

APPENDIX A

BIOLOGICAL STUDY

Biological Resources Report for the Carson Lake Geothermal Exploration Project

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Prepared By:

Ty Brookhart
MHA Environmental Consulting, an RMT, Inc. Business
4 West Fourth Ave. Suite 303
San Mateo, CA 94402
(650) 373-1200

Prepared For:

Ormat Nevada Inc.
6225 Neil Rd # 300
Reno, NV 89511

Introduction

This report describes MHA|RMT's survey of the biological resources in the Carson Lake Geothermal Project area where geothermal exploration is being proposed by Ormat Nevada, Inc. (Ormat) on land managed by the United States (U.S.) Department of Interior (DOI) Bureau of Reclamation (BOR), and U.S. Department of Defense (DOD) at Fallon Naval Air Station (NAS), with subsurface mineral rights managed by the Bureau of Land Management (BLM). This report describes the existing conditions and provides an evaluation of the potential impacts to biological resources as a result of the proposed actions.

Background and Purpose

PROPOSED PROJECT

Ormat proposes to conduct the Carson Lake Geothermal Exploration Project (Project), a geothermal resources exploration program of well pad construction, geothermal well drilling, and well testing for reservoir evaluation. The Project is proposed to be located on public lands leased and under contract to Ormat for geothermal resource development in Churchill County, Nevada. The proposed project area is approximately seven miles southeast of Fallon, Nevada (Figure 1).

The area to be explored, the Carson Lake Project Area, is comprised of Federal geothermal leases NVN-079104, NVN-079105, NVN-079106 and NVN-079107 leased to Ormat, pursuant to the Geothermal Steam Act of 1970. The leases include approximately 13 sections in Townships T17N R29E, T17N R30E, and T18N R30E, Mount Diablo Baseline and Meridian (MDB&M) (see Figure 2). Exploration would occur within the Salt Wells Known Geothermal Resources Area (KGRA) Noncompetitive Lease area. The BLM administers the leases for these areas.

Ormat proposes to construct up to 11 well pads, and may drill up to three wells per pad. In addition, Ormat proposes to drill at an existing well pad located on DOD lands. The well pad locations are shown in Figure 1 and are designated Pads A through K. The corresponding Kettleman well numbers are shown in parentheses.

The Project would include:

- Constructing new access roads (approximately 2.5 miles)
- Upgrading existing access roads
- Constructing up to eleven well pads
- Drilling and completing exploration wells
- Flow testing wells to determine commercial potential
- Analyzing well data

The Project includes constructing drill pads at up to 11 sites, drilling and completing wells to a total depth of up to 9500 feet from each drill pad, and flow-testing each completed well to obtain samples of the geothermal fluid and production information from the geothermal reservoir. Ormat may need to drill up to three wells per site in order to locate a successful well (capable of commercial production). Ormat may conduct directional drilling at each site based on the location and extent of geothermal resources in proximity to the well site. Directional drilling at sites A, G, and J would likely result in a deep bottom hole located under BLM lease areas. Ormat Geothermal Drilling Permit applications would be submitted to the BLM for the drilling of these wells, pursuant to 43 CFR 3261.11.

PURPOSE OF THE SURVEY

The National Environmental Policy Act (NEPA) requires all federal agencies to consider the environmental impact of their proposed actions, and to consider reasonable alternatives to those actions. Ormat proposes geothermal exploration on federal lands (DOD and DOI) and holds federal leases administered by the BLM. The DOD, DOI, and BLM must all consider the environmental impact of geothermal exploration as proposed by Ormat under NEPA. To meet NEPA requirements a detailed statement known as an Environmental Assessment (EA) must be prepared when impacts resulting from the project are considered less than significant. An Environmental Impact Statement (EIS) must be prepared when the potential impacts of the proposed project are considered to be significant. The NEPA document must contain a biological resources component that analyzes potential impacts to flora and fauna. This biological survey and assessment have been completed to describe biological resources at the proposed site and analyze the potential impacts to biological resources that could result from the project as required.

