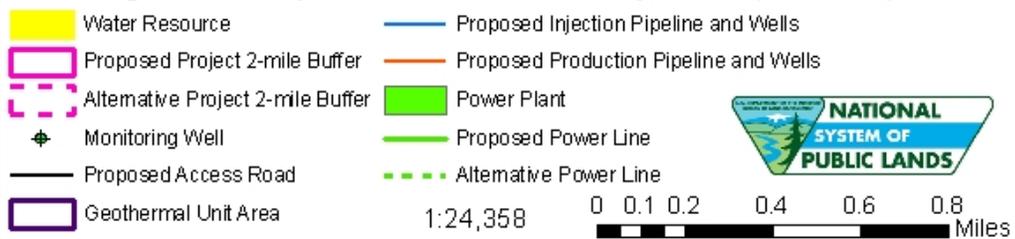


Figure 20: Springs, Seeps, Wet Meadows, and Riparian Areas Recorded through BLM Monitoring in the Vicinity of the McGinness Hills Project Area (BLM 2011).



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Through the exploration environmental assessment (NV063-EA08-093) only TGH sites 22-10 and 62-11 are located within Basin 138. The remaining 25 TGH sites and/or well sites are located in Basin 137B. Also temporary water wells were approved to be constructed at sites 88-16, 38-15, 18-22, and/or 33-22. These wells were located down-gradient from all seep and spring sources, wetlands, and riparian zones. In June 2009, NDCNR-DWR issued a waiver to drill one temporary water well in Basin 137B to support drilling operations.

Temperature and chemical quality data for the cold water springs within the Unit Area were collected in 2008 and 2010 by Ormat and 7Q10, respectively. Chemical quality is dilute, with total dissolved solids (TDS) ranging from 103 to 186 mg/l (parts per million) and temperatures ranging from 42 to 52 degrees F (7Q10, Inc. 2010). Geothermal fluid is affected by the high temperatures encountered and includes increased concentrations of boron, silica, fluoride and lithium. These concentrations are substantially higher than the cold water springs which indicates there is no mixing between the water resources (7Q10, Inc. 2010).

3.10.2 Environmental Consequences

3.10.2.1 Proposed Action

The Proposed Action would likely have no direct impacts on the quality or quantity of either surface or groundwater. The amount of water required for well drilling is relatively small (30,000 gallons per day for each well and substantially less for construction activities) and the geothermal power plants have closed systems injecting the geothermal fluid back into the deeper geothermal aquifer. All wells drilled to date have been reviewed and approved by BLM, Nevada Division of Minerals (NDOM) and NDEP as necessary. Well drilling includes a drilling plan, emergency plans and safety plans. Any new wells would be drilled using air or non-toxic drilling mud. Wells would be cased with steel through the shallow groundwater aquifer to minimize the potential for contamination. Reserve pits, lined with an approved pit liner, would be constructed at each well location for containment and temporary storage of drilling mud, drill cuttings, geothermal fluid and storm water runoff. The Underground Injection Control Permit from the Nevada Department of Environmental Protection, Bureau of Water Pollution Control (NDEP-BWPC) would require that the injection program be designed and monitored to prevent degradation of underground sources of drinking water due to geothermal fluid injection practices.

Project construction, including construction of the power plants, wells and well pads, geothermal pipelines, access roads and transmission line, would involve removal of vegetation. This disturbance could result in increased sedimentation into seeps, springs and meadows, reducing water quality and decreasing infiltration and groundwater recharge. The total disturbance for the Proposed Action would be approximately 217 acres. A portion of this disturbance, estimated at almost 69 acres, would be short-term and reclaimed as soon as practical. However, more than 148 acres of the disturbed area would not be reclaimed until project decommissioning. Lack of vegetation and periodic disturbance for maintenance in these areas of long-term disturbance would potentially increase sedimentation and decrease water quantity

After the exploration EA was approved, Ormat obtained a lease for the Lake Ranch private land.

Five additional production wells were constructed along with access roads. These access roads are in close proximity to Meadow 2 (see Figure 20) located on the private land. Disturbance from these roads could increase sedimentation into the meadow decreasing water quality. Access roads near Meadow 2 could reduce water infiltration and groundwater recharge.

Over the life of the project, accidental discharges of geothermal fluids could contaminate surface or groundwater within the Project area. However, accidental discharges large enough to cause contamination are unlikely because of frequent inspections and ultrasonic testing of the pipelines, flow and pressure monitoring and well pump and pipeline valve shutdown features.

Erosion and sedimentation structures would be constructed to divert runoff around the constructed well pads, power plant sites and the substation into ditches and back into existing drainages. Construction of these structures will implement best management practices (Gold Book) to further minimize potential impacts to surface and groundwater contamination. Any ground disturbing construction would also implement best management practices to minimize erosion and water contamination.

A water well would be constructed at each of the power plants for domestic use. These wells would be located in hydrographic Basin 137B. Each well would consume approximately 20-30 gpm, or about 2.5-3.0 af/yr, over the life of the Project. Even though this is a small quantity of water, if the well is directly connected to the aquifer feeding the cold springs, it could affect the flow.

Only small amounts of petroleum products would be stored on site with the majority of products being brought in as needed. Petroleum products stored on site would have a containment structure large enough to contain the amount of product on site and would be lined with an approved liner to prevent surface and groundwater contamination. A spill and disposal contingency plan which describes the methods for cleanup and abatement of any petroleum hydrocarbon or other hazardous material spill would be completed for the Project.

Pumping an additional 30.6 acre feet of groundwater, for well drilling and project construction, from Basin 138 at projected rates would not affect existing groundwater users or the surface environment.

3.10.2.2 Alternative 1

Environmental impacts would be the same as the Proposed Action except for routing the transmission line across Burton Creek and requiring five acres of additional disturbance for a substation. The construction of the transmission line and substation would have no direct impacts to water quality or quantity. Indirect impacts from construction are not expected when using best management practices for pole placement.

3.10.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This could result in additional impacts to water quality and quantity. See the 2009 Geothermal Exploration EA for a complete analysis of these potential impacts.

3.11 WETLANDS AND RIPARIAN

3.11.1 Affected Environment

Figure 19 shows existing riparian areas in and around the Project area. These riparian areas consist of seeps, springs, meadows and perennial and ephemeral drainages. Most of the drainages within the Project area are ephemeral that flow only in response to runoff from storm events or snow melt. The ephemeral drainages within the Project area lacked riparian vegetation (GBE 2008). Drainages that were flowing when surveyed in late spring had narrow strips of riparian vegetation with upland vegetation immediately adjacent (GBE 2008). A larger area of riparian vegetation was identified in the southeast quarter of Section 14 where two drainages joined (GBE 2008). The private land (Lake Ranch) contains a large meadow and two springs.

Riparian vegetation observed included the following: sedges (*Carex* sp.), rushes (*Juncus* sp.), bluegrass (*Poa pratensis*), foxtail barley (*Hordeum jubatum*), mat muhly (*Muhlenbergia richardsonis*), and meadow foxtail (*Alopercurus pratensis*). Iris (*Iris* sp.) and willow (*Salix* sp.) were also present in some areas (GBE 2008).

Little is known about the interaction between the seeps, springs, meadows and underlying geothermal resource. Pumping and injection of the geothermal fluid could cause indirect impacts such as changes in temperature or chemical makeup, reduced or increased flow, or stopping flow altogether.

3.11.2 Environmental Consequences

3.11.2.1 Proposed Action

There is no surface disturbance proposed within any wetlands or riparian vegetation, and no direct impacts are anticipated. However, indirect impacts from construction of pipelines, access roads and geothermal production to Springs 2-6 and 8-9 along with Meadows 1 and 2 (see Figure 20) could be realized through changes in temperature or chemical makeup, reduced or increased flow, or stopping flow altogether. However, the water chemistry data suggests that there is essentially no interaction between the cold water springs and the geothermal fluid.

Continuing the current program of monitoring for flow (water level), chemistry and temperature during Project construction and operation would provide data which would either confirm the absence of any connection between the cold water springs and the geothermal reservoir, or provide documentation of adverse changes and information to develop effective correction measures. Through the monitoring program, if any adverse impacts are documented, mitigation would be required.

Mitigation Measure

If water flows or chemistry within Springs 2-6, 8-9 and/or Meadows 1-2 are realized, the proponent would be required to modify operations to correct the impact to ensure flows are maintained at natural occurrence. If the effects cannot be corrected through operational change the proponent would be required to improve other existing seeps, springs and/or meadows within the 3:1 mitigation zone (Figure 14). Improvements could include fencing, habitat improvement, or riparian enhancement through restoration efforts.

This mitigation measure would allow riparian acreage to be maintained at pre-project levels and therefore minimizing any adverse impacts within the 3:1 mitigation zone. The mitigation projects will improve riparian habitat adjacent to the Project area to avoid a net loss of such habitat as a result of permitting geothermal activities.

3.11.2.2 Alternative 1

Environmental impacts would be the same as the Proposed Action except for routing the transmission line across Burton Creek and requiring five acres of additional disturbance for a substation. The construction of the transmission line and substation would have no direct impacts to riparian and/or wetland areas. Indirect impacts from construction are not expected when using best management practices for pole placement.

3.11.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. If this were to occur, additional mitigation measures would be put in place to eliminate impacts to wetland and riparian habitat. See the 2009 Geothermal Exploration EA for a complete analysis of potential effects.

3.12 WASTES (HAZARDOUS AND SOLID) & HEALTH AND SAFETY

3.12.1 Affected Environment

There are no hazardous material storage facilities in the Project Area and no hazardous materials are known to be routinely used in the Project Area. The transport and handling of hazardous materials in Nevada are subject to numerous federal and state laws and regulations.

3.12.2 Environmental Consequences

3.12.2.1 Proposed Action

During drilling activities, diesel fuel, lubricants, hydraulic fluids and drilling chemicals (drilling mud, caustic soda, barite, etc.), would be transported to, stored on and used by the Project at the proposed drill sites (see Table 13). The Project must conform to both federal and state requirements for handling these hazardous/regulated wastes materials. Typical of most construction projects, the storage and use of these materials may result in minor, incidental spills of diesel fuel or oil to the ground during fueling of equipment, filling of fuel storage tanks, and handling lubricants. Other incidental spills could be associated with equipment failures such as ruptured hoses. The Project includes the development of a hazardous material spill and disposal contingency plan, as identified in the Utilization Plan, which describes the methods for cleanup and abatement of any petroleum hydrocarbon (including petroleum contaminated soils) or other hazardous material spill.

Table 13: Materials and Chemicals Commonly Used During Well Drilling

Product	Quantity Used	Quantity Stored	Hazardous Material? ¹
Drilling Mud Gel (Bentonite Clay)	200,000 lbs	100 lb sacks on pallets	No
Salt (NaCl)	80,000 lbs	50 lb sacks on pallets	No
Barite (BaSO ₄)	12,000 lbs	50 lb sacks on pallets	No
Tannathin (Lignite)	2,500 lbs	50 lb sacks on pallets	No
Lime (Calcium Hydroxide)	2,000 lbs	50 lb sacks on pallets	Yes ²
Caustic Soda (Sodium Hydroxide)	1,000 lbs	50 lb sacks on pallets	Yes ²
Diesel Fuel	30,000 gals	6,000 gal tank	Yes ³
Lubricants (Motor Oil, Compressor Oil)	1,000 gals	55 gal drums	Yes ³
Hydraulic fluid	200 gals	55 gal drums	No
Anti-Freeze (Ethylene Glycol)	100 gals	55 gal drums	No ⁴
Liquid Polymer Emulsion (partially hydrolyzed polyacrylamide / polyacrylate (PHPA) copolymer)	100 gals	5 gal buckets	No

Product	Quantity Used	Quantity Stored	Hazardous Material? ¹
<ol style="list-style-type: none"> 1. Hazardous materials are defined and regulated in the United States primarily by laws and regulations administered by the U.S. Environmental Protection Agency (EPA), the U.S. Occupational Safety and Health Administration (OSHA), the U.S. Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC). Each has its own definition of a "hazardous material." 2. The material is characteristically hazardous due to its corrosivity 3. The material is characteristically hazardous due to its flammability 4. This material is considered orally toxic following ingestion. 			

Should well workover operations be necessary, these actions may involve placing a dilute mixture of hydrochloric (muriatic) and hydrofluoric acids down the well. This would only transpire when and if needed. The amount of dilute acid placed in the well bore (which can vary from 10,000 gallons to 50,000 gallons or more) is determined by calculating the amount of each type of mineral to be dissolved. Concentrated (35%) hydrochloric acid and 40% ammonium fluoride solution (to make the hydrofluoric acid) would be delivered via truck to the site on use (i.e. would not be stored onsite during well drilling and testing). The acids are mixed on site with water by experienced contractors. The dilute acid mixture is placed in the cased well bore, followed by water to push the mixture into the geothermal reservoir. After dissolving the minerals in the geothermal reservoir, the water and now spent acids are flowed back through the well to the surface where they are tested, neutralized if necessary (using sodium hydroxide or crushed limestone or marble), and discharged to the lined reserve pit, which will be sampled prior to reclamation of the pit (see Section 2.1.3).

No geothermal fluid waste is anticipated from the Project. The Project must comply with BLM requirements to ensure that any geothermal fluid encountered during the drilling does not flow uncontrolled to the surface. These include the use of "blow-out" prevention equipment during drilling and the installation of well casing cemented into the ground.

The small quantities of solid wastes (paper trash and garbage) generated by the project would be transported offsite to an appropriate landfill facility. Portable chemical toilet wastes would be removed by a local contractor. Given Ormat's compliance with the associated lease stipulations, no effects would result from solid wastes generated by the project (see also Section 2.1.11). The disposal of these wastes would be a residual impact of the project.

Small quantities of hazardous waste would be generated during construction operations. Typically these wastes would be in the form of empty drums or spent lead acid batteries used for construction equipment. Construction activities typically generate waste oils, oily rags, and oil impregnated absorbent materials used to clean up minor spills from construction equipment. These wastes would be transported to a disposal facility authorized to accept the waste. Most waste generated from the construction activities would be solid (nonhazardous) waste which would also be transported to an offsite disposal facility authorized to accept the waste.

Hazardous materials stored on site during normal power plant operations include diesel fuel for the fire pump and standby generator, lubricating oils, and small quantities of paint, antifreeze, cleaning solvents, battery acid, transformer insulating fluid, and laboratory reagent chemicals. Geothermal fluid handling chemicals (i.e. lubricating oil and scale inhibitor) will also be stored on site. These materials will be stored within secondary containment and there will be little potential for adverse effects from spills or releases of these materials.

Substantial quantities of the binary working fluid, pentane, would be stored and used (though not consumed or intentionally released). Pentane is a flammable but non-toxic hydrocarbon similar to, but less volatile than propane. During major maintenance activities on the pentane side of the binary power plant units, the liquid pentane would first be transferred to the pentane storage tank.

Small quantities of typical office and industrial trash will be generated during power plant operations. Similar to construction wastes, the operations waste will be removed from the site by a local waste contractor and deposited in an offsite disposal facility authorized to accept the wastes. Sanitary wastes will be handled by a septic system constructed as part of the power plant facilities.

Proper handling, storage and disposal of these hazardous materials, hazardous/regulated wastes and solid wastes in conformance with federal and state regulations would ensure that no soil, groundwater, or surface water contamination would occur with any adverse effects on the environment or worker health and safety.

The following mitigation measure is provided to help contain spills at the source and prevent contamination of soils.

Mitigation Measure:

As specified in the Hazardous Materials Spill Contingency Plan, absorbent pads or sheets would be placed under likely spill sources.

The proposed Project presents an unlikely target for an intentionally destructive act and has an extremely low probability of attack. In addition, gates will restrict vehicle access to the facility.

The limited access in addition to the relative remoteness of the facilities would deter intruders. Theft or opportunistic vandalism would be more likely than sabotage or terrorist acts. The results of any such acts could be expensive to repair, but no prolonged disruption of electrical service would be anticipated. No environmental impacts would be expected from physical damage to the proposed project or from loss of power delivery.

3.12.2.2 Alternative 1

The impacts of Alternative 1 to Wastes (Hazardous and Solid) & Health and Safety would not be different from that of the Proposed Action. The mitigation measures recommended for the Proposed Action would be equally applicable to Alternative 1.

3.12.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This could result in impacts from hazardous and solid wastes. See the 2009 Geothermal Exploration EA for a complete analysis of potential impacts.

3.13 PALEONTOLOGY

3.13.1 Affected Environment

A literature review of the Unit Area and vicinity was conducted by Cogstone Resource Management, Inc. to determine the potential for the rock units in the proposed Project area to produce significant fossil resources. The majority of the rock units present in the Unit area were not expected to produce fossils. The relatively recent (<1.8 million year old) silica sinter deposits near the center of the Unit area and the 470+/- million year old Valmy Formation were determined to have a low to moderate potential to yield fossils, while the relatively recent (<1.8 million year old) “older” alluvium was determined to have a moderate to high potential for producing fossils (Cogstone 2008).

3.13.2 Environmental Consequences

3.13.2.1 Proposed Action

Project activities are proposed very near one or more of the three rock units within the proposed Project area determined to have the potential to produce significant fossils (the silica sinter deposits, the Valmy Formation or “older” alluvium).

Though no proposed Project components are directly within any of the above rock units, portions of the injection pipeline to well sites 67A-9 and 27-16 abut the Valmy Formation; and portions of injection pipeline to 67-15, and the new access road/injection pipeline to well 87-15 abut the silica sinter deposits.

Construction activities on these rock units that involve new surface disturbance could result in the disturbance or destruction of potentially important fossils. The following mitigation measure is designed to minimize the potential loss of fossils.