Methodology

REVIEW OF EXISTING DATA

MHA|RMT reviewed the following data prior to the site visit to obtain general information on habitat types and quality, vegetative communities, and potential for special status species occurrences within the project area:

- United States Fish and Wildlife Service (USFWS) species list (USFWS 2007)
- Recent (2006) Aerial Photos
- Salt Wells Geothermal Exploration EA (BLM 2005)
- NAS Fallon Geothermal Energy Development Programmatic EIR and Appendices (US Navy 1991)
- Nevada Natural Heritage Program Database (NNHP) 2007
- Other pertinent publications (as listed in the references section of this report)

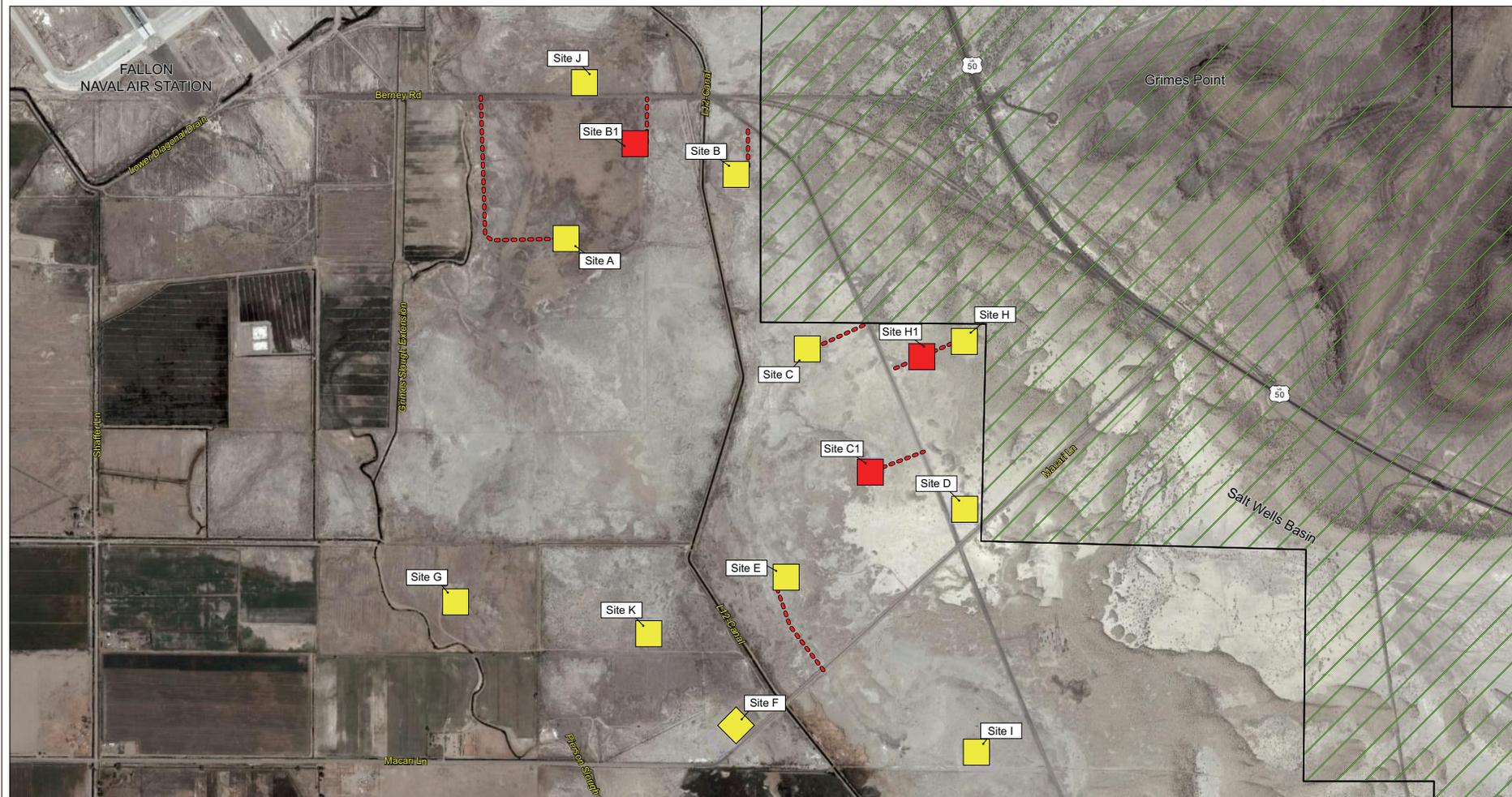
Review of the above sources provided a preliminary assessment and description of the habitat types within the proposed project area. The proposed project area is within the Salt Wells Basin. The habitat in the project area provides moderate quality habitat for wildlife.

Subsequent to the site visit, data from the following was obtained and reviewed:

- BLM Sensitive Species List for CCFO Contractors (2007)
- www.natureserve.org (a USFWS accessory program)
- Nevada Wildlife Action Plan (2006)
- Nevada Partners in Flight (1999)

Prior to the site visit, MHA|RMT contacted the Nevada Natural Heritage Program and requested that a database (NNHP 2007) search be conducted to identify special status plant and wildlife species known to occur in the project area. The NNHP conducted a geographic GIS database search for special status species within a 5 mile radius of the project. The United States Fish and Wildlife Service was also contacted for a list of federally listed threatened and endangered species in accordance with Section 7 of the Endangered Species Act (ESA). MHA|RMT reviewed the habitat requirements, physical description, distribution, and other pertinent information for each special status species that was identified. Special status species were judged to occur on the project site if there were locality records, either historic or recent, indicating its presence. A special status species was judged to have some potential for occurring on the project site if it is known to occur in the same general area, in a similar habitat, and/or in similar habitat and elevation as the

Figure 1: Location of Proposed Wellsites



SOURCE: Google Earth Pro 2008, Ormat Nevada, Inc. 2007, and MHA Environmental Consulting 2008

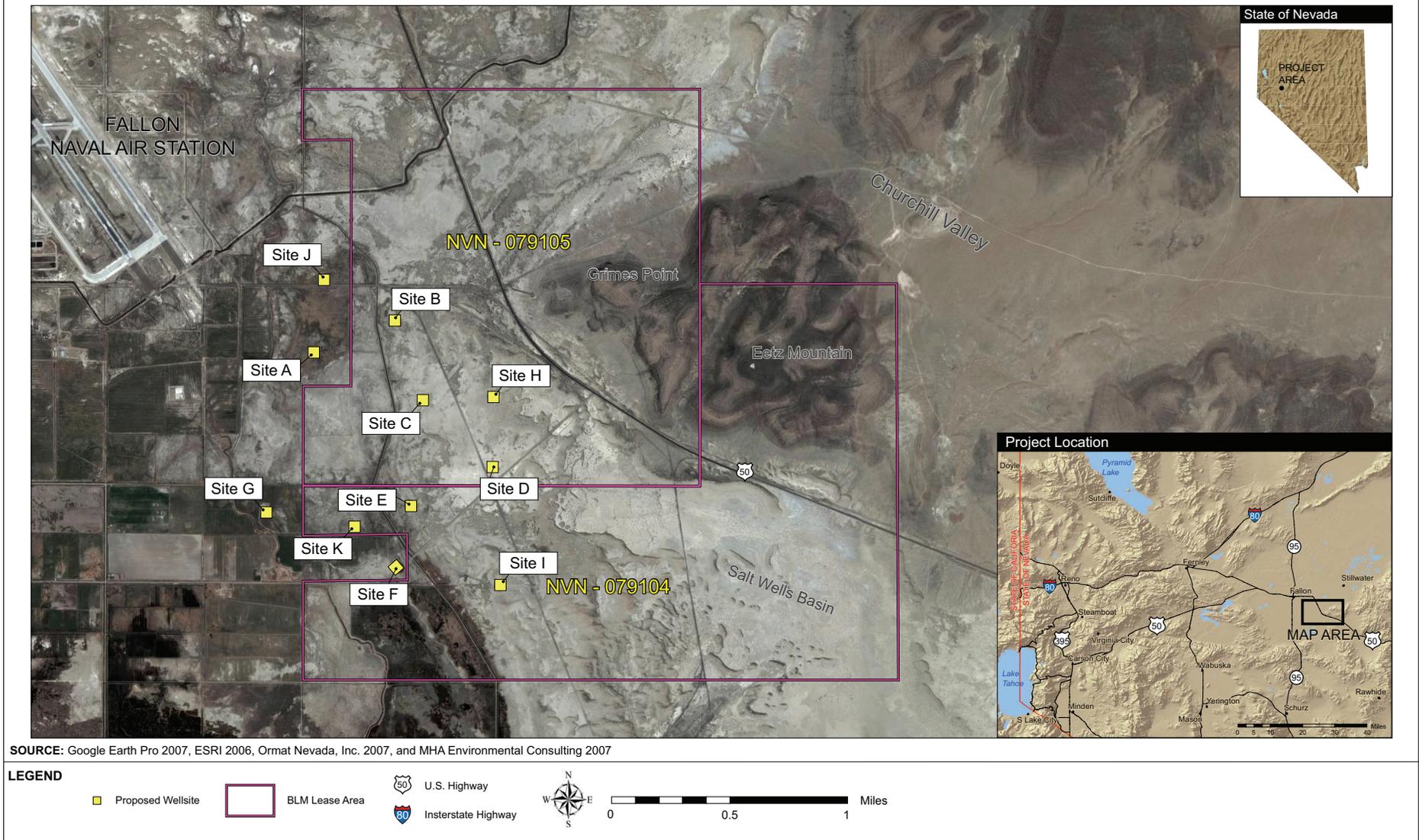
LEGEND

| | | | | | | | | | |
|---|-------------------|---|----------------------|---|------------------|---|--------------|---|---------------------------|
|  | Proposed Wellsite |  | Alternative Wellsite |  | Proposed Roadway |  | U.S. Highway |  | No Surface Occupancy Area |
|---|-------------------|---|----------------------|---|------------------|---|--------------|---|---------------------------|





Figure 2: BLM Leases Associated with the Carson Lake Project



project site. No special status plant species occurrences were identified by the NNHP within five miles of the proposed project area.

Subsequent to the site visit, the BLM Sensitive Species List for CCFO Contractors was consulted and www.natureserve.org was utilized to determine the potential of occurrence of any special status species on the project site.