Mitigation Measure

Surface disturbing activities on the rock units determined to have the potential to produce significant fossils (the silica sinter deposits, the Valmy Formation or the “older” alluvium) will require pre-disturbance surveys to determine the appropriate subsequent course of action, which could include monitoring during surface disturbance activities, avoidance of identified significant fossil localities, or no further action.

3.13.2.2 Alternative 1

Based on the information received, the impacts of Alternative 1 to paleontological resources would not be different from that of the Proposed Action. The mitigation measures recommended for the Proposed Action would be equally applicable to Alternative 1.

3.13.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. If this were to occur, exploration activities on some rock units could result disturbance or destruction of fossils. See the 2009 Geothermal Exploration EA for a complete analysis of potential effects to paleontological resources.

3.14 RANGELAND

3.14.1 Affected Environment

The McGinness Hills Geothermal Project would be located within the Grass Valley and Simpson Park Allotments (see Table 14).

Table 14: Allotment Information

Allotment	Total Public Land (acres)	Total Permitted AUMs¹
Grass Valley	282,854	20,041
Simpson Park	97,167	3,446

¹ An animal unit month (AUM) is the amount of forage needed to sustain one cow, five sheep or five goats for a month.

The livestock allotments within the McGinness Hills Unit Area are summarized in Table 15.

Table 15: Permittee and AUM Information

Allotment	Operator	Use Area (Pasture)	AUMs	Season of Use
Grass Valley	Grass Valley Ranch LLC	Antelope	2,168 (odd yrs.)	4/1 – 5/31 (odd yrs.)
			3,083 (even yrs.)	8/16 – 11/30 (even yrs.)
Simpson Park	Grass Valley Ranch LLC	Lake Ranch	525	5/1 – 8/15
	Grass Valley Ranch LLC; Wolf Ranches II	Rye Patch	501	5/1 – 8/30

In addition, the transmission line would cross through both the Lake Ranch and Rye Patch Use Areas (Pastures) in the Simpson Park Allotment (see Table 15).

There have been several range improvements within the proposed Project Area: a fence exists in the northwestern portion of the McGinness Hills Unit Area which runs through Sections 9-10 and 15-16; a fence exists in the southern portion of the Unit Area which runs through Sections 14-15 and 22-23; and a corral exists in Section 22 of the Unit Area; a cattle guard (N-594236); Oscar Spring Redevelopment (N-593548); and Ox Corral Spring Walker Troughs (N-590229)

There are 2 Key Management Areas (KMAs) within the proposed Project Area. KMAs are used by the BLM for long-term monitoring and analysis of the rangelands across the landscape.

3.14.2 Environmental Consequences

3.14.2.1 Proposed Action

Long term surface disturbance associated with the Proposed Action would be 148.5 acres. It would also reduce the 23,487 AUMs within the combined allotments by 2 AUM, or less than one percent of the AUMs within the combined allotments (see Table 16).

Table 16: AUM Reductions per Allotment

Allotment	Operator	Use Area (Pasture)	AUMs	Acres per AUM	AUM Reduction
Grass Valley	Grass Valley Ranch LLC	Antelope	2,168 (odd yrs.)	28	0
			3,083 (even yrs.)		
Simpson Park	Grass Valley Ranch LLC	Lake Ranch	525	13	2
	Grass Valley Ranch LLC; Wolf Ranches II	Rye Patch	501	12	0

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

None of the proposed Project components are located within 200 feet of the KMAs within the Project Area. No impacts to these KMAs are anticipated.

The fencing of the power plants will exclude approximately 33 acres from livestock. The geothermal pipeline network could impair livestock movement and distribution. Ormat has committed (see Section 2.1.4.1) to bury the pipelines at 3 strategic locations to facilitate livestock and wildlife movement and distribution.

The following mitigation measure is recommended to address potential impacts to rangeland improvements:

Mitigation Measure:

Fences and other livestock/wildlife improvements that would be affected by any Project construction or activities would be restored to provide for their original function and capacity.

3.14.2.2 Alternative 1

The construction, operation, maintenance and reclamation of Alternative 1 would differ from the Proposed Action only by the increase (5.0 acres) in the total long term surface disturbance. The impacts of Alternative 1 to rangeland would not be different from that of the Proposed Action.

3.14.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This would result in additional impacts to rangelands. See the 2009 Geothermal Exploration EA for a complete analysis of potential rangeland impacts.

3.15 RECREATION

3.15.1 Affected Environment

Recreation use within the proposed Project Area is low and mainly associated with dispersed recreation activities such as hunting, OHV use, wildlife viewing, camping and rockhounding.

There are no organized OHV race courses within the proposed Project Area. The Pony Express trail is located approximately ½ mile south of the NVE Frontier substation at the southern end of the project.

3.15.2 Environmental Consequences

3.15.2.1 Proposed Action

During operation of the Project, 127.4 acres of public land would be unavailable for dispersed recreation activities. Although this disturbance would exist throughout the life of the Project, Project facilities and operations would not prevent or inhibit continued access for recreation on adjacent public lands. Project operations should also not impact the ability of hunters to access previous hunting grounds, or impact the abundance of game animals.

Air quality impacts to recreational users could include dust from vehicle traffic on unpaved roads and exhaust from construction vehicles. As discussed in Section 3.2.2, these would be short-term and temporary. Ormat has also stated that water would be applied to the disturbed ground during the construction activities as necessary to control dust (see Section 2.1.11).

Project-generated noise and traffic could cause some recreational users within the Project Area to stay away during the Project construction and drilling activities. These indirect effects would be temporary and short-term. The Project would have no foreseeable long term impacts on recreation.

3.15.2.2 Alternative 1

The construction, operation, maintenance and reclamation of Alternative 1 would differ from the Proposed Action only by the increase (5.0 acres) in the total long term surface disturbance. The impacts of Alternative 1 to recreation would not be different from that of the Proposed Action.

3.15.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This would result in additional effects to dispersed recreational use of the area. See the 2009 Geothermal Exploration EA for a complete analysis of potential recreational impacts.

3.16 VISUAL RESOURCES

3.16.1 Affected Environment

The BLM initiated the visual resource management (VRM) process to manage the quality of landscapes on public land and to evaluate the potential impacts to visual resources resulting from development activities. VRM class designations are determined by assessing the scenic value of the landscape, viewer sensitivity to the scenery, and the distance of the viewer to the subject landscape. These management classes identify various permissible levels of landscape alteration, while protecting the overall visual quality of the region. They are divided into four levels (Classes I, II, III, and IV). Class I is the most restrictive and Class IV is the least restrictive (BLM 1986).

The portion of the Project Area on BLM-managed public lands is located in a VRM Class IV area. The objective of Class IV is to provide for management activities that require major modification of the existing landscape character. The level of change to the characteristic landscape can be high. Management activities may dominate the view and be the major focus of viewer attention. Every attempt, however, should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic landscape elements (BLM 1986).

The portion of the National Forest System lands that the proposed transmission line and alternative route goes through is classified as “modification” under the Visual Quality Objective system. Under the Modification Visual Quality Objective, man’s activity may dominate the characteristic landscape but must, at the same time; utilize naturally established form, line, color and texture.

3.16.2 Environmental Consequences

3.16.2.1 Proposed Action

Drilling operations would be visible in the Project Area during site construction and intermittently over the life of the Project. The drill rigs proposed for the Project would be up to 175 feet in height. Well drilling operations would typically take about 45 days to complete for each well. These operations would be 24-hour per day, 7 days per week. During drilling operations, the rig will be visible at distances of greater than one mile from the respective drill sites, and lights used when drilling at night would increase rig visibility. Impacts to visual resources from drilling operations would primarily affect the elements of line and color. Drilling operations will be temporary and short-term. The following mitigation measure is recommended to reduce visual impacts during drilling operations.

Mitigation Measure

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

Most power plant facilities will be single story and will not be visible at a distance from the power plant site(s). The air cooled condensers would be the tallest permanent structure on each power plant site and are estimated to be about 35± feet tall.

The following mitigation measures are recommended to reduce the visual impacts to long term project related facilities within the McGinness Hills Unit Area.

Mitigation Measures

Permanent project facilities within the McGinness Hills Unit Area would be painted covert green which would blend with the landscape. Prior to painting, Ormat would contact the Mount Lewis Field Office project lead.

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

Within the transmission line corridor the single poles would be up to 82 to 104 ft tall and would be spaced about 710 feet apart, on average.

The proposed transmission line generally parallels the Grass Valley Road (County Road #201) and the existing Nevada Energy transmission line and would terminate at an existing substation. The transmission line would be visually apparent in the foreground, middleground, and background to visitors within and adjacent to the Project Area. The transmission line will add an extended linear feature to the landscape.

Project activities on BLM managed public lands would be consistent with the Class IV classification of the area. Project activities on National Forest System lands would be consistent with the Modification visual quality objective of the area.

3.16.2.2 Alternative 1

The impacts of Alternative 1 to Visual Resources would be very similar to, but slightly greater than those of the Proposed Action due to the fact that portions of the transmission line would be located in a previously undisturbed corridor and the construction of a new substation would be necessary. The mitigation measures proposed under the Proposed Action would be equally applicable for Alternative 1.

3.16.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. This would result in additional effects to visual resources. See the 2009 Geothermal Exploration EA for a complete analysis of potential visual resource impacts.

3.17 SOCIO-ECONOMIC VALUES

3.17.1 Affected Environment

Based on the 2005—2009 American Community Survey 5-year Estimates, Lander County had a total population of 5,047 (U.S. Census Bureau 2011a) and the Battle Mountain Census Designated Place (CDP) had an estimated population of 2,711 (U.S. Census Bureau 2011b). Based on 2007 estimates available via city-data.com, the town of Austin had a 2007 population of 417 (City-Data.com 2011a).

Based on the 2005—2009 American Community Survey 5-year Estimates, Lander County has 2,287 total housing units, of which approximately 1,834 are occupied (U.S. Census Bureau 2011a), and the Battle Mountain CDP had 1,163 housing units of which 964 were occupied (U.S. Census Bureau 2011b). Based on 2007 estimates available via city-data.com, the town of Austin had 357 housing units, of which 220 were occupied (City-Data.com 2011b).

Based on the 2005—2009 American Community Survey 5-year Estimates, the labor force for Lander County was estimated to be 2,331 persons. Lander County's leading employers included the agriculture, forestry, fishing and hunting, and mining industry (29.3%); construction, extraction, maintenance and repair occupations (26.9%); and management, professional and related industries (21.4 percent). Also based on the 5-year estimates, the labor force for the Battle Mountain CDP was estimated to be 1,205 persons. The Battle Mountain CDP's leading employers included the construction, extraction, maintenance and repair occupations (30.7%); the agriculture, forestry, fishing and hunting, and mining industry (30.4%); and service occupations (27.5%) (U.S. Census Bureau 2011b). Based on 2007 estimates available via city-data.com, the leading employers included educational services (15.9%); mining, quarrying and oil and gas extraction (14.7%); and accommodations and food service industry (14.2%) (City-Data.com 2011c).

The Austin school is designed to handle 60-75 K-12 students, and is currently under capacity (Personal communication Steve Larsgard, Lander County School Superintendent).

3.17.2 Environmental Consequences

3.17.2.1 Proposed Action

Construction of the Project would require 12 to 24 months to complete once all permits are obtained and equipment orders scheduled. Drilling would be conducted by a crew of 9-10 workers with as many as 18 workers on site during short periods. Power plant and pipeline construction would likely require a maximum of up to 50 workers, although substantially fewer would be on site most of the time during construction, as the construction activities are staged. Construction of the transmission line and fiber optic line would require approximately 8 – 10 workers. In total, approximately 70 construction workers would be needed during the construction period.

Some of these workers would be recruited locally, though most would be specialized workers from outside of the local area. Typically, non-local skilled workers do not bring families with them on temporary construction assignments. Therefore, most workers would be expected to stay in local hotels, rental housing units or recreational vehicles.

Non-local construction workers are typically paid a *per diem* rate for daily housing and meal costs. Workers normally spend the *per diem* on motel accommodations or RV campground space rent, restaurants, groceries, gasoline, and entertainment. In addition, Ormat would likely purchase or rent some portion of the equipment and supplies required to drill and complete the construction activities (such as grading equipment, fuel and tools) from local suppliers. This spending activity associated with the construction of the Project would have a small but positive effect on local businesses in Lander Counties.

Once the power plant is operating, and if they are remotely operated, 5-8 workers would be needed. If the power plants are not remotely operated, approximately 8-15 workers would be needed. Given the small amount of workers needed, the project would not induce population growth in an area. Neither does the proposed Project create or provide any infrastructure which would indirectly induce substantial population growth.

As the school is currently operating under capacity, any additional influx of new students associated with the construction and operation workforce, could be accommodated by the school within the current infrastructure.

3.17.2.2 Alternative 1

The impacts to Socio-economic values of Alternative 1 would be the same as those described for the Proposed Action.

3.17.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, exploration activities could continue for approximately seven more years. This would result in a small positive effect on local businesses in Lander County. See the 2009 Geothermal Exploration EA for a complete analysis of potential socioeconomic impacts.

3.18 LAND USE AUTHORIZATIONS

3.18.1 Affected Environment

Several rights-of-way (ROWs) have been granted by the BLM on the public lands within the McGinness Hills Unit Area and transmission line corridor (see Table 17), and generally consist of ROWs for power lines, aggregate pits and geothermal leases.

Table 17: Land Use Authorizations within the McGinness Hills Unit Area and Transmission Line Corridor

Holder	ROW/Activity	Case File No.	Location
Sierra Pacific Power Co.	Power Transmission Line	NVN-005253	19N 45E, sec. 13, 14
Sierra Pacific Power Co.	Power Transmission Line	NVN-025341	19N 45E, sec. 13, 24, 25, 36
Lander County	Free Use Permit	NVN-053239	19N 45E, sec. 14
Lander County Road and Bridge Dept.	Free Use Permit	NVN-082390	20N 45E, sec. 21
Ormat Nevada, Inc.	Geothermal Lease	NVN-083966	20N 45E, sec. 9, 10, 11, 12, 13, 14, 15, 16
Ormat Nevada, Inc.	Geothermal Lease	NVN-083967	20N 45E, sec. 21, 22, 23, 24
Ormat Nevada, Inc.	Geothermal Unit	NVN-084268X	20N 45E, sec. 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24
Lander County	Free use Permit	NVN-073768	21N 46E, sec. 20

3.18.2 Environmental Consequences

3.18.2.1 Proposed Action

All project activities within the McGinness Hills Unit Area are located away from the authorized ROWs, so there would be no impacts to lands and realty within the geothermal operations area.

Transmission line poles would not be located within any existing ROWs and no impacts are expected. The transmission line wires would pass over several land use authorizations, but would not interfere with any existing ROWs. No impacts are anticipated.

3.18.2.2 Alternative 1

The impacts to lands and realty from Alternative 1 would be identical to those described for the Proposed Action.

3.18.2.3 No Action Alternative

Under the No Action alternative, the McGinness Hills Geothermal Development Project as currently proposed would not be constructed or operated. The direct, indirect and cumulative impacts identified for the proposed action would not occur.

Under this alternative, Ormat would still have the ability to continue geothermal exploration. As currently approved, continued exploration activities would disturb an additional 34 acres. However, these exploration activities would not affect any other existing land use authorizations.

4 CUMULATIVE EFFECTS

The CEQ regulations for implementing NEPA (40 CFR 1508.7) define cumulative impacts as:

“ . . . the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.”

4.1 CUMULATIVE EFFECTS STUDY AREA

The cumulative effects study area (CESA) for all resources (exclusive of sage grouse) is the approximately 352,680 acre area which was determined on a hydrographic, cultural and topographic basis (hereafter referred to as the “Principal CESA”) (see Figure 21). The CESA for sage-grouse is the Toiyabe Population Management Unit (PMU). PMU’s were established by the Governor’s Sage-Grouse Conservation Team which included cooperating agencies and affected parties. PMUs were designated based on sage-grouse distribution and configuration of leks on the landscape (see Figure 21).

4.2 PAST AND PRESENT ACTIONS

4.2.1 Principle CESA

Past and present actions consist primarily of Ormat’s ongoing McGinness Hills geothermal exploration activities, livestock grazing, recreational activities, transportation and access, wildfires, wild horse and burro management (including wild horse gathers), wildlife use and mineral exploration. The past and present actions identified as part of the no-action alternative in the previous sections are expected to continue, in the same manner as they have in the recent past.

Ongoing McGinness Hills Geothermal Exploration Activities – Ormat’s geothermal exploration activities on the leased geothermal unit include the drilling and construction geothermal wells and access roads (see Section 1.1). These activities have resulted in 33.9 acres of surface disturbance. Well drilling and access road construction on private land resulted in 23.2 acres of surface disturbance.

Livestock grazing – Portions of four BLM-managed grazing allotments are within the Principle CESA: Grass Valley, Simpson Park, Underwood and Austin. Portions of three USFS-managed grazing allotments are within the Principle CESA: Lake Flat, Bade Flat and Cahill. In addition, several privately owned ranches support livestock grazing and associated uses. In order to support the management of these grazing lands, a variety of range improvement projects have been implemented through the years, including fences, cattle guards, wells, and watering facilities.