FIELD RECONNAISSANCE SURVEY

On June 28 and 29, 2007, MHA|RMT Biologist, Ty Brookhart, visited the project area to evaluate the habitat occurring at the proposed project site and to record the vegetative communities, habitat types, and habitat quality in the area. The project area was surveyed on foot. All animal species and their signs encountered were recorded. Bird species were identified by sight and by vocalizations when possible.

Results

The proposed project is located in the southern end of the Lahontan Basin, in the northwestern portion of the Great Basin. The Lahontan basin's borders are defined by the former Pleistocene Lake Lahontan that once filled the basin (Morgan 1982). Climactic changes over time caused the lake to recede, leaving several small lakes and marshes in the basin. The proposed project is approximately 15 miles southwest of Stillwater Marsh and 5 miles north of Carson Lake. The entire basin is part of the Carson Desert, which is very warm and dry (Morgan 1982).

Most of the project area has a history of agricultural use, both for alfalfa and other crop farming, and as grazing land for cattle. Water for agriculture is brought to the region through a series of canals that divert water from Carson and Truckee Rivers as part of the Newlands Reclamation Project. The water irrigates approximately 60,000 acres (State of Nevada 2007).

VEGETATION

The general setting of the project site is typical of the lowland and foothill areas of the Great Basin, with sparse vegetation and saline soils. Vegetation communities in the project area are all of low or moderate quality and are a mix of native and non-native vegetation. The eastern portion of the project area is almost devoid of vegetation in some areas, as there has been no irrigation of these lands and a thick crust of alkaline salts covers the ground. The western portion of the project area has a more significant vegetation component. Several canals pass through the western portion as part of the Newlands Reclamation Project and this water is or has been used to irrigate crops or to increase the yield of grasses for cattle grazing. The increased soil moisture has resulted in a thicker topsoil layer and denser vegetation, with a considerable number of non-native forb and grass species represented.