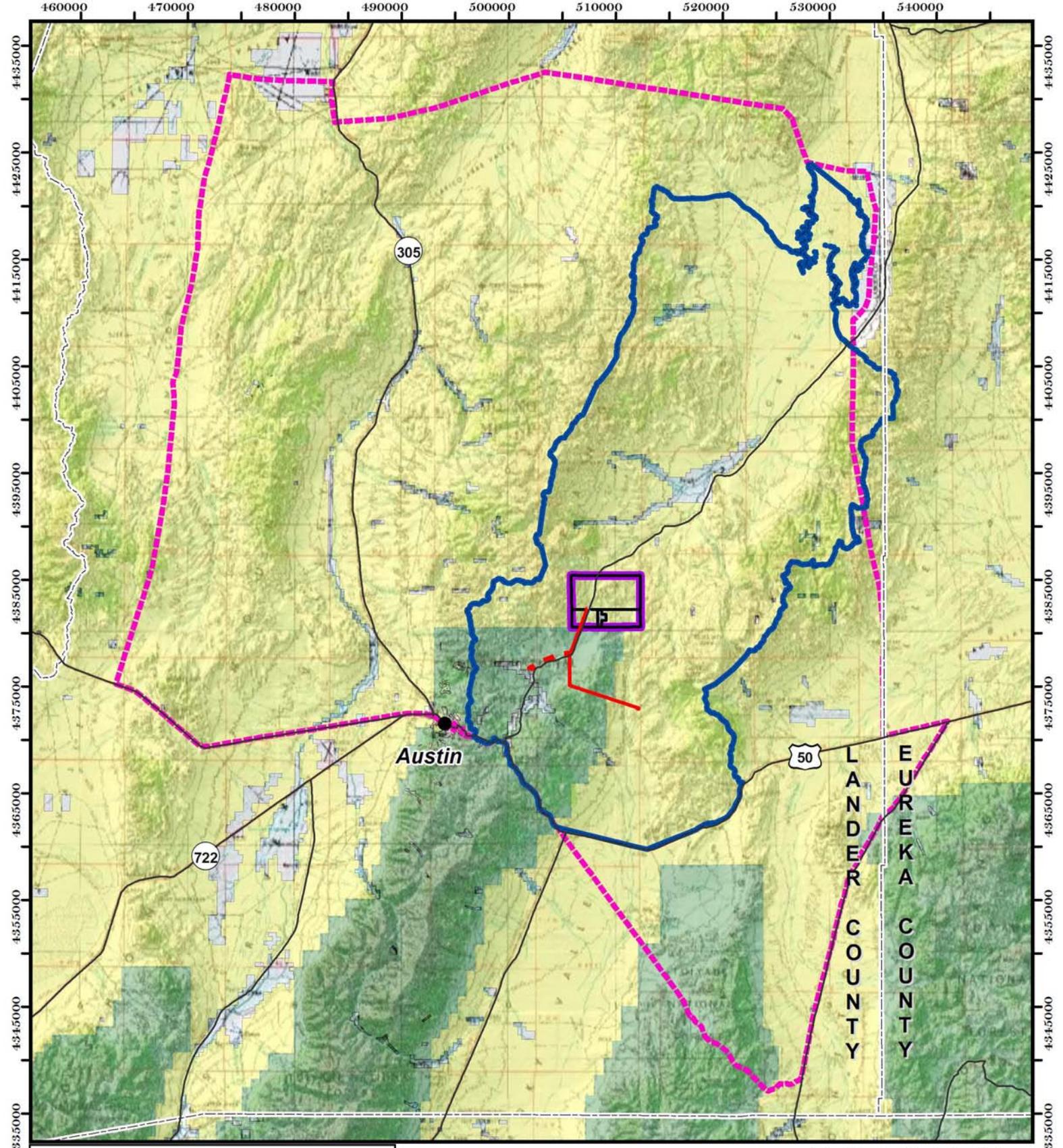
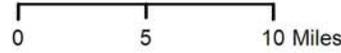


Figure 21: Cumulative Effects Study Area

-  CESA-Sage Grouse
-  Principle CESA
-  230 kV Transmission Line-Proposed
-  Proposed Powerline Alternative
-  Power Plants
-  McGinness Hills Geothermal Unit Area
-  Geothermal Lease Boundaries



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 Bureau of Land Management
 Mount Lewis Field Office
 50 Bastian Road
 Battle Mountain, NV 89820



* 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.

The data shown on the map uses the Universal Transmegerator (Zone 11N) Coordinate system and uses the NAD83 projection.

Map Date : 05/17/2011

Recreational activities – There is one developed recreation site within the Principle CESA, Hickison Petroglyph Recreation Site. All other recreation in the study area is of a dispersed nature. These recreation activities include sightseeing, pleasure driving, rock collecting, off-highway vehicle use, wildlife viewing and hunting, camping, horseback riding, and hiking.

The Hickison Petroglyph Recreation Site is located approximately 24 miles east of Austin, Nevada, along US Highway 50. The site received more than 21,000 visitors in 2006. Recreational opportunities at this site include petroglyph viewing, hiking, picnicking, camping, and horseback riding. The site has 16 camp sites, four picnic sites, three restrooms, and more than three miles of equestrian/hiker trails.

Transportation and access – Past and present actions within the Principle CESA are supported by a transportation system which includes gravel County Roads, Forest Service Roads, and dirt roads or “two-tracks” on public lands. Few are regularly maintained.

Wilderness Study Area – A portion of the Simpson Park Wilderness Study Area (WSA) is located along the eastern edge of the Principal CESA. This WSA is in the Simpson Park Mountain Range approximately 50 miles northwest of Eureka, Nevada. The WSA includes almost 50,000 acres of public land. The Simpson Park WSA consists of mountainous topography with scattered stands of aspen and mountain mahogany. The WSA is approximately 17 miles long and five miles wide.

Wildfires - There have been 42 wildfires within the Principle CESA since 1985. Seven of the fires were human caused, 30 fires were natural causes and 5 fires were of unknown cause. Total acres burnt were 109,657 acres.

Wild Horse and Burro Use and Management – Portions of three BLM-managed Herd Management Areas (HMAs) are within the Principle CESA: Callahan HMA, Hickison Burro HMA and Bald Mountain HMA.

The east half of the Callahan HMA is located within the Principle CESA. The Callahan HMA, covers an area that is approximately 26 miles long and averages 8 miles wide. The HMA shares its north boundary with the Bald Mountain HMA. The HMA was recently estimated to support approximately 212 wild horses. However, the southeast corner of the Callahan HMA, a portion of which is located within the McGinness Hills Geothermal Unit, has not been utilized by wild horses in the recent past.

The extreme southeastern portion of the Bald Mountain HMA is located in the Principle CESA. Wild horses frequent this area and are often observed congregating near the northern portion of the Callahan HMA, where numerous water sources are located.

The northern portion of the Hickison HMA is located within the Principle CESA. However, all wild burros are located south of US Highway 50, which acts as a barrier to movement. Therefore, all wild burros within the Hickison HMA are located outside of the Principle CESA.

BLM management of these HMAs includes wild horse gathers to remove excess wild horses and to treat wild horses with a fertility control vaccine to slow population growth. These measures are designed to maintain population size within the Appropriate Management Level, which is the level of use by wild horses which results in a thriving natural ecological balance and multiple use relationship on the public lands in the area. Gathers can occur as frequently as every 2 years, but also occur at 3, 4, or 5 year intervals. The most recent wild horse gather was conducted on the Callahan HMA in January 2011.

Mineral exploration – Hundreds of active mining claims exist within the Principle CESA. Past and present active exploration consists of exploration mining notices (disturbances of less than five acres) and exploration plans of operations (disturbances over five acres) for precious metals exploration, as well as removal of gravel resources.

Wind anemometers – Sierra Pacific Power Co (SPPCo.) maintains wind anemometers on Bates Mountain in the NE1/4, NE1/4, SW1/4 Section 7, T20N, R47E.

4.2.2 Sage Grouse CESA

In addition to the actions identified above, the following past and present actions are also within the sage grouse CESA:

Ongoing Geothermal Exploration Activities – Two additional geothermal exploration projects (Reese River Geothermal Exploration Project and the Grass Valley Geothermal Exploration Project) are within the sage grouse CESA. These exploration projects include the drilling and construction of geothermal wells and access roads. The Grass Valley Project is currently being reclaimed.

Livestock grazing – Four additional BLM-managed grazing allotments are within the sage grouse CESA: Manhattan Mountain, Gilbert Creek, Dry Creek and Potts. Portions of three USFS-managed grazing allotments are within the CESA:

Wildfires – There have been 187 wildfires within the Principle CESA since 1985. Thirty-eight of the fires were human caused, 138 fires were natural causes and 11 fires were of unknown cause. Total acres burnt were 283,288 acres.

Wild Horse and Burro Use and Management – In addition to the three BLM Herd Management Areas described above for the Principle CESA, portions of two additional HMAs are located within the sage-grouse CESA: New Pass/Ravenswood HMA and South Shoshone HMA.

The New Pass/Ravenswood HMA is located approximately 35 miles northwest of Austin, Nevada. The HMA is approximately 18 miles wide and 24 miles long. The BLM may re-assess the Appropriate Management Level in the coming years, as recurrent wildfire in this HMA has affected forage, water and the distribution of wild horses. The most recent wild horse gather was conducted in January 2011 in conjunction with the Callaghan Complex gather.

Just north of the New Pass/Ravenswood HMA is the South Shoshone HMA, the extreme southern end of which is located within the sage-grouse CESA. The most recent wild horse gather in this HMA occurred in December 2008.

4.3 REASONABLY FORESEEABLE FUTURE ACTIONS

The past and present actions identified above are expected to continue, in the same manner and to the same degree as they have been conducted in the present and recent past.

The McGinness Hills Geothermal project area is located in what is known as the Battle Mountain/Carlin Trend. This Trend is known for containing numerous large gold mines, precious metals mines, as well as other metal commodities mines. It is anticipated that the current high commodity market prices for precious metals such as gold and silver as well as other metals such as copper will continue to drive mining notice applications and plans of operations for exploration in and around the project and CESA areas. As this market driven commodities remain stable or even increase, it is likely the CESAs will see an increase in mineral exploration activity.

Neither the U.S. Forest Service's Austin/Tonopah Ranger District nor the Mount Lewis Field Office of the BLM has any applications for specific activities or permitting within the CESA boundaries. However, Ormat Technologies, Inc. does have applications for water rights pending in Hydrographic Basin 138 for water withdrawals at two wells located on private property (the Grass Valley Ranch). Ormat has indicated to the BLM that these water wells and withdrawals may be used at some future date to supply cooling water to their McGinness Hills geothermal plants. This would require retrofitting to utilize water cooling technology. Should Ormat choose to pursue this option, a modification to its utilization plan and a new plan of development would be required to be submitted to the BLM with a new NEPA document.

Addition of a water cooled option would provide increased electrical generation capability during high summer ambient air temperatures. There are two possible cooling scenarios that Ormat has used on other projects: 1) water misted at the base of air cooling towers. This process lowers the ambient temperature of the surrounding air, making the cooling process, and thus the electrical generation process more efficient; and 2) adding cooling towers (approximately 50 feet in height) that would cool the water and pentane by increasing the surface area exposed in the cooling towers; again, improving electrical generation efficiency.

Ormat currently estimates that 2,500 acre feet/year (1,250 acre/year/generating plant) would be needed for the water-cooling process. As is currently understood, Ormat would apply for beneficial use from the Nevada State water engineer for 1,250 acre feet for industrial purposes from wells located on the Grass Valley Ranch. The remaining 1,250 acre feet needed for cooling would be created using treated geothermal fluid from Ormat's geothermal well field. A pipeline would also need to be developed to convey water from the Grass Valley Ranch to the geothermal power plants.

Recreational use within the CESAs is expected to continue consistent with past and present use, with dispersed outdoor recreational activities being the predominant type of recreation. In addition, the BLM Mount Lewis Field Office has plans to expand the number and length of trails within the Hickison Petroglyph Recreation Area. Future funding will allow a total of 30 to 50 miles of trail to be built. The trail system will include a portion of the Pony Express National Historic Trail. Additional funding will also allow construction of new camp loops and improvements to existing campground facilities.

4.4 CUMULATIVE EFFECTS ANALYSIS

4.4.1 Air Quality

4.4.1.1 Proposed Action

The Proposed Action would generate particulates in the form of fugitive dust from earth moving activities, travel on unpaved roads and reclamation activities. Diesel engines used during earth moving, well drilling and reclamation activities would create combustion emissions, criteria air pollutant precursors and greenhouse gas emissions. During operation of the power plants, up to twelve (12) tons of pentane per year would be lost to the atmosphere (see Section 3.2 for additional details).

Past and present actions have generated fugitive dust, principally from surface disturbing activities and travel on unpaved roads. It is likely the increased commodity prices for precious metals and other metals such as copper will drive increased exploration across the Carlin Trend, including the CESA.

This increase, while not quantifiable, will likely contribute to incremental increases in fugitive dust, combustion emissions, criteria air pollutant precursors and greenhouse gas emissions within the CESAs.

There are no known other industrial complexes proposed in the CESA boundaries. Unless another binary pentane operated plant is built in the air basin, additional quantities of pentane over the proposed action quantities will not occur

4.4.1.2 Alternative 1

Cumulative effects to air quality under Alternative 1 would be essentially the same as those identified under the Proposed Action.

4.4.1.3 No Action Alternative

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

4.4.2 Cultural Resources

4.4.2.1 Proposed Action

The current project is expected to have adverse effects to certain contributing elements of the McGinness Hills Archaeological District (MHAD). These adverse impacts could potentially occur on both BLM and National Forest System lands. In addition, adverse impacts to contributing elements and unevaluated cultural resource sites in the MHAD would be treated in accordance with an approved Historic Properties Treatment Plan.

Impacts to the integrity of setting of any subsequently identified National Register listed/eligible sites where integrity of setting is critical to their listing/eligibility could occur from future mineral exploration. Construction activities could increase the likelihood of vandalism of cultural sites (see Section 3.3.2.1 for additional details).

Under a reasonably foreseeable development scenario, any future disturbance resulting from construction of a waterline from the Grass Valley Ranch to the two power plants would either avoid eligible and unevaluated cultural resources sites or result in a treatment plan similar to the proposed MHAD treatment plan.

The project would result in additional human presence in the CESAs and could create further disturbance of cultural resources.

4.4.2.2 Alternative 1

Under Alternative 1, two additional cultural resource sites would be affected (see Section 3.3.2.2). Impacts to cultural resources from the RFFAs and other past and present actions would be the same as with the Proposed Action. Cumulative effects to cultural resources under this alternative would be substantially similar to those of the Proposed Action.

4.4.2.3 No Action Alternative

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

4.4.3 Native American Religious Concerns

4.4.3.1 Proposed Action

Implementation of the Proposed Action would include the potential for impacts to cultural resource sites, impacts to water sources (adjacent cold springs complex) and impacts to sage-grouse. Vehicles, equipment, and personnel used for development purposes could have impacts to areas utilized by native peoples. Also, the act of drilling wells could be viewed by traditional practitioners and believers as being harmful to “mother earth” due to impacts to underground and surface waters (see Section 3.4.2.1).

Over the last 15 to 20 years, the BLM, USFS and the tribes have witnessed an increase in the use of public lands, by various groups, organizations, and individuals. New ways to utilize the public lands are also on the rise. Livestock grazing, pursuit of recreation opportunities, hunting/fishing, oil, gas, geothermal, and mining leasing, exploration and development, along with relatively “newer” uses such as OHV use, interpretive trails, and mountain biking are among many increasing activities within the CESAs and the BLM Mount Lewis Field Office administrative boundary. In addition to all the existing, growing, and developing uses of the public lands, fluid mineral leasing and exploration would continue to contribute to the general decline in sites and associated activities of a cultural, traditional, and spiritual nature.

It is believed that cultural resources, including tribal resources and sites of cultural, traditional, spiritual use and associated activities are increasingly in danger of losing their physical and spiritual integrity. As populations grow, public interest in utilizing public lands (including the CESAs) could increase and thus the potential for the decline of culturally sensitive areas also could increase.

Impacts to native american religious concerns resulting from the Proposed Action would be cumulative with these effects from past, present and other RFFAs.

Different world views and social and spiritual practices and beliefs often conflict with each other. Because traditional lands encompass the majority of the State of Nevada including the BLM Mount Lewis administrative area, it is imperative that BLM and affected Tribes remain flexible and open to productive and proactive communication in order to assist each other in making decisions that will significantly reduce or eliminate any adverse affects to all party’s interests, resources, and/or activities.

4.4.3.2 Alternative 1

Cumulative effects to Native American Religious Concerns under Alternative 1 would be essentially the same as those identified under the Proposed Action.

4.4.3.3 No Action Alternative

Under the No Action Alternative, impacts to Native American religious concerns would be limited to those discussed above for the past, present and reasonably foreseeable future actions

4.4.4 Wildlife (Including Special Status Species – Plants and Animals, and Migratory Birds)

4.4.4.1 Proposed Action

The cumulative effects identified would be similar for general wildlife, migratory birds, and sensitive and special status plant and wildlife species. As the proposed Project would have no effect on threatened and endangered species, there would be no cumulative impacts to these species from the Proposed Action.

The Proposed Action would result in loss of approximately 217 acres of wildlife habitat and direct displacement of wildlife. Direct effects could also include injury or mortality during surface-clearing activities. Project-generated noise and human activity would also deter some wildlife from using the area surrounding the project. Increased wildlife mortality and injury from collisions would result from increased vehicular traffic associated with the Proposed Action. Habitat fragmentation resulting from the project facilities and activities would affect various types of wildlife. Effects to all wildlife would occur due to reduced access to seeps, springs, wet meadow, and riparian areas.

Disturbance and loss of wildlife habitat resulting from the Proposed Action would be cumulative with past and present actions and RFFAs implemented in the CESA. Habitat directly disturbed by these activities would be eliminated from wildlife use until completion of reclamation. Indirect effects would include human activity and noise surrounding additional projects. Individuals of species and local population utilizing specific project sites would be affected, but greater effects to regional populations are not expected.

Habitat fragmentation from the proposed action would be cumulative with that resulting from past and present actions and RFFAs that take place within the CESA. The extent of this habitat fragmentation would depend on the cumulative size of the footprint of these activities. Localized effects could occur, however greater effects to regional populations are not expected.

4.4.4.2 Alternative 1

The direct impacts to general wildlife, migratory birds, and sensitive and special status plant and wildlife species from the implementation of Alternative 1 would be very similar too and in some cases slightly less than those of the Proposed Action. Cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.4.3 No Action Alternative

Under the No Action Alternative, impacts to general wildlife, migratory birds, and sensitive and special status plant and wildlife species would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.5 Noxious Weeds, Invasive and Nonnative Species

4.4.5.1 Proposed Action

Although the Proposed Action would include measures to help minimize the spread of noxious weeds, invasive and nonnative species (Section 2.1.11 and Appendix A) and would include reclamation of disturbed areas (see Appendix B), the project would result in the potential for the spread of noxious weeds, invasive and nonnative species (seed and vegetative plant parts) within the McGinness Hills Unit Area and along the transmission line corridor (see Section 3.6.2.1).

Within the CESAs, past and present actions have the potential to introduce and contribute to the spread of noxious weeds, invasive and nonnative species, and the same may be expected from the RFFAs. Past, present and future mineral exploration activities would cause the most extensive surface disturbance and would present the greatest opportunity for noxious weed, invasive and nonnative species introduction and proliferation. The number and size of construction vehicles and construction activities could lend themselves to transporting noxious weeds, invasive and nonnative species to areas where they had not previously existed. Construction and operation activities and surface disturbance associated with the Proposed Action would also provide opportunities for noxious weed, invasive and nonnative species introduction and proliferation. These effects would be cumulative with those of the other past, present and reasonably foreseeable future actions within the CESAs.

4.4.5.2 Alternative 1

The direct impacts associated with noxious weeds, invasive and nonnative species resulting from the implementation of Alternative 1 would be very similar to but slightly greater than those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.5.3 No Action Alternative

Under the No Action Alternative, impacts to noxious weeds, invasive and nonnative species would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.6 Noise

4.4.6.1 Proposed Action

Short-term noise impacts resulting from the Proposed Action include noise from well drilling, construction activity, reclamation, and decommissioning. These impacts are highly variable and intermittent in nature. Long-term noise impacts would be generated by operation of the geothermal power plants, geothermal wells, and pipelines. To determine the extent and degree of these anticipated noise impacts, the proposed operations were mathematically modeled. The results of modeling indicate that at distances greater than approximately 2 miles from the proposed locations of the power plants, noise produced by project operations would not be discernibly detected above typical ambient sound levels.

Various ongoing activities within the CESAs generate noise. Activities associated with Ormat's McGinness Hills geothermal exploration intermittently produce noise within the project area. Other activities either produce so little sound or are so sporadic or are located so far from the project area that they do not meaningfully contribute to the project area noise level. Development of a future water-cooled option for the geothermal power plants would create additional noise impacts through construction activities and operation of water cooling towers at the power plants. Acoustic modeling indicates that cooling towers would add to the amount of noise

generated by the power plants. Cumulative noise effects would attenuate with distance from the sources, however, and would probably be negligible at distances greater than about 2.5 miles from the proposed power plants.

4.4.6.2 Alternative 1

The direct and indirect noise impacts resulting from the implementation of Alternative 1 would be the same as those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would also be the same as those of the Proposed Action.

4.4.6.3 No Action Alternative

Under the No Action Alternative, noise impacts would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.7 Soils

4.4.7.1 Proposed Action

Under the Proposed Action, surface disturbance and vegetation removal during construction of proposed project facilities within the Project Area would increase the potential for soil erosion through exposure of denuded surfaces. Additionally, soil would be compacted during construction activities due to heavy vehicle travel and heavy equipment use (see Section 3.8.2.1).

Within the CESAs, Ormat's geothermal exploration activities on the leased geothermal unit, including well and well pad construction, road construction, and other activities have resulted in 33.9 acres of surface disturbance, exposing soils and making them more susceptible to erosion.

Additional impacts to soils have and could be expected to continue to occur from mineral exploration within the CESAs. Additional roads could be constructed and mineral exploration holes drilled. Past, present, and reasonably foreseeable future OHV use, livestock grazing, and wildfires would also disturb soils within the CESAs. Development of a future water-cooled option for the geothermal power plants would create additional soil disturbances through construction of a water transmission pipeline and other project features.

The direct disturbance and exposure of soils to erosion associated with the Proposed Action would be cumulative with these past, present, and reasonably foreseeable future effects to soils.

4.4.7.2 Alternative 1

The direct impacts to soils resulting from the implementation of Alternative 1 would be very similar to but slightly greater than those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.7.3 No Action Alternative

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

4.4.8 Vegetation

4.4.8.1 Proposed Action

Surface disturbance associated with the proposed Project activities within the McGinness Hills Unit Area and along the transmission line corridor would result in the loss of vegetation. Approximately 68.7 acres of the surface disturbance within the Project Area would be short-term, as these areas would be reclaimed and revegetated after construction is completed. Approximately 148.5 acres of the disturbance within the Project Area would be long-term, as these areas would remain disturbed over the operational life of the proposed Project. All disturbed areas would be subject to final reclamation following project decommissioning (see Section 3.9.2.1).

Within the CESAs, Ormat's geothermal exploration activities on the leased geothermal unit, including well and well pad construction, road construction, and other activities have resulted in 33.9 acres of surface disturbance, and vegetation removal.

Additional impacts to vegetation have and could be expected to continue to occur from mineral exploration within the CESAs. Additional roads could be constructed and mineral exploration holes drilled, thereby removing vegetation. Past, present, and reasonably foreseeable future OHV use, livestock grazing, wild horse and burro use, and wildfires would also alter vegetation within the CESAs. Development of a future water-cooled option for the geothermal power plants would result in additional vegetation removal through construction of a water transmission pipeline and other project features.

The direct disturbance and removal of vegetation associated with the Proposed Action would be cumulative with these past, present, and reasonably foreseeable future effects to vegetation.

4.4.8.2 Alternative 1

The direct impacts to vegetation resulting from the implementation of Alternative 1 would be very similar to but slightly greater than those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.8.3 No Action Alternative

The direct impacts to vegetation resulting from the implementation of Alternative 1 would be very similar too but slightly greater than those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.9 Water Quality and Quantity

4.4.9.1 Proposed Action

As described in Section 3.10.1 for water quality and quantity of this document, impacts associated with the Proposed Action may occur. When coupled with past, present and reasonably foreseeable future actions, including ongoing McGinness Hills geothermal exploration, livestock grazing, recreational activities, transportation and access, wildfires, wild horse and burro management, and mineral exploration, additional impacts would be expected. However, these impacts would be minimized through best management practices (Gold Book) to ensure no cumulative adverse impacts.

Cumulative impacts (positive or adverse) of the Proposed Action to water quality and/or quantity are not expected to occur with the future expansion of the Hickison Petroglyph recreation site. However, the addition of two cold water wells for cooling the McGinness Hills power plants is estimated to use an additional 2,500 acre feet of water per year and include 11 acres of disturbance. This water usage and ground disturbance along with the associated cooling processes could result in adverse cumulative impacts to water quality and quantity. These impacts would be analyzed and mitigated through a separate environmental analysis.

4.4.9.2 Alternative 1

The cumulative impacts from selecting Alternative 1 would be the same as the Proposed Action.

4.4.9.3 No Action Alternative

Under the No Action Alternative, the McGinness Hills geothermal development would not be permitted. Cumulative impacts to water quality and quantity would be limited to those that may occur under the past, present and reasonably foreseeable future actions.

4.4.10 Wetlands and Riparian

4.4.10.1 Proposed Action

As described in Section 3.11.1 for riparian and wetland resources of this document, indirect adverse impacts associated with the Proposed Action may occur. When coupled with past, present and reasonably foreseeable future actions, including ongoing McGinness Hills geothermal exploration, livestock grazing, recreational activities, transportation and access, wildfires, wild horse and burro management, and mineral exploration, additional indirect impacts would be expected. However, these impacts would be minimized through best management practices (Gold Book) and mitigation measures identified in the wetland and riparian section of this document to ensure no cumulative adverse impacts.

Cumulative impacts (positive or adverse) of the Proposed Action to wetland and riparian resources are not expected to occur with the future expansion of the Hickison Petroglyph

recreation site. However, the addition of two cold water wells for cooling the McGinness Hills power plants is estimated to use an additional 2,500 acre feet of water per year and include 11 acres of disturbance. This water usage and ground disturbance along with the associated cooling processes could result in adverse cumulative impacts to wetland and riparian resources. These impacts would be analyzed and mitigated through a separate environmental analysis.

4.4.10.2 Alternative 1

The cumulative impacts from selecting Alternative 1 would be the same as the Proposed Action.

4.4.10.3 No Action Alternative

Under the No Action Alternative, the McGinness Hills geothermal development would not be permitted. Cumulative impacts to riparian or wetland resources would be limited to those that may occur under the past, present and reasonably foreseeable future actions.

4.4.11 Wastes (Hazardous and Solid)

4.4.11.1 Proposed Action

The Proposed Action would result in generation and disposal of solid and hazardous wastes. The Project could also result in minor petroleum hydrocarbon (including petroleum contaminated soils) or other hazardous material spills. However, no soil, groundwater, or surface water contamination is anticipated. No adverse effects to the environment or worker health and safety are anticipated (see Section 3.12.2.1).

Hazardous materials are expected to be used by both the non-renewable and renewable mineral exploration activities and the activities associated with the reasonably foreseeable development scenario (water cooled power plant), including the use of petroleum fuels (principally diesel fuel), hydraulic fluid, lubricants and drilling chemicals and materials. Additional non-hazardous solid waste and liquids would also be generated by the RFFAs. The transportation, use, storage and disposal of hazardous materials and wastes are subject to numerous federal, state and local laws and regulations which are intended to protect the public and the environment, and which are applicable to all of the past, present and RFFAs.

The Proposed Action is unlikely to result in cumulative effects to the environment from hazardous or solid wastes. Cumulative effects to worker health and safety are also unlikely.

4.4.11.2 Alternative 1

Cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.11.3 No Action Alternative

Under the No Action Alternative, impacts from wastes (hazardous and solid) and to health and safety would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.12 Rangeland

4.4.12.1 Proposed Action

The Proposed Action would result in the reduction of 2 AUMs, or less than one percent of the AUMs within the combined Project Area allotments. Additionally, the geothermal pipeline network could impair livestock movement and distribution (see Section 3.14.2.1).

Within the CESAs, Ormat's geothermal exploration activities on the leased geothermal unit, including well and well pad construction, road construction, and other activities have resulted in 33.9 acres of surface disturbance and a reduction of approximately 1 AUM of available forage. Additional impacts to livestock have and could be expected to continue to occur from mineral exploration within the CESAs. Additional roads could be constructed and mineral exploration holes drilled, thereby removing vegetation and altering grazing patterns.

Past, present and reasonably foreseeable future livestock grazing on public lands within the CESAs is and would be managed in accordance with standards and guidelines to maintain rangeland health. Past, present, and reasonably foreseeable future OHV use, wild horse and burro use, and wildfires would also alter vegetation and grazing within the CESAs.

The reasonably foreseeable development scenario (water-cooled option for the geothermal power plants) would result in vegetation removal and changes to grazing through construction of a water transmission pipeline and other project features.

Minor impacts to livestock grazing associated with the Proposed Action would be cumulative with these past, present, and reasonably foreseeable future effects to rangeland.

4.4.12.2 Alternative 1

The direct impacts to rangeland resulting from the implementation of Alternative 1 would be very similar to but slightly greater than those of the Proposed Action. Thus, cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.12.3 No Action Alternative

Under the No Action Alternative, impacts to rangeland would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.13 Recreation

4.4.13.1 Proposed Action

During operation of the Project, 127.4 acres of public land would be unavailable for dispersed recreation activities. Project facilities and operations would not prevent or inhibit continued access for recreation on adjacent public lands. Air quality impacts to recreational users could include dust from vehicle traffic on unpaved roads and exhaust from construction vehicles. Project-generated noise and traffic could cause some recreational users within the Project Area to temporarily stay away during the Project construction and drilling activities (see Section 3.15.2.1).

Within the CESAs, displacement of dispersed recreational use to other areas could occur from ongoing and future geothermal and mineral exploration activities, livestock grazing, wildfires, and the reasonably foreseeable development scenario (water cooled power plant). Trail development planned for the Hickison Petroglyph Recreation Area would provide additional non-motorized recreational opportunities within the CESAs.

Minor impacts to recreation associated with the Proposed Action would be cumulative with those of these past, present, and reasonably foreseeable future actions.

4.4.13.2 Alternative 1

Cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.13.3 No Action Alternative

Under the No Action Alternative, impacts to recreation would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.14 Visual Resources

4.4.14.1 Proposed Action

Drilling operations under the Proposed Action would be visible within the Project Area during site construction and intermittently over the life of the Project. The transmission line, visually apparent in the foreground to travelers along the County Road, would add an extended linear feature to the landscape. The air cooled condensers would be the tallest permanent structure on each power plant site and are estimated to be about 35± feet tall. However, most power plant facilities would be single story. Project facilities and activities would be consistent with the BLM Class IV Visual Resource Management classification of the area and USFS Modification Visual Quality Objective (see Section 3.16.2.1).

The CESAs are rated as VRM Class IV (modification) and Modification Visual Quality Objective. Construction activities associated with the mineral exploration, the reasonably foreseeable development scenario (water cooled plant option), and other RFFAs (including wildfires) would result in long-term modifications to the line, form, color, and texture of the characteristic landscape. The creation of roads has and would create strong horizontal linear contrasts. Vegetation and soil removal create color, textural, and linear contrasts with adjacent areas that could be visible long after all the facilities were removed.

The contribution of the proposed Project to these cumulative effects on visual resources would be minimal.

4.4.14.2 Alternative 1

The direct impacts to visual resources resulting from the implementation of Alternative 1 would be very similar to, but slightly greater than those of the Proposed Action due to the fact that portions of the transmission line would be located in a previously undisturbed corridor and the construction of a new substation would be necessary. Thus, cumulative impacts under Alternative 1 would be slightly greater than those of the Proposed Action.

4.4.14.3 No Action Alternative

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

4.4.15 Socio-Economic Values

4.4.15.1 Proposed Action

In total, approximately 70 construction workers would be needed during the construction period and these workers would be expected to stay in local hotels, rental housing units or recreational vehicles. Spending activity associated with the construction of the Project would have a small but positive effect on local businesses in Lander Counties. Given the small number of workers needed during operations, the project would not induce population growth in an area, nor would it create or provide any infrastructure which would indirectly induce substantial population growth (see Section 3.17.2.1).

Past and present activities have had a generally positive economic impact. Generally positive economic impacts would also be expected from the RFFAs, as some of the services and supplies needed for exploration and development would be contracted out to local contractors and builders, and some of the required supplies and construction materials could also be purchased from local merchants. Some positive economic impacts could also be realized from the rental of hotel rooms and purchase of meals and entertainment by workers.

The contribution of the proposed action to these cumulative effects on socioeconomic values would be minimal to moderate.

4.4.15.2 Alternative 1

Cumulative impacts under Alternative 1 would be essentially the same as those of the Proposed Action.

4.4.15.3 No Action Alternative

Under the No Action Alternative, socioeconomic impacts would be limited to those discussed above for the past, present and reasonably foreseeable future actions.

4.4.16 Land Use Authorization

4.4.16.1 Proposed Action

The Proposed Action would not have direct impacts to existing land use authorizations (see Section 3.18.2.1). Thus, there would be no cumulative effects to land use authorizations.

4.4.16.2 Alternative 1

Alternative 1 would not have direct impacts to existing land use authorizations. Thus, there would be no cumulative effects to land use authorizations.

4.4.16.3 No Action Alternative

The No Action Alternative would not have impacts to land use authorizations.

5 COORDINATION AND CONSULTATION

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Timbisha Shoshone Tribe

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Appendix A: Federal Geothermal Lease Stipulations

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.

SAGE GROUSE LEKS STIPULATIONS

Operations would avoid active leks (strutting grounds) by 2 miles during strutting season (see Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, October 2000).
Approximate dates: March 1- May 15.

The locations listed below will be avoided during strutting season:

Description of Lands

PARCEL NV-07-08-041

T. 20 N., R. 45 E., MDM, Nevada
sec. 09, E2, E2NW, E2NWNW, E2SWNW, NESW,
E2SESW;
sec. 10, All;
sec. 11, All;
sec. 12, All;
sec. 13, All;
sec. 14, All;
sec. 15, All;
sec. 16, E2, E2NENW, SENW, NESW, SESW.

PARCEL NV-07-08-042

T. 20 N., R. 45 E., MDM, Nevada
sec. 21, E2, NWNW, E2SESW, E2SESW;
sec. 22, NENE, W2, S2NESE, SESE;
sec. 23, All;
sec. 24, All.

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.

SAGE GROUSE LEKS STIPULATIONS

Operations would avoid active leks (strutting grounds) by 2 miles during strutting season (see Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada, October 2000). Approximate dates: March 1- May 15.

The locations listed below will be avoided during strutting season:

Description of Lands

PARCEL NV-07-08-041

T. 20 N., R. 45 E., MDM, Nevada
sec. 09, E2, E2NW, E2NWNW, E2SWNW, NESW,
E2SESW;
sec. 10, All;
sec. 11, All;
sec. 12, All;
sec. 13, All;
sec. 14, All;
sec. 15, All;
sec. 16, E2, E2NENW, SENW, NESW, SESW.

PARCEL NV-07-08-042

T. 20 N., R. 45 E., MDM, Nevada
sec. 21, E2, NWNW, E2SESW, E2SESW;
sec. 22, NENE, W2, S2NESE, SESE;
sec. 23, All;
sec. 24, All.

Appendix B: Interim and Final Reclamation Plan

Reclamation Plan

Ormat Nevada, Inc. McGinness Hills Geothermal Project

Lander County, Nevada

May 2011

The McGinness Hills Geothermal Development Project and associated Transmission line will be constructed, operated, and maintained by ORNI 39 and ORNI 49 as subsidiary of Ormat Nevada, Inc. (Ormat). Intermediate and final reclamation is required for two geothermal power plants, 9.01 miles of power transmission line, geothermal wells, geothermal pipelines, and ancillary facilities located on Private lands, Bureau of Land Management and U.S. Forest Service managed properties. All disturbed areas resulting from the project will be reclaimed in accordance with the requirements of 43 CFR 3200. Interim reclamation of the project to the extent practicable will occur throughout the project life. Final reclamation will involve removal of the utilization facility and all associated equipment and will occur at the time of facility decommissioning.

Reclamation Objectives:

The objective of interim reclamation is to restore vegetative cover and a portion of the landform sufficient to maintain healthy, biologically active topsoil; control erosion; and minimize habitat, visual, and forage loss during the life of the project. Individual well sites and other facilities may be partially restored by interim reclamation.

The objective of final reclamation is long-term and is designed to return the land to a condition approximating that which existed prior to disturbance created by the project. This includes restoration of the landform and natural vegetative community, hydrologic systems, visual resources, and wildlife habitats. To ensure that the long-term objective will be reached through human and natural processes, actions will be taken to ensure standards are met for site stability, visual quality, hydrological functioning, and vegetative productivity.

General Reclamation

The BLM Mount Lewis Field Office and or USFS Authorized Officer will be notified 24 hours prior to the commencement or undertaking of any interim or final reclamation operations.

Housekeeping:

1. Immediately upon well completion, all well locations and surrounding areas will be cleared and maintained free of: debris, materials, trash, and equipment not required for production or injection.
2. No hazardous substances, trash, or litter will be buried or placed in reserve pits. Upon well completion, any hydrocarbons in the reserve pit will be remediated or removed, for proper disposal at an approved facility.
3. Vegetation removal and surface disturbance will be minimized wherever possible.

Topsoil Management:

1. Operations will disturb the minimum amount of surface area necessary to conduct safe and efficient operations. When possible, equipment will be stored and operated on vegetated ground to minimize surface disturbance.
2. In areas to be heavily disturbed, the top eight (8) inches of soil material, will be stripped and stockpiled around the perimeter of the well location and along the perimeter of the access road to control run-on and run-off, and to make redistribution of topsoil more efficient during interim reclamation. Stockpiled topsoil may include vegetative material. Topsoil will be clearly segregated and stored separately from subsoils. If additional topsoil is needed to reclaim the site, topsoil will be imported from a location approved by the BLM Mount Lewis Field Office and or U.S. Forest Service Authorized Officer.
3. Earthwork for interim and final reclamation will be completed within 12 months of well completion or plugging unless a delay is approved in writing by the BLM Mount Lewis Field Office and or U.S. Forest Service Authorized Officer.
4. Salvaging and spreading topsoil will not be performed when the ground or topsoil is frozen or too wet to adequately support construction equipment. If such equipment creates ruts in excess of four (4) inches deep, the soil will be deemed too wet.
5. No major depressions will be left that would trap water and cause ponding unless the purpose is to trap runoff and sediment.
6. Areas able to be reclaimed will be ripped, tilled, or disked on contour, as necessary, to restore to approximate original contour and minimize erosion. Deep ripping to relieve compaction will be performed. All compacted areas to be seeded will be ripped to a minimum depth of eighteen (18) inches with a minimum furrow spacing of two (2) feet.
7. Wherever possible, cut slopes, fill slopes, and borrow ditches will be covered with topsoil and revegetated. Final reclamation includes re-contouring of roads back to original contour.
8. Salvaged topsoil will be replaced at the approximate original thickness prior to seedbed preparation.

Seeding:

Seedbed Preparation:

1. Initial seedbed preparation will consist of re-contouring to the appropriate interim or final reclamation land surface. All compacted areas to be seeded will be ripped to a minimum depth of eighteen (18) inches with a minimum furrow spacing of two (2) feet, followed by re-contouring the surface. Topsoil that has been stockpiled shall be replaced by spreading in an evenly distributed manner. Prior to seeding, the seedbed will be scarified, pitted, or barricaded as necessary and left with a rough surface.
2. Appropriate planting instructions will be followed for each seed mix provided. If broadcast seeding is to be used and is delayed, final seedbed preparation will consist of contour cultivating to a depth of four (4) to six (6) inches within 24 hours prior to seeding, dozer tracking, or other imprinting in order to loosen the soil and create seed germination micro-sites.

Seed Application:

1. Seeding will be conducted no more than 24 hours following completion of final seedbed preparation.
2. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM.
3. For the McGinness Hills Geothermal Project, the following seed mix and rates will be used on all disturbed surfaces, including pipelines and road cut & fill slopes:

Disturbed areas would be treated with a pre-emergent herbicide for the control of cheatgrass following the application of the seed mix and prior to plant emergence. Treatment would be by application of PLATEAU, or an equivalent herbicide (Imazipic is the active ingredient) following the reseeding, at an application rate of 2 -12 ounces/acre.

Seeding of disturbed areas within the Unit Area (Lake Ranch Pasture/Use Area) would be completed using the following BLM-approved native seed mixture and application rate:

Grass	Scientific Name	Pounds/acre (bulk)
Indian ricegrass	<i>Achnatherum hymenoides</i>	5.5
Needleandthread	<i>Hesperostipa comata</i>	6
Bottlebrush squirreltail	<i>Sitanion hystrix</i>	2.5
Forb		Pounds/acre (bulk)
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	1
Western yarrow	<i>Achillea millefolium</i>	1
		16.0 lbs

Seeding of disturbed areas associated with the transmission line (Rye Patch Pasture/Use Area and Lake Ranch Pasture/Use Area) would be completed using the following BLM-approved native seed mixture and application rate:

Grass	Scientific Name	Pounds/acre (bulk)
Indian ricegrass	<i>Achnatherum hymenoides</i>	4
Needleandthread	<i>Hesperostipa comata</i>	5
Bluebunch wheatgrass*	<i>Pseudoroegneria spicata</i>	4.5
Forb		Pounds/acre (bulk)
Scarlet globemallow	<i>Sphaeralcea coccinea</i>	1
Sulfur flower	<i>Eriogonum umbellatum</i>	1
		15.5 lbs
* The cultivar of Bluebunch Wheatgrass used to seed disturbed areas would not be the Snake River Bluebunch wheatgrass (<i>Elymus wawawaiensis</i>)		

All seeding on public lands managed by the BLM would be reviewed and approved by the Mount Lewis Field Manager prior to implementation, to include seed mixtures, seeding rates, methods and timing. All seeding on USFS managed lands will be reviewed and approved by the USFS prior to implementation, to include seed mixtures, seeding rates, methods and timing.

The application of seed is prohibited from May 15 to September 15. Fall seeding is preferred and recommended. Seeding will be conducted after September 15 and prior to ground freezing. Shrub species will be seeded separately and will be seeded during the winter.

Erosion Control and Mulching:

1. Mulch, silt fencing, waddles, certified weed-free hay bales, and other erosion control devices will be used on areas at risk of soil movement from wind and water erosion.
2. Water bars, detention basins, silt fencing or other erosion control devices shall be installed as necessary.
3. Mulch will be used if necessary to control erosion, create vegetation micro-sites, and retain soil moisture and may include hay, small-grain straw, wood fiber, live mulch, cotton, jute, or synthetic netting. Mulch will be free from mold, fungi, and certified free of noxious weed or invasive weed seeds.
4. If straw mulch is used, it will contain fibers long enough to facilitate crimping and provide the greatest cover.

Reserve Pit Closure:

1. Reserve pits will be closed and backfilled within 12 months of release of the drill rig. All reserve pits remaining open after 12 months will require written authorization of the BLM Mount Lewis Field Office Authorized Officer. Immediately upon well completion, any hydrocarbons or trash in the pit will be removed. Pits will be allowed to dry, pumped dry, or allowed to solidify in-situ prior to backfilling.
2. Following completion activities, pit liners will be completely removed or removed down to the solids level and disposed of at an approved landfill, or treated to prevent their reemergence to the surface and interference with long-term successful revegetation. If it was necessary to line the pit with a synthetic liner, the pit will not be trenched (cut) or filled (squeezed) while containing fluids. When dry, the pit will be backfilled with a minimum of five (5) feet of soil material. In relatively flat areas the pit area will be slightly mounded above the surrounding grade to allow for settling and to promote surface drainage away from the backfilled pit.
3. All refuse; junk, trash, tools, residual material, or personal property shall be removed from the drill pad and reserve pit prior to restoration work.

Control of Noxious Weeds, Invasive Weeds, and Non-Native Species:

1. All reclamation equipment will be cleaned prior to use to reduce the potential for introduction of noxious weeds or other undesirable non-native species.
2. A weed monitoring and control program will be implemented prior to site preparation for planting and will continue until interim or final reclamation is approved by the BLM Mount Lewis Field Office and or U.S. Forest Service Authorized Officer.

3. Monitoring will be conducted at least annually during the growing season to determine the presence of noxious weeds, invasive weeds, and non-native species. Noxious weeds, invasive weeds, and non-native species that have been identified during monitoring will be promptly treated and controlled. A Pesticide Use Proposal (PUP) will be submitted to the BLM Mount Lewis Field Office and or U.S. Forest Service Authorized Officer for approval prior to the use of herbicides.

Interim Reclamation

A. Transmission Line

Procedures:

1. Temporary areas of disturbance would be re-contoured to match the surrounding terrain. Areas to be reclaimed will be ripped, tilled, or disked on contour, as necessary. Construction sites, material storage yards, and access roads would be kept in an orderly condition and free of trash.
2. Refuse, junk, trash, tools, residual material, or personal property shall be removed from the transmission line right-of-way prior to restoration work. Refuse and trash would be collected at temporary staging areas in a closed container until removed from the transmission line right-of-way and disposed of in an approved manner. Oils and fuels would not be discharged to the ground surface. Waste oils or chemicals would be collected and hauled to an approved site (approved disposal site refers to a “permitted TSD facility” as identified on the Nevada Division of Environmental Protection, Bureau of Waste Management website) for disposal.
3. Interim reclamation stormwater management actions will be taken to ensure disturbed areas are quickly stabilized to control surface water flow and to protect both the disturbed and adjacent areas from erosion and siltation. This may involve construction and maintenance of temporary detention basins, silt fences, berms, ditches, and mulching.

B. Geothermal Pads, Plant and Pipeline

Procedures:

1. Liquids from the reserve pits would either naturally evaporate or be removed as may be necessary (i.e. pumped into another well), or allowed to solidify in-situ prior to backfilling.
2. Reserve pits will be closed and backfilled within 12 months of release of the drill rig. All reserve pits remaining open after 12 months will require written authorization of the BLM Mount Lewis Field Office Authorized Officer. Immediately upon well completion, any hydrocarbons or trash in the pit will be removed.
3. The solid contents remaining in each of the reserve pits, typically consisting of non-hazardous, non-toxic drilling mud and rock cuttings would be tested to confirm that they are not hazardous. Typical tests may include the Toxicity Characteristic Leaching Procedure (TCLP) (EPA Method 1311), tested for heavy metals; pH (EPA method 9045D); Total Petroleum Hydrocarbons/Diesel (EPA Method 8015B); and Oil and Grease (EPA Method 413.1). If the test results indicate that these solids are non-hazardous, the solids would then be mixed with the excavated rock and soil and buried by backfilling the reserve pit. Hazardous materials, if any, would be taken to a “permitted TSD facility” as identified on the Nevada Division of Environmental Protection, Bureau of Waste Management website.
4. Following completion activities, pit liners will be completely removed or removed down to the solids level and disposed of at an approved landfill, or treated to prevent their reemergence to the surface and interference with long-term successful revegetation. If it was necessary to line the pit with a synthetic liner, the pit will not be trenched (cut) or filled (squeezed) while containing fluids. When dry, the pit will be backfilled with a minimum of 5 feet of soil material. In relatively flat areas the pit area will be slightly mounded above the surrounding grade to allow for settling and to promote surface drainage away from the backfilled pit.
5. All refuse; junk, trash, tools, residual material, or personal property shall be removed from the drill pad and reserve pit prior to restoration work.
6. A well with no commercial potential may continue to be monitored, but will eventually be plugged and abandoned in conformance with the well abandonment requirements of the BLM and NDOM. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cement until the top of the cement is at ground level, which is designed to ensure that fluids will not move across these barriers into different aquifers. The well head (and any other equipment) will then be removed, the casing cut off well below ground surface and the hole backfilled to the surface.
7. Portions of cleared well sites not needed for operational and safety purposes (i.e. the “shoulders” of the pad) would be re-contoured to a final or intermediate contour that would blend with the surrounding topography as much as possible. Stockpiled topsoil will be spread on the area to aid in revegetation. Areas to be reclaimed will be ripped, tilled, or disked on contour, as necessary.

8. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious, invasive, and non-native seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM.
9. Interim reclamation stormwater management actions will be taken to ensure disturbed areas are quickly stabilized to control surface water flow and to protect both the disturbed and adjacent areas from erosion and siltation. This may involve construction and maintenance of temporary detention basins, silt fences, berms, ditches, and mulching.
10. When well drilling and completion has occurred, some portions of the well location will undergo interim reclamation and some portions of the well pad may not be restored. Most well locations will have limited areas of bare ground, such as a small area around production facilities or the surface of a rock road. Interim reclamation may not take place where work-over rigs and fracturing tanks need a level area to set up in the future. Some areas will undergo final reclamation where portions of the well pad will no longer be needed for production operations and can be re-contoured to restore the original landform.

Interim Reclamation Procedures - Additional

Re-contouring:

1. Interim reclamation actions will be completed no later than 12 months from the time that the final well on the location has been completed, season and weather permitting. Portions of cleared well sites not needed for active operational and safety purposes will be re-contoured to the original contour if feasible, or to an interim contour that blends with the surrounding topography as much as possible. Sufficient semi-level areas may remain for setup of a workover rig or for equipment storage. In some cases, rig anchors may need to be pulled and reset after re-contouring to allow for maximum interim reclamation.
2. For production or injection wells, the interim cut and fill slopes prior to re-seeding will not be steeper than a 3:1 ratio, unless the adjacent native topography is steeper. Constructed slopes may be much steeper during drilling, but will be re-contoured to the above ratios during interim reclamation.
3. Roads and well production equipment, such as tanks, treaters, separators, vents, electrical boxes, and equipment associated with pipeline operation, will be placed on location so as to permit maximum interim reclamation of disturbed areas. If equipment is found to interfere with proper interim reclamation of disturbed areas, the equipment will be moved so proper re-contouring and revegetation can occur.

Application of Topsoil & Revegetation:

1. Topsoil will be evenly spread and revegetated over the entire disturbed area not needed for all-weather operations including road cuts and fills and to within a few feet of the production facilities, unless an all-weather, surfaced, access route or small “teardrop” turnaround is needed on the well pad.

2. In order to inspect and operate the well or complete workover operations, it may be necessary to drive, park, and operate equipment on restored, interim vegetation within the previously disturbed area.
3. Damage to soils and interim vegetation will be repaired and reclaimed following use. To prevent soil compaction, under some situations, such as the presence of moist, clay soils, the vegetation and topsoil will be removed prior to workover operations and restored and reclaimed following workover operations.

Visual Resources Mitigation:

1. Trees (if present) and tall vegetation will be left undisturbed along the edges of the pads whenever feasible to provide screening.
2. To help mitigate the contrast of re-contoured slopes, reclamation will include measures to feather cleared lines of vegetation and redistribute in-situ vegetation, woody debris, and large rocks over re-contoured cut and fill slopes.
3. Production facilities will be clustered and placed away from cut slopes and fill slopes to allow the maximum re-contouring of the cut and fill slopes.

Final Reclamation

Procedures:

The following minimum reclamation actions will be taken to ensure that the reclamation objectives and standards are met. It may be necessary to take additional reclamation actions beyond the minimum in order to achieve the Reclamation Standards.

Transmission Line

1. Poles, conductors, and hardware associated with the 230 kV transmission line would be totally removed. The remaining holes would be filled with soil gathered from the immediate vicinity within the approved permanent right-of-way. Areas so disturbed will be treated by contouring and revegetation.
2. Areas to be reclaimed will be ripped, tilled, or disked on contour, as necessary and revegetated during final reclamation. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM and USFS.
3. The areas where the poles were removed would be raked to match the surrounding topography. Bladed areas would be re-contoured and revegetated with site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM and USFS

4. Refuse, junk, trash, tools, residual material, or personal property shall be removed from the transmission line right-of-way prior to restoration work.

Geothermal Plant, Well Pads, and Geothermal Pipeline

1. At the end of Project operations the wells would be plugged and abandoned as required by Nevada Division of Minerals (NDOM) regulations and BLM. Abandonment typically involves filling the well bore with clean, heavy abandonment mud and cemented at specific intervals to ensure that fluids would not move into different zones or aquifers. The top interval of the well bore is cemented to ground level to eliminate surface contamination to ground waters. The well head (and any other equipment) would then be removed, the casing cut off well below ground surface and the hole backfilled to the surface.
2. Areas to be reclaimed will be ripped, tilled, or disked on contour, as necessary. Pipeline reclamation would include placing fill in the trench, fill compaction, re-grading cut-and-fill slopes to restore the original contour, replacing topsoil and revegetation.
3. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM.
4. Disposition of waste, residual material, junk trash, personal property.
5. All other above-ground facilities and areas of surface disturbance associated with geothermal development would be removed and reclaimed.

Final Reclamation Procedures - Additional

1. Final reclamation actions will be completed within 6 months of well plugging, season and weather permitting.
2. Final reclamation plans shall include the reclamation of roads, drill pads and sumps back to original contour. Demolition and removal of facilities, pipelines, culverts, transmission lines, substation, and total site reclamation.
3. All disturbed areas, including roads, pipelines, pads, production facilities, and interim reclaimed areas will be re-graded to match the contour that existed prior to initial construction; or a contour that blends indistinguishably with the surrounding landscape. Salvaged topsoil will be spread evenly over the entire disturbed site to ensure successful revegetation. To help mitigate the contrast of re-contoured slopes, reclamation will include measures to 'feather' cleared lines of vegetation and redistribute in-situ vegetation, woody debris, and large rocks over re-contoured cut and fill slopes.
4. Water breaks and terracing will only be installed when absolutely necessary to prevent erosion of fill material. Water breaks and terracing are not permanent features and will be removed and reseeded when the rest of the site is successfully revegetated and stabilized.
5. If necessary to ensure timely revegetation, well pads and other areas will be fenced to BLM standards to exclude livestock grazing for the first two growing seasons or until the intended plant communities become firmly established, whichever comes later. Fencing will meet

standards found on page 18 of the Gold Book, 4th Edition, or will be fenced with operational electric fencing.

6. Final abandonment of pipelines and flowlines will involve flushing and properly disposing of any fluids in the lines. All surface lines and any lines that are buried close to the surface that may become exposed in the foreseeable future due to water or wind erosion, soil movement, or anticipated subsequent use, must be removed. Deeply buried lines may remain in place unless otherwise directed by the Mount Lewis Field Office Authorized Officer.
7. Refuse, junk, trash, tools, residual material, or personal property will be removed from the project area prior to restoration work.

Reclamation Performance Standards:

The following reclamation performance standards will be met:

1. Interim reclamation includes disturbed areas that may be re-disturbed during operations and will be re-disturbed at final reclamation to achieve restoration of the original land form and natural vegetative community.
2. Interim reclamation will be judged successful when the BLM Mount Lewis Field Office Authorized Officer determines that:
3. Disturbed areas not needed for active, long-term production operations or vehicle travel have been re-contoured.
4. Areas to be reclaimed will be ripped, tilled, or disked on contour, as necessary; protected from erosion; and revegetated with a self-sustaining, vigorous, diverse, native (or as otherwise approved) plant community sufficient to minimize visual impacts; provide forage; stabilize soils; and impede the invasion of noxious, invasive, and non-native weeds.
5. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded. Seed mixtures will be subject to the approval of the BLM.
6. Final reclamation includes disturbed areas where the original landform and a natural vegetative community have been restored.
7. Final reclamation will be judged successful when the BLM Mount Lewis Field Office Authorized Officer and or the USFS Authorized Officer determines that:

8. The original landform has been restored for all disturbed areas including well pads, production facilities, roads, pipelines, and utility corridors.
9. Reclaimed areas are ripped, tilled, or disked on contour, as necessary.

General Performance Standards:

A self-sustaining, vigorous, diverse, native (or otherwise approved) plant community is established on the site, with a density sufficient to control erosion and invasion by non-native plants and to reestablish wildlife habitat or forage production. At a minimum, the established plant community will consist of species included in the seed mix and/or desirable species occurring in the surrounding natural vegetation. Revegetation will include site appropriate seed mixtures for various ecological site types encountered. Disturbed areas will be reseeded with a diverse mix of perennial native or introduced plant species. Noxious weeds, invasive weeds, and non-native species seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201) will be excluded.

Specific Performance Standards:

1. No single species will account for more than 30% total vegetative composition unless it is evident at higher levels in the adjacent landscape. Permanent vegetative cover will be determined successful when the basal cover of desirable perennial species is at least 80% of the basal cover on adjacent or nearby undisturbed areas where vegetation is in a healthy condition; or 80% of the potential basal cover as defined in the National Resource Conservation Service Ecological Site(s) for the area. Plants must be resilient as evidenced by well-developed root systems and flowers.
2. Erosion features are equal to or less than surrounding area and erosion control is sufficient so that water naturally infiltrates into the soil and gullying, head-cutting, slumping, and deep or excessive rills (greater than 3 inches) are not observed.
3. The site is free of Noxious, invasive, and non-native seeds listed in the Nevada Designated Noxious Weed List (Nevada Administrative Code 555.010) or prohibited by the Federal Seed Act (7 CFR Part 201), field debris, equipment, and contaminated soil.
4. Invasive and non-native weeds are controlled.
5. Refuse, junk, trash, tools, residual material, or personal property is removed from the project area.

Reclamation Monitoring and Final Abandonment Approval

1. Reclaimed areas will be monitored annually. Actions will be taken to ensure that reclamation standards are met as quickly as reasonably practical and are maintained during the life of the project.
2. Reclamation monitoring will be documented in an annual reclamation report submitted to the BLM Mount Lewis Field Office and or USFS Authorized Officer by March 1 of each

calendar year. The report will document compliance with all aspects of the reclamation objectives and standards, identify whether the reclamation objectives and standards are likely to be achieved in the near future without additional actions, and identify actions that have been or will be taken to meet the objectives and standards. The report will also include acreage figures for: Initial Disturbed Acres; Successful Interim Reclaimed Acres; Successful Final Reclaimed Acres.

3. Annual reports will not be submitted for the project or portions thereof when approval by the Mount Lewis Field Office and or USFS Authorized Officer was obtained in writing as having achieved interim or final reclamation standards. Monitoring and reporting shall continue annually until interim or final reclamation is approved. Whenever 30% or more of a reclaimed area is re-disturbed, monitoring will be reinitiated.
4. The BLM Mount Lewis Field Office and or USFS Authorized Officer shall be informed when reclamation has been completed, appears to be successful, and the site is ready for final inspection.

Appendix C: Greater Sage-Grouse Monitoring and Mitigation Plan

APPENDIX C

**Greater Sage-Grouse Monitoring and Mitigation Plan
 for
 McGinness Hills Geothermal Project**

SOURCES OF CONCERN AND MITIGATION MEASURES

Greater sage-grouse (*Centrocercus urophasianus*) use of the Project area has been documented through field surveys (Great Basin Ecology 2010, Nevada Department of Wildlife [NDOW] 2011), observational records (Battle Mountain District Office 2010), and telemetry data collection (NDOW 2011). Suitable habitat exists throughout and around the Project Area for all seasonal uses (i.e. winter, lek/breeding/nesting, brood rearing, and fall) by sage-grouse. Predicted impacts to sage-grouse are from Project construction, existence and maintenance of the power plants, facilities, wells, and pipelines, increased human activity, and increased noise.

Immediate mitigation measures to reduce impacts to sage-grouse will be implemented when construction of permitted activities is started.

PROPOSED ACTION	KEY ISSUE FOR SAGE-GROUSE	MITIGATION MEASURE	RESULT
Transmission Line	<ul style="list-style-type: none"> • Increased predation risk due to increased presence of common ravens and other avian predators because of added perching and nesting sites 	<ul style="list-style-type: none"> • Implementation of Common Raven Monitoring, Mitigation, and Management Plan (Appendix D). This plan includes the following mitigation measures: <ul style="list-style-type: none"> ○ During all phases of the Project (i.e., construction and maintenance), all food, waste, and trash will be placed in closed containers. ○ Workers will not feed wildlife or leave food available for scavenging wildlife. ○ Road-killed wildlife on the Project site will be promptly removed and disposed of in closed containers to eliminate access to ravens. ○ Presence of road-killed wildlife will also be minimized by the Operator's 	<ul style="list-style-type: none"> • This will lead to a decreased presence of common ravens and other avian predators; therefore, decreased predation risk to sage-grouse.

PROPOSED ACTION	KEY ISSUE FOR SAGE-GROUSE	MITIGATION MEASURE	RESULT
		environmental protection measure of a <25 mph speed limit within the Project area. • The Operator has committed to implement the following environmental protection measures: perch and nest deterrents on all power poles; single pole power pole design (APLIC 2006).	
Geothermal Components	• Disturbance to sage-grouse during all seasons from visual and human activities	• Low output, motion sensor lights will be installed on facilities and must be shaded and pointed down. • Non-refractive, tinted windows will be installed in buildings.	• Reduced disturbance from visual and human activities will minimize effects to sage-grouse that could increase shifts away from the Project
Geothermal Construction and Maintenance Activities	• Disturbance to sage-grouse leks from noise, visual, and human activities	• Personnel shift changes will be timed and deliveries will be scheduled outside the lekking period (15 March – 15 May, 1 hour before sunrise – 10:00 AM). • Flow vent testing to the atmosphere will occur outside the lekking period (15 March – 15 May, 1 hour before sunrise – 10:00 AM). • Construction activities associated with well pads, pipelines, transmission lines, plant facilities, and roads will not be permitted within 2 miles of active leks (see Sage-Grouse Population Monitoring)	• Reduced impacts from noise, visual, and human activities will reduce the likelihood of lowered male lek attendance, shifting of lek locations, or loss of active lek locations.

PROPOSED ACTION	KEY ISSUE FOR SAGE-GROUSE	MITIGATION MEASURE	RESULT
		<p>during lekking period (15 March – 15 May, 1 hour before sunrise – 10:00 AM).</p> <ul style="list-style-type: none"> • Sound pressure levels must be below 49 dBA (MTSGWG 2005, NDGFD 2005, WYSGWG 2006) at active leks (see Sage-Grouse Population Monitoring section below) during the lekking period (15 March – 15 May, 1 hour before sunrise – 10:00 AM). 	
<p>Geothermal Components and Transmission Line</p>	<ul style="list-style-type: none"> • 217 acres of direct and/or long-term surface disturbance to category 1 sage-grouse habitat 	<ul style="list-style-type: none"> • The Operator will complete at a 3 to 1 ratio (NGSCT 2010) offsite habitat restoration to compensate for disturbance in sage-grouse category 1 habitat in the vicinity of the Project (Figure 1). The Operator will complete and fund all restoration projects to BLM specifications, following all BLM requirements for additional analyses. <ul style="list-style-type: none"> ○ At a 3 to 1 ratio, this equates to 651 acres (217 acres*3). ○ Restoration projects will be completed in R-1, R-2, R-3, or R-4 value habitats (NGSCT 2010). ○ Treatments may include the following: <ul style="list-style-type: none"> ➤ Sagebrush seedings into historic burned areas ➤ Interseeding or diversification of surrounding monotypic habitats ➤ Shrub thinning or green stripping to reduce fuels and fire risk to sage-grouse habitats with 	<ul style="list-style-type: none"> • This will improve offsite sage-grouse habitat to substitute and offset the habitat lost through Project development (IM 2008-204). • All seasonal habitats (e.g., lekking, nesting, brood-rearing, fall, winter) will benefit.

PROPOSED ACTION	KEY ISSUE FOR SAGE-GROUSE	MITIGATION MEASURE	RESULT
		subsequent successful seeding <ul style="list-style-type: none"> ➤ Weed treatment with subsequent successful seeding ➤ Pinyon-juniper reduction ➤ Improvements and protection of brood-rearing habitat 	
Geothermal Components and Transmission Line	<ul style="list-style-type: none"> • Risk to nesting sage-grouse due to construction activities 	<ul style="list-style-type: none"> • Nest “clearance” surveys will be conducted prior to any-surface disturbing activities. The area to be disturbed and a 0.5-mile radius buffer will be surveyed by a BLM-approved specialist to determine if nesting (15 March – 30 June) sage-grouse are present. If an active nest is located, a 0.5-mile radius buffer will be placed around the nest, and no surface-disturbing activities will occur until the nest is vacated. 	<ul style="list-style-type: none"> • This will decrease the chance of nest destruction or abandonment due to construction activities.
Geothermal Components	<ul style="list-style-type: none"> • 34 acres of lost brood-rearing habitat 	<ul style="list-style-type: none"> • The Operator will complete at a 3 to 1 ratio (NGSCT 2010) offsite treatments to protect and/or restore brood-rearing habitat in targeted locations (Figure 1). The Operator will complete and fund all restoration projects to BLM specifications, following all BLM requirements for additional analyses. <ul style="list-style-type: none"> ○ At a 3 to 1 ratio, this equates to 102 acres (34 acres*3). ○ Treatments may include fencing, plantings, and contouring landscape features. 	<ul style="list-style-type: none"> • This will improve offsite sage-grouse brood-rearing habitat to substitute and offset the habitat lost through Project development (IM 2008-204).

All mitigation measures outlined above are effective for the life of the Project unless subsequent monitoring deems them inadequate, and modification is deemed necessary. Subsequent monitoring will include sound pressure level monitoring (see below), sage-grouse population monitoring (see below), and common raven population monitoring (Appendix D). If through this monitoring, identified triggers/thresholds are met, additional or alternative mitigation measures will be required. Because time lags in sage-grouse response to development have been documented (Walker et al. 2007, Harju et al. 2010), all monitoring will be conducted for a minimum of 10 years, beginning when construction of permitted activities is started.

Sound Pressure Level Monitoring

The main goal for sound pressure level monitoring is to ensure sound pressure levels are below the 49 dBA requirement. By recording daily sound pressure levels and by monitoring sage-grouse activity at lek locations, a determination can be made as to the adequacy of the 49 dBA level to protect sage-grouse leks (see Sage-grouse Monitoring). Continuous daily sound pressure level monitoring will be conducted at the four leks closest to the Project using appropriate acoustical equipment and during the lekking season (15 March – 15 May) when leks are active (one hour before sunrise – 10:00 AM). To determine seasonal lek locations, at least one lek survey should be completed prior to placement of acoustical equipment. Equipment will be placed at the lek edge closest to the Project during the afternoon (12:00 – 16:00) to avoid disruption to lek activity. Reporting of sound pressure levels during the lekking season will be required a weekly basis.

Threshold:

If through sound pressure level monitoring, it is documented that sound pressure levels are exceeding the 49 dBA level requirement, the Operator must immediately implement future mitigation measures to reduce sound pressure levels below 49 dBA. Sound pressure level monitoring documenting successful reduction in dBA levels must demonstrated in one week.

Future mitigation measures to reach appropriate sound pressure levels include the following:

- **Employment of an acoustic engineer to identify and assess options to reduce noise from Project components**
- **Sound damping shelters or walls for pumps to reduce noise at geothermal facilities (e.g., plant facilities, wellheads, etc.)**
- **Reducing or changing the timing of vehicular traffic**
- **Installing poly slats on chain link fence around station to minimize visual and auditory impacts**

Sage-grouse Population Monitoring

Annual counts of male lek attendance will be conducted to determine if changes in attendance are occurring. It is assumed that reductions in male lek attendance below a certain level over a time period are attributable to Project activities.

Annual monitoring of sage-grouse leks will be required. This includes leks with both active and unknown status until leks with unknown status can be determined inactive or active. Lek surveys must be completed by BLM-approved specialist following standard lek survey protocol (Attachment 1) and ensure the following:

- Surveys must be conducted between 15 March and 15 May of each year (understanding that male lek attendance is typically greatest later in the season).
- Surveys must be conducted at least four times per lek during the lekking season with 8 days between lek visits.
- A center point of the lek activity should be captured during each monitoring visit to document any shift in the lek location over time. The center point will be collected with a GPS unit either after lek activity has dispersed or by projecting the location using a rangefinder and compass bearing.

To account and evaluate annual climatic variations that may be influencing male lek attendance, the results from each of the monitored leks should be compared to the closest trend leks outside the Project influence.

Monitoring movements of sage-grouse at the affected leks will be conducted through radiotelemetry efforts. This monitoring will provide additional information should shifts in lek locations occur after the Project has been initiated. All efforts regarding capture and telemetry will be the responsibility of the Operator through coordination with the BLM and NDOW. A minimum of 3 males and 1 female per targeted lek will need to be monitored per season for all affected leks. A minimum of 1 GPS radiocollar per lek will need to be utilized. If radiocollars continue to function annually, the same males as previous years may be monitored. Monitoring will occur at minimum once per week during the lekking season (15 March – 15 May), and once per month outside of the lekking season.

Threshold:

If through monitoring any of the following are detected and are evaluated to be a result from Project development regardless of results from dBA level monitoring, the Operator must take measures to mitigate these impacts.

- >50% decrease in the average three year lek attendance compared to the long-term average.
- >50% decrease in male lek attendance in two consecutive years of monitoring.

Future mitigation measure to eliminate decreased male lek attendance:

- **Reduction in sound pressure level to 40 dBA (Crompton 2005) at sage-grouse leks must be demonstrated during the next lekking season. This may be accomplished by adjusting to stricter levels the previously identified measures:**
 - **Employment of an acoustic engineer to identify and assess options to reduce noise from Project components**
 - **Sound damping shelters or walls for pumps to reduce noise at geothermal facilities (e.g., plant facilities, wellheads, etc.)**
 - **Reducing or changing the timing of vehicular traffic**
 - **Installing poly slats on chain link fence around station to minimize visual impacts**

Threshold:

If through monitoring any of the following are documented, the Operator will be required to mitigate the impact:

- A lek location shift of greater than 500 meters away from the Project as calculated using the surveyed center point from each year's lek monitoring and applying its associated 2-mile radius buffer.
- Loss of a lek.

Future mitigation measure to offset loss of a lek location:

- **The Operator will be required to fund additional habitat restoration projects to improve nesting habitat associated with active leks at a ratio of 3 to 1 for the acres lost around a 2-mile radius buffer of the lost lek site.**

Evaluation of Habitat Fragmentation between Sage-grouse Metapopulations

The Nevada Department of Wildlife has data to suggest that sage grouse in the Simpson Park Mountains and the Toiyabe Mountains both lek and nest in Grass Valley. As such, the leks in Grass Valley provide a conduit for gene flow across two mountain ranges, resulting in a high degree of connectivity and genetic variation within this portion of the PMU. Therefore, there is concern that the development of the Project in Grass Valley will 1) have a negative impact on male lek attendance, 2) reduce successful levels of mating and nesting, 3) act as a barrier to sage-grouse movement in Grass Valley. These potential impacts can combine to reduce connectivity and gene flow and have the potential to create two or more divergent populations. Molecular markers, such as allozymes or microsatellites, are an excellent tool to assess existing connectivity and variation, as well as divergence and loss of variation over time.

To address these concerns, the Operator will be required at the initiation (2011 or 2012) of the permitted Project to use established conservation genetics techniques to assess these impacts to sage-grouse from the Project. Tissue samples can be obtained from harvested sage-grouse with

little effort from NDOW, the Operator, or the BLM. Additional targeted sampling can be conducted in areas of interest or areas with low sample sizes, as necessary. Once an appropriate sample is obtained, DNA can be extracted and amplified at an NDOW-approved lab (NDOW Habitat Supervisor, 775-777-2300). Several standard analyses can be conducted to obtain a “snapshot” of existing gene flow, connectivity, and population structure (alleles per locus, expected and observed heterozygosity, F-statistics, hierarchical AMOVA, etc.). Results from these analyses are expected to show a highly panmictic population (characterized by high gene flow and low population structure) in Grass Valley. If a panmictic population is not detected through genetic sampling, no further action will be required of the Operator. If a panmictic population is detected, a future sampling effort would be undertaken 10-12 years later in order to detect divergence, as measured by loss of gene flow and connectivity and an increase in population structure. A similar sampling, lab, and analytical regime would be applied. The results would provide a new “snapshot” of existing gene flow, connectivity, and population structure. The results from both of these efforts could be used in a modeling effort to project future divergence and loss in genetic variation. If divergence is detected, then genetic variation within this population will have been lost, and a negative impact will have been imposed on this population. At that time, the following mitigation would be required:

- **If loss of habitat connectivity is documented through genetic sampling, mitigation for this loss may include:**
 - **Habitat restoration in areas identified through radiotelemetry or other monitoring as important corridors for sage-grouse movement**
 - **Retroactive burial of transmission line in sagebrush habitat if identified as a barrier to sage-grouse movement; additional analyses may be needed at that time**

REPORTING

An annual report documenting results from sound pressure level monitoring and sage-grouse lek and nest monitoring will be submitted to the BLM and NDOW no later than August 31. Reports should include the following:

- Sound pressure level monitoring results, including daily dBA levels during the outlined lekking season and times; location (UTM, NAD83) of acoustical equipment; any isolated incidents that may have increased dBA levels temporarily.
- Sage-grouse lek monitoring, including lek count data sheets, center point of sage-grouse leks (UTM, NAD83), isolated incidences disturbing sage-grouse lekking activities.
- Sage-grouse radiotelemetry results
- Sage-grouse nest sites (UTM, NAD83) found during “clearance” surveys or collected opportunistically through other monitoring activities.
- If future mitigation measures are implemented, identification and a detailed description of the mitigation measure and date of implementation will need to be reported.

Attachment 1 Greater Sage-Grouse Lek Count Protocol

NEVADA DEPARTMENT OF WILDLIFE INSTRUCTION FOR GREATER SAGE-GROUSE LEK COUNTS

- 1) Arrive at the lek at least 45 minutes before sunrise.
- 2) Do not approach any closer than about 200 meters from the lek. This will prevent disturbance of the birds while strutting.
- 3) Conduct all counts between 30 minutes before sunrise and 1.5 hours after sunrise.
- 4) If at all possible, observe the lek from inside your vehicle. Sage-grouse are less sensitive to the approach of a vehicle and its presence than they are to you.
- 5) Note your arrival time and departure time on the lek count form.
- 6) Obtain a minimum of three counts at 15-minute intervals of each lek on each date counted. A count of males, females, and unknown birds is always preferable to a flush count.
- 7) In the comments section of the form, please note the following information:
 - a. Wind direction and speed
 - b. Temperature in degrees Fahrenheit
 - c. Ground condition – dry, muddy, snow (depth in inches)
 - d. Cloud cover in the following manner:
 - i. Clear
 - ii. Partly cloudy (less than 25% cover)
 - iii. Scattered (more than 25% but scattered horizon to horizon)
 - iv. Cloudy (more than 50% cover)
 - v. Foggy
- 8) Note the presence of predators by species, time and activity: Example – golden eagle @ 6:45 a.m. flying over lek; coyote chasing grouse at 8:15 a.m.

Be sure to use the common name of the lek



NEVADA DEPARTMENT OF WILDLIFE
LEK COUNT DATA COLLECTION FORM



LEK ATTRIBUTES

LEK ID: _____ LEK NAME: _____
 LEK COMPLEX: _____ TREND LEK: _____
 PMU NAME: _____ PLANNING UNIT: _____

NDOW REGION: _____ UNIT: _____ BLM DISTRICT: _____
 COUNTY: _____ RANGE/ALLEY: _____ LEK STATUS: _____

EASTING _____ NORTHING _____
 GPS COORD (NAD83): _____ NEW/UPDATED:

SURVEY ATTRIBUTES

OBSERVER NAME(S): _____ SURVEY METHOD: _____
 TIME OF ARRIVAL: _____ SUNRISE: _____
 DATE OF SURVEY: _____ TIME OF SURVEY: _____

WEATHER CONDITIONS: _____

TEMPERATURE: _____
 WIND SPEED: _____ DIRECTION: _____

OTHER ANIMALS AT LEK: _____

LEK COUNT DATA

	COUNT 1	COUNT 2	COUNT 3	COUNT 4
MALES:	_____	_____	_____	_____
FEMALES:	_____	_____	_____	_____
UNKNOWN:	_____	_____	_____	_____

HIGH COUNT MALES: _____ FEMALES: _____ UNKNOWN: _____

REMARKS:

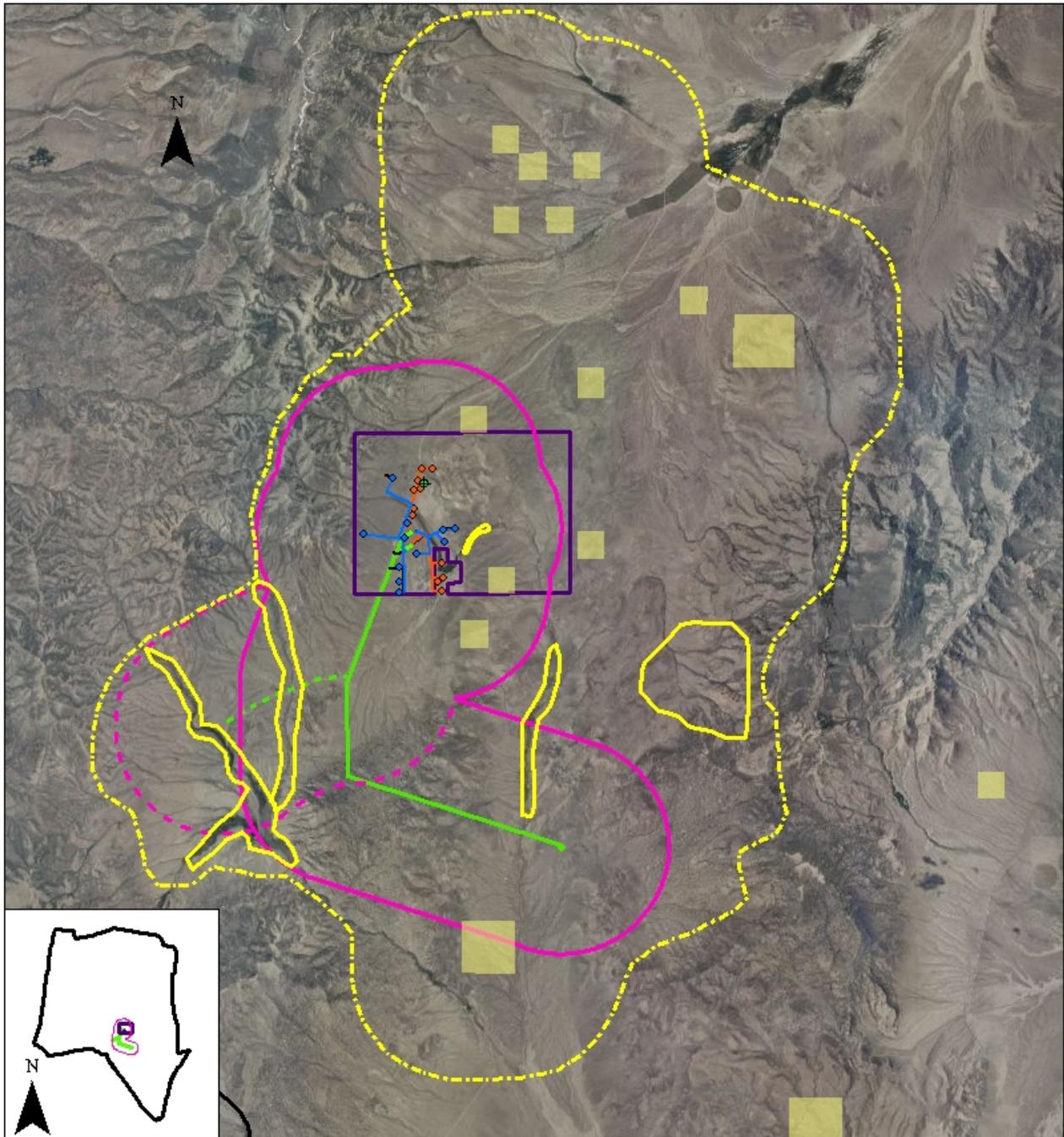
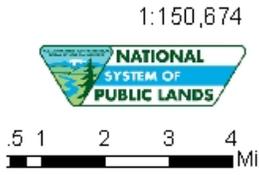


Figure 1: Sites for 3:1 mitigation for impacts to water resources ($34 \times 3 = 102$ acres), and area for 3:1 mitigation for impacts to sage-grouse habitat ($217 \times 3 = 653$ acres).

- | | |
|-------------------------------------|--|
| Habitat Restoration Mitigation Area | Monitoring Well |
| Water Resource Mitigation Site | Proposed Injection Pipeline and Wells |
| Active Lek Area | Proposed Production Pipeline and Wells |
| Toiyabe PMU | Proposed Access Road |
| Proposed Project 2-mile Buffer | Power Plant |
| Alternative Project 2-mile Buffer | Proposed Power Line |
| Geothermal Unit Area | Alternative Power Line |



*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.

The data shown on the map uses the Universal Transmencator (Zone 11N) Coordinate system and uses the NAD83 projection. Map date: 03/25/2011.

United States Department of the Interior
Bureau of Land Management
Mount Lewis Field Office
50 Bastian Road
Battle Mountain, NV 89820

Appendix D: Common Raven Monitoring Plan

APPENDIX D

Common Raven Monitoring, Mitigation, and Management Plan for McGinness Hills Geothermal Project

Greater sage-grouse (*Centrocercus urophasianus*) use of the Project area has been documented through field surveys (GBE 2010, Nevada Department of Wildlife [NDOW] 2011), observational records (Nevada Natural Heritage Program XX), and telemetry data collection (NDOW 2011). One identified source of risk to sage-grouse from Project development is increased occurrence of common ravens (*Corvus corax*; hereafter raven) utilizing the Project vicinity. Research indicates that increased raven numbers are common near anthropogenic structures (Knight and Yawashima 1993, Webb et al. 2004). Such an increase is expected with the McGinness Hills Geothermal Project development and would likely have detrimental impacts to greater sage-grouse (Coates and Delehanty 2008, Bui et al. 2010).

By implementing monitoring, mitigation, and control measures, impacts to greater sage-grouse from increased occurrence of common ravens will be minimized.

SOURCES OF CONCERN AND MANAGEMENT PRACTICES

Several features associated with development have the potential to attract common ravens to the Project area. The primary focus of management practices will be to reduce human-provided subsidies, including food and perching/roosting/nesting sites.

Ravens are considered scavengers and will opportunistically utilize waste produced at anthropogenic sites as food resources (Webb et al. 2004, Coates et al. 2007). The following procedures will be implemented by the Operator to reduce raven food attractants near the Project.

Immediate Mitigation Measures:

- **During all phases of the Project (i.e., construction and operations), all food, waste, and trash will be placed in closed containers.**
- **Workers will not feed wildlife or leave food available for scavenging wildlife.**
- **Road-killed wildlife on the Project site will be promptly removed and disposed of in closed containers to eliminate access to ravens.**
- **Presence of road-killed wildlife will also be minimized by the Operator's environmental protection measure of a <25 mph speed limit within the Project area.**

By implementing these mitigation measures, food subsidies produced by humans will be reduced, which will likely minimize raven presence near the Project.

New perching, roosting, and nesting sites would primarily occur along the 9.01 miles of transmission line and power poles. The Operator has already minimized these effects through their proposed environmental protection measures. These include utilizing a single pole design along the entirety of the transmission line, which will decrease potential perching, roosting, and nesting sites for ravens. In addition, the Operator will install a cone (Kaddas Enterprises type KE1140 or equal) on each power pole to deter raven perching, roosting, and nesting sites.

Additional perching, roosting, and nesting sites may also occur on well pads and production plant sites. These sites include wellheads, fencing, building roofs, and other structures. Monitoring of raven occurrence at these sites will identify the extent to which structures are being utilized (see Monitoring Plan). Additional mitigation measures may be required if increases or concentrated raven numbers are identified (see Monitoring Plan).

COMMON RAVEN MONITORING PLAN

A common raven monitoring plan will be implemented to assess changes in raven numbers and identify areas of increased raven use due to Project development and human activities associated with the Project.

- Resumés and experience of potential biological monitors will be submitted to and approved by the BLM before monitoring begins.
- During construction and year one and two of operations, weekly monitoring for raven nests will be completed from 01 March – 31 July at the production plants, well pads, and along the transmission line.
- Basic information that will be recorded for each monitoring session will include: 1) date and time of day, 2) observer, 3) location (NAD 83 UTM), 4) activity (i.e., perching/nesting, flying, ground, 5) any other avian mortalities associated with the transmission line (e.g., raptors, sage-grouse); if ravens are located perching or nesting, note what structure is being utilized)
- During weekly monitoring, all unoccupied nests and nesting material will be removed from Project structures as located. If eggs are present in nests, a location and description (as described above) will be recorded, but the nest will be left intact until further mitigation is deemed necessary (see Future Mitigation Measures).
- A monthly report summarizing findings will be submitted to the BLM, United States Fish and Wildlife Service (USFWS), and NDOW.

Through this monitoring plan, the Operator will coordinate with the BLM, USFWS, and NDOW to determine the effectiveness and adequacy of initial mitigation measures as determined by raven trends documented in monthly reports. If initial mitigation measures are deemed adequate over the 3-year period, monitoring frequency may be reduced or eliminated as agreed upon by the BLM, USFWS, and NDOW. If initial mitigation measures are deemed inadequate because sustained increases in raven occurrences are documented during the raven and sage-grouse

breeding seasons, or if a trend in raptor and sage-grouse mortalities is detected in associated with the transmission line, the following measures may also need to be implemented:

Future Mitigation Measures:

- **Additional perch deterrents on Project structures will be required if monitoring identifies areas where raven perching, roosting, or nesting is concentrated or regularly occurring. Specific details on type of deterrent to be used will be determined and coordinated by the BLM, USFWS, and NDOW based on the Project structure.**
- **Hazing using auditory and visual deterrents may be useful in areas of concentrated raven presence are identified. Methods may include visual deterrents, such as streamers or flagging, and auditory deterrents, such as gas cannons. A variety of methods would need to be implemented and frequently changed to increase efficacy of deterrents.**
- **Lethal measures to reduce raven numbers in the Project area may also be needed to reduce raven presence around the Project. This would require the Operator to acquire a common raven depredation permit through United States Department of Wildlife Services (WS) and USFWS. Primary depredation activities would focus on removal of active raven nests (those with eggs or chicks) and raven management using chicken egg baits treated with CPTH (3-chloro-p-toluidine hydrochloride) or another approved compound. Details regarding this depredation permit would be finalized during the permitting process by WS and USFWS.**
- **Retroactive installation of flight diverters along the transmission line to reduce the likelihood of avian collisions.**

By implementing a suite of immediate mitigation measures and, as identified through monitoring, future mitigation measures, raven presence around the Project area should be reduced and minimized, which subsequently will reduce raven impacts to sage-grouse utilizing the habitat.

Appendix E: Transmission Line Stipulations

May 17, 2011

N-88978 & N-88979

EXHIBIT B

STIPULATIONS

1.0 General Stipulations:

1. In case of change of address, the Holder shall immediately notify the BLM Authorized Officer.
2. In the event that the public land underlying the rights-of-way (N-88978 and N-88979) encompassed in this grant, or a portion thereof, is conveyed out of Federal ownership and administration of the ROW or the land underlying the ROW is not being reserved to the United States in the patent/deed and/or the ROW is not within a ROW corridor being reserved to the United States in the patent/deed, the United States waives any right it has to administer the right-of-way, or portion thereof, within the conveyed land under Federal laws, statutes, and regulations, including the regulations at 43 CFR Part [2800][2880], including any rights to have the Holder apply to BLM for amendments, modifications, or assignments and for BLM to approve or recognize such amendments, modifications, or assignments. At the time of conveyance, the patentee/grantee, and their successors and assigns, shall succeed to the interests of the United States in all matters relating to the right-of-way, or portion thereof, within the conveyed land and shall be subject to applicable State and local government laws, statutes, and ordinances. After conveyance, any disputes concerning compliance with the use and the terms and conditions of the ROW shall be considered a civil matter between the patentee/grantee and the ROW Holder.
3. This grant is subject to all valid rights existing on the effective date of this grant.
4. Holder shall maintain a copy of this Grant and stipulations and Plan of Development on the construction site at all times.
5. All reports, notices or advisories required under the terms, conditions and stipulations of this Right-of-Way Grant are to be made to the BLM's Authorized Officer as follows:

Field Manager
Mount Lewis Field Office, Bureau of Land Management
Battle Mountain District Office
50 Bastian Rd.
Battle Mountain, NV 89820
(775) 635-4000
6. All design, material, and construction, operation, maintenance, and termination practices shall be in accordance with safe and proven engineering practices.
7. The Holder shall conduct all activities associated with the construction, operation, and termination of the right-of-way within the authorized limits of the right-of-way.
8. Roads and Construction sites shall be maintained in a sanitary condition at all times; waste materials shall be disposed of promptly at an appropriate waste disposal site. "Waste" means all discarded matter including, but not limited to: human waste, trash, garbage, vegetation, refuse, oil drums, petroleum products, ashes, and equipment.

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9. The Holder shall comply with all applicable Federal, State, and local laws and regulations, existing or hereafter enacted or promulgated, with regard to any hazardous material, as defined in this paragraph, that will be used, produced, transported or stored on or within the R/W or any of the R/W facilities, or used in the construction, operation, maintenance or termination of the R/W or any of its facilities. "Hazardous material" means any substance, pollutant, or contaminant that is listed as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 43 U.S.C. 9601 et seq., and its regulations. The definition of hazardous substances under CERCLA includes any "hazardous waste" as defined in the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 U.S.C. 6901 et seq., and its regulations. The term hazardous materials also includes any nuclear or byproduct material as defined by the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2011 et seq. The term does not include petroleum, including crude oil or any fraction thereof that is not otherwise specifically listed or designated as a hazardous substance under CERCLA section 101 (14), 42 U.S.C. 9601 (14), nor does the term include natural gas.
10. The Holder of Right-of-Way N-88978 and N-88979 agrees to indemnify the United States against any liability arising from the release of any hazardous substance or hazardous waste (as these terms are defined in the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. 9601, et. seq. or the Resource Conservation and Recovery Act (RCRA) of 1976, as amended, 42 U.S.C. 6901 et seq.) on the right-of-way (unless the release or threatened release is wholly unrelated to the right-of-way Holder's activity on the right-of-way). This agreement applies without regard to whether a release is caused by the Holder, its agent, or unrelated third parties.
11. The Holder shall construct, operate, and maintain the facilities, improvements, and structures within this right-of-way in strict conformity with the Plan of Development that accompanied the Application and was approved and made part of the grant. Any relocation, additional construction, or use that is not in accord with the approved plan of development, shall not be initiated without the prior written approval of the Authorized Officer. A copy of the complete right-of-way grant, including all stipulations and approved plan of development, shall be made available on the right-of-way during construction, operation, and termination to the Authorized Officer. Noncompliance with the above will be grounds for immediate temporary suspension of activities if it constitutes a threat to public health and safety or the environment.
12. The Holder shall protect all survey monuments found within the right-of-way. Survey monuments include, but are not limited to, General Land Office and Bureau of Land Management Cadastral Survey Corners, reference corners, witness points, U.S. Coastal and Geodetic benchmarks and triangulation stations, military control monuments, and recognizable civil (both public and private) survey monuments. In the event of obliteration or disturbance of any of the above, the Holder shall immediately report the incident, in writing, to the Authorized Officer and the respective installing authority if known. Where General Land Office or Bureau of Land Management right-of-way monuments or references are obliterated during operations, the Holder shall secure the services of a registered land surveyor or a Bureau cadastral surveyor to restore the disturbed monuments and references using surveying procedures found in the Manual of Surveying Instructions for the Survey of the Public Lands in the United States, latest edition. The Holder shall record such survey in the appropriate county and send a copy to the Authorized Officer. If the Bureau cadastral surveyors or other Federal surveyors are used to restore the disturbed survey monument, the Holder shall be responsible for the survey cost.
13. Holder shall limit excavation to the areas of construction. No borrow areas for fill material

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will be permitted on the site. All off-site borrow areas on public lands must be approved in writing by the Authorized Officer in advance of excavation. All waste material resulting from construction or use of the site by Holder shall be removed from the site. All waste disposal sites on public land must be approved in writing by the Authorized Officer in advance of use.

14. The Holder shall mark the exterior boundaries of the right-of-way with a stake and/or lath at 50-foot intervals. The intervals may be varied at the time of staking at the discretion of the Authorized Officer. The tops of the stakes and/or laths will be painted and the laths flagged in a distinctive color as determined by the Holder. The survey station numbers will be marked on the boundary stakes and/or laths at the entrance to and the exit from public land. Holder shall maintain all boundary stakes and/or laths in place until final cleanup and restoration is completed and approved by the Authorized Officer. The stakes and/or laths will then be removed at the direction of the Authorized Officer.
15. Use of pesticides shall comply with the applicable Federal and state laws. Pesticides shall be used only in accordance with their registered uses and within limitations imposed by the Secretary of the Interior. Prior to the use of pesticides, the Holder shall obtain from the Authorized Officer written approval of a plan showing the type and quantity of material to be used, pest(s) to be controlled, method of application, location of storage and disposal of containers, and any other information deemed necessary by the Authorized Officer. Emergency use of pesticides shall be approved in writing by the Authorized Officer prior to such use.
16. During the period of May 1 through October 1 of each year, Holder should consider using spark arresters on vehicles and equipment in the project area, due to the potential for fire ignition from project related activities. This includes emission of hot carbon particles from diesel powered equipment, improperly equipped or poorly operating exhaust systems on gas powered vehicles and direct contact of wildland fuels with catalytic converters. Individuals, groups, businesses or corporations found responsible for the ignition of a wild fire may be held liable for the costs associated with the suppression of that fire.
17. The Holder shall permit free and unrestricted public access to and upon the R/W for all lawful purposes, except for those specific areas designated as restricted by the Authorized Officer to protect the public, wildlife, livestock, or facilities constructed within the R/W.
18. Within 90 days of construction completion, the Holder shall provide the Authorized Officer with data in a format compatible with the Bureau's Arc-Info Geographic Information System to accurately locate and identify the right-of-way:

Acceptable data formats are:

- Corrected Global Positioning System files with sub-meter accuracy or better, in UTM NAD 83; Zone 11;
 - ARCGIS export files on a CD ROM, shapefile, geodatabase.
Data may be submitted in any of the following formats:
 - ARCGIS interchange, shapefile or geodatabase format.
 - CD ROM in compressed or uncompressed format.
19. The Holder shall comply with all applicable Federal, State, and local laws and regulations existing or thereafter enacted or promulgated.

20. In accordance with Federal regulations in 43 CFR 2807.21 any proposed transfer of any right or interest in the right-of-way grant shall be filed with the BLM Authorized Officer. An application for assignment shall be accompanied by a showing of qualifications of the Assignee. The assignment shall be supported by a stipulation that the Assignee agrees to comply with and to bound by the terms and conditions of the grant to be assigned. No assignment shall be recognized unless and until it is approved in writing by the Authorized Officer.

2.0 Construction Stipulations:

21. The Authorized Officer may suspend or terminate in whole, or in part, any notice to proceed which has been issued when, in his judgment, unforeseen conditions arise which result in the approved terms and conditions being inadequate to protect the public health and safety or to protect the environment.
22. The Holder shall not initiate any construction or other surface disturbing activities on the right-of-way without the prior written authorization of the Authorized Officer. Such authorization shall be a written notice to proceed issued by the Authorized Officer. Any notice to proceed shall authorize construction or use only as therein expressly stated and only for the particular location or use therein described.
23. The Holder shall designate a representative(s) who shall have the authority to act upon and to implement instructions from the Authorized Officer. The Holder's representative shall be available for communication with the Authorized Officer within a reasonable time when construction or other surface disturbing activities are underway.
24. Holder will hire an independent third-party Compliance Inspection Contractor, approved by the Authorized Officer, to insure compliance with the terms, conditions and stipulations of this Grant, N-88978 and N-88979. All questions or concerns regarding compliance with the terms, conditions, and stipulations of this Grant shall be directed to the BLM Authorized Officer or Project Manager.
25. Overnight parking and storage of equipment and materials, including staging or stockpiling of same, shall be within 1) previously disturbed areas, 2) areas cleared by biologist and 3) areas inventoried and cleared for cultural resources.
26. Holder shall remove only the minimum amount of vegetation necessary for the construction of structures and facilities. Where possible and if needed, topsoil shall be conserved during excavation and reused as cover on disturbed areas to facilitate regrowth of vegetation.
27. The Holder shall be responsible for weed control on disturbed areas within the limits of the right-of-way. The Holder is responsible for consultation with the Authorized Officer and/or local authorities for acceptable weed control methods (within limits imposed in the grant stipulations).
28. Future modifications, construction of improvements, or major maintenance operations involving disturbance of the land, shall not occur until plans for such actions have been submitted and approved in writing by the Authorized Officer. Any proposals involving new surface disturbance shall require a cultural inventory and may require completion of an environmental assessment.
29. The Holder shall prevent any activities which may cause erosion. Where erosion has resulted, the Holder shall re-vegetate and re-habilitate the location. The Holder is responsible for consultation with the Authorized Officer for an acceptable proposal.

30. Ninety days prior to termination of the right-of-way, the Holder shall contact the Authorized Officer to arrange a joint inspection of the right-of-way. This inspection will be held to agree to an acceptable termination (and rehabilitation) plan. This plan shall include, but is not limited to, removal of facilities, drainage structures, or surface material, recontouring, topsoiling, or seeding. The Authorized Officer must approve the plan in writing prior to the Holder's commencement of any termination activities.

3.0 Wildlife Stipulations:

31. Clearance surveys by a BLM-approved specialist in coordination with the USFS Botanist using agency-approved protocols will be conducted for special status and sensitive plant species in species-specific suitable habitat within the Project Area prior to surface-disturbing activities. Surveys will be completed at the appropriate time of year to best detect and identify target species. If target species are identified in areas subject to direct and/or indirect impacts from surface-disturbing activities, the following actions will be taken:
 - a. If avoidance of special status and/or sensitive plants is practicable, the occurrences will be buffered, and the buffer perimeter will be visibly marked (e.g., with staking, flagging, or fencing) in the field and identified on construction drawings. Direct impacts associated with construction will avoid identified areas. Buffer distances will be determined by the BLM Wildlife Biologist and (if on USFS land) the USFS Botanist and implemented by a BLM-approved specialist.
 - b. If indirect impacts are expected to special status and/or sensitive plants, BLM Wildlife Biologist and (if on USFS land) the USFS Botanist will develop practicable measures to avoid or minimize such impacts. Measures will be implemented by a BLM-approved specialist. Some examples of potential minimization measures include, but are not limited to, increasing the buffer around plants, installing silt fencing or other erosion control devices, slightly shifting minor project features, etc.
 - c. If target species cannot be avoided, potential mitigation measures include, but are not limited to, the following: seed collection from plants to be impacted, followed by reseeding; seed collection from plants to be impacted, followed by propagation and outplanting; and enhancement of habitat for non-impacted portions of impacted populations. Measures would be implemented by a BLM-approved specialist with oversight of by the BLM Wildlife Biologist and (if on USFS land) the USFS Botanist. All reseeding/outplanting/enhancement will be completed in suitable habitat within the Project CESA.
32. All ground-disturbing activities will be conducted outside the raptor nesting season (01 March – 31 July). If ground-disturbing activities cannot be avoided during this time period, pre-construction nest surveys will be conducted by a BLM-approved specialist with the following guidelines:
 - a. Surveys will cover all potential nesting habitat, including previously documented nest sites, for northern goshawks, ferruginous hawks (known nest location: T20N R45E Section 32), and short-eared owls in and within 0.5-mile area to be disturbed.
 - b. If active nests are detected, a 0.5-mile no-disturbance buffer zone will be established. Nest locations will be mapped and submitted to the BLM and/or USFWS as needed.
 - c. If nests of other species identified in the EA as special status or sensitive are found, a 0.5-mile no-disturbance buffer will be established. Nest locations will be mapped and submitted to the BLM and/or USFWS as needed.

33. All ground-disturbing activities will be conducted outside the migratory bird nesting season (15 March – 31 July). If ground-disturbing activities cannot be avoided during this time period, pre-construction nest surveys will be conducted by a BLM-approved specialist with the following guidelines:
 - a. Surveys will cover all potential nesting habitat in and within 250 feet of the area to be disturbed.
 - b. Surveys must be conducted between sunrise and 3 hours post-sunrise when birds are most active.
 - c. Surface-disturbing activity must be conducted within 10 days of surveys or additional surveys may be required to “re-clear” the area.
 - d. If active nests are detected, a species-specific no-disturbance buffer zone (as determined by USFWS Reno [Fish and Wildlife Biologist, 775-861-6300]) will be established. Nest locations will be mapped and submitted to the BLM as needed.
34. Mitigation Measures for sage-grouse (from Sage-Grouse Monitoring and Mitigation Plan):
 - a. Construction activities associated with well pads, pipelines, transmission lines, plant facilities, and roads will not be permitted within 2 miles of active leks (see Sage-Grouse Population Monitoring) during lekking period (15 March – 15 May, 1 hour before sunrise – 10:00 AM)
 - b. Implementation of Operator environmental protection measures: perch and nest deterrents on all power poles; single pole power pole design (APLIC 2006)
35. To help reduce sage-grouse mortality risks and predation to sage-grouse nests, the Common Raven Monitoring, Mitigation, and Management Plan, developed for the McGinness Hills Geothermal Development Project, will be implemented.

4.0 Cultural Stipulations:

36. Any cultural or paleontological resource (historic or prehistoric site or object) or Native American human remains, funerary item, sacred object, or objects of cultural patrimony discovered by the permit Holder, or any person working on their behalf, during the course of activities on Federal land, shall be immediately reported to the Authorized Officer by telephone, with written confirmation. The permit Holder shall suspend all operations in the immediate area of such discovery and protect it until an evaluation of the discovery will be made by the Authorized Officer.

For cultural resources other than Native American human remains, funerary item, sacred object, or objects of cultural patrimony, this evaluation will determine the significance of the discovery and what mitigation measures are necessary to allow activities to proceed. The Holder is responsible for the cost of evaluation and mitigation. Any decision on treatment and/or mitigation will be made by the Authorized Officer after consulting with the permit Holder. Operations may resume only upon written authorization to proceed from the Authorized Officer.

5.0 Bonding Stipulations:

37. A Performance and Reclamation bond, in an amount determined by the Authorized Officer, shall be obtained by the holder to ensure compliance with the terms and conditions of this instrument. The Authorized Officer will require that the holder submit a Reclamation Cost Estimate for review and to

assist the Authorized Officer in determining the bond amount. The Holder shall provide the Authorized Officer proof that a bond in the required amount has been obtained prior to receiving a Notice to Proceed or at such earlier date as may be specified by the Authorized Officer. The amount of the bond will be limited to the anticipated liabilities associated with the activities approved by the Notice to Proceed. If the Notice to Proceed is limited to only an initial phase of development or activity, the bond amount will be limited to that phase or activity. The bond amount would increase with the issuance of a Notice to Proceed for future phases of development or additional activities. The bond must be maintained in effect until removal of improvements and restoration of the right-of-way authorization has been accepted by the Authorized Officer. Acceptable bond instruments include cash, cashier's or certified check, certificate or book entry deposits, negotiable U.S. Treasury securities (notes, bills, or bonds) equal in value to the bond amount, or surety bonds from the approved list of sureties (U.S. Treasury Circular 570) payable to the Bureau of Land Management. The Authorized Officer will accept an irrevocable letter of credit as an acceptable form of bond. Irrevocable letters of credit must be payable to the Bureau of Land Management and issued by financial institutions that have the authority to issue letters of credit and whose operations are regulated and examined by a federal agency. The Bureau of Land Management will not accept a corporate guarantee as an acceptable form of bond. The Authorized Officer will review the bond on an annual basis to ensure adequacy of the bond amount. The bond will also be reviewed at the time of any assignment, modification, or renewal of this instrument. The Authorized Officer may increase or decrease the bond amount at any time during the term of the right-of-way authorization, consistent with the regulations.

38. The Holder agrees that any bond held as security for Holder's performance of the terms and conditions of this instrument may, upon failure on the Holder's part to fulfill any of the requirements herein set forth or made a part hereof, be retained by the United States to be applied as far as may be needed to the satisfaction of the Holder's obligations assumed hereunder, without prejudice whatsoever to any other rights and remedies of the United States.
39. Should the bond delivered under this instrument become unsatisfactory to the Authorized Officer, the Holder shall, within 30 calendar days of demand, furnish a new bond. In the event of noncompliance with the terms and conditions of this instrument, the BLM will notify the Holder that the surety or other bond instrument is subject to forfeiture and will allow the Holder 15 calendar days to respond before action is taken to forfeit the bond and suspend or terminate the authorization.
8. The Holder shall provide a bond in the amount of \$-----00 to be maintained until restoration of disturbed areas and other requirements relative to the construction phase of the project have been accepted by the Authorized Officer. Upon completion, or partial completion of these construction related requirements, the Authorized Officer may terminate or reduce the amount of the bond.