Five terrestrial vegetation communities are found in the project area (Figure 3). The majority of the project is covered by Intermountain Basins Greasewood Flat shrubland. This community includes all areas east of the L12 Canal (see Figure 3). Vegetation communities west of the canal include shadscale (*Atriplex confertifolia*) shrubland, agricultural/pasture, emergent wetland/riparian, and ruderal areas. Several canals can be found in the area, which were developed in the early 1900's with the Newlands Reclamation Project. The canals are small, channelized conveyance systems. Roads line the banks and obstructions, such as downed tress, are removed from the canals. The waterways are fairly featureless; however the banks of the canals do provide a small strip of vegetation that resembles emergent wetland communities.

Much of the agricultural areas are no longer farmed but are still used as grazing land. Native species, including salt grass, greasewood, and shadscale, are reestablishing in these areas since active farming has ceased.

WILDLIFE

The project area is a mix of native and non-native vegetation, with the eastern portion showing fewer disturbances from agricultural and military uses. The eastern portion is almost devoid of vegetation in some areas, as there has been no irrigation of these lands and a thick crust of alkaline salts covers the ground. The western portion of the project area has a more significant vegetation component. Several canals pass through the western portion as part of the Newlands Reclamation Project and this water is or has been used to irrigate crops or to increase the yield of grasses for cattle grazing. The increased soil moisture has resulted in a thicker topsoil layer and denser vegetation, with a considerable number of non-native forb and grass species represented.

Several terrestrial wildlife habitats are found in the project area (Table 1) as described in the Nevada Wildlife Action Plan (Nevada Wildlife Action Plan Team 2006). The major wildlife habitat types include:

Intermountain Cold Desert Scrub

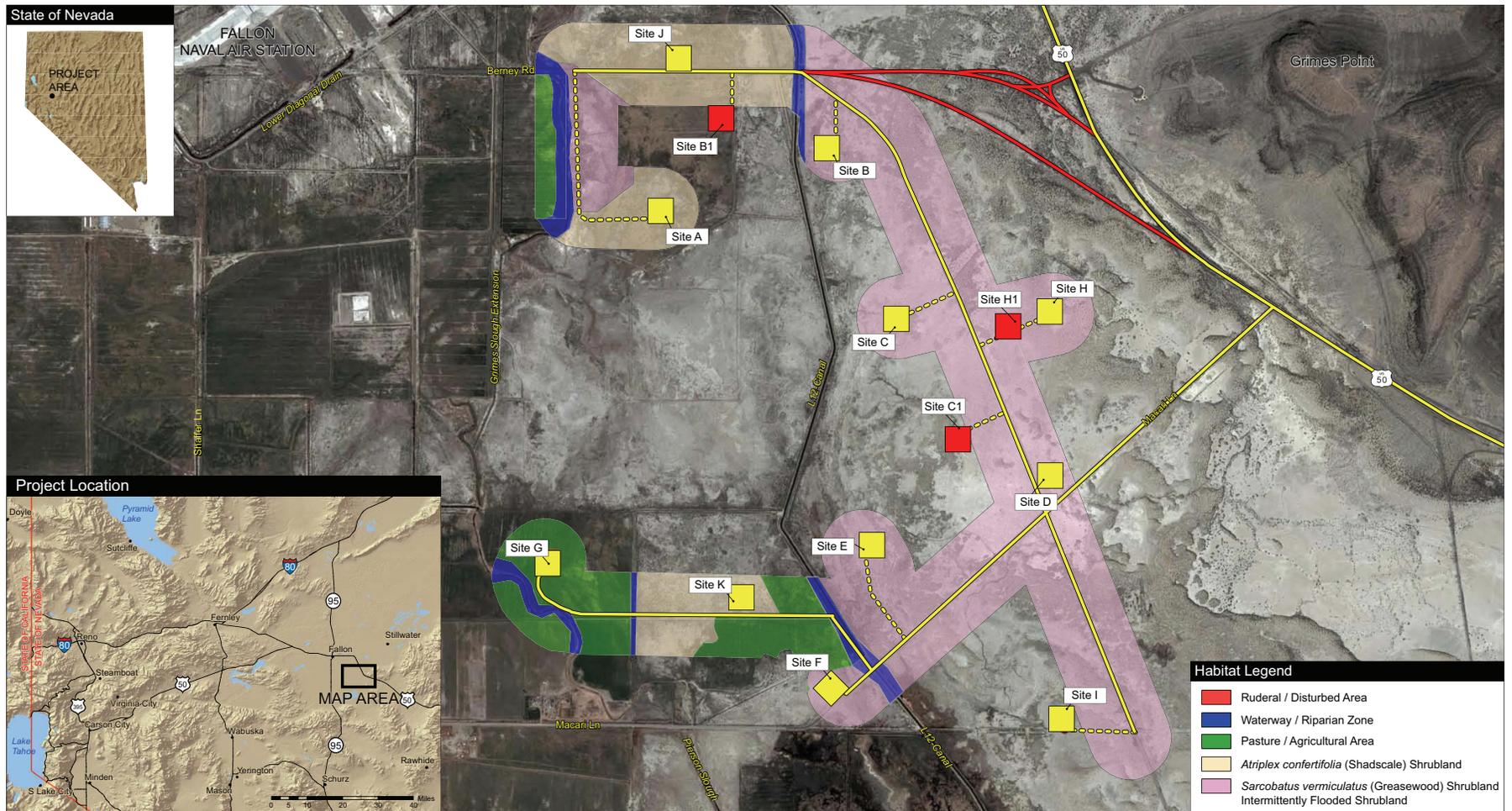
Intermountain Basins Greasewood Flat

Black greasewood (*Sarcobatus vermiculatus*) is found in the majority of the project area. The vegetation is typically composed of sparsely vegetated shrubs, often with little or no groundcover. When groundcover does occur it is often non-native annual forbs. The greasewood flat commonly supports other species, including iodine bush (*Allenrolfea occidentalis*) and inland saltgrass (*Distichlis spicata* var. *stricta*). Some shadscale (*Atriplex confertifolia*), alkali seepweed (*Suaeda* sp.), and Bailey greasewood (*Sarcobatus vermiculatus bailey*) were also observed. The greasewood community in the lease area contains sparse understory vegetation; however, understory species that could occur may include grasses, such as squirreltail (*Elymus elymoides*), inland saltgrass, Great Basin wild rye (*Elymus cinereus*), alkali sacaton (*Sporobolus airoides*), cheatgrass (*Bromus tectorum*), and saltbush (*Atriplex truncata*). Greasewood can often be the only shrub in severely alkaline environments (Barbour 1988), and this is the case in the eastern portion of the project area (sites C, H, D, and J). The community begins to become more typical of the Shadscale vegetation community as the soil becomes less alkaline.

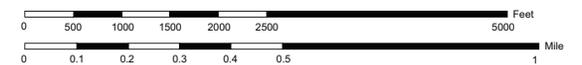
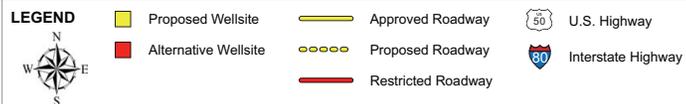
The greasewood flat provides limited habitat for many Great Basin wildlife species, and does not maintain a high diversity or density of wildlife species. Limited wildlife use is especially the case in Greasewood habitats that maintain very sparse shrub cover like that found in the project area. The habitat provides limited cover for large animals, the high alkalinity makes it unsuitable for amphibian species. Birds were not frequently observed in this habitat, and only horned lark (*Eremophila alpestris*), western king bird (*Tyrannus verticalis*), and sage sparrow (*Amphispiza belli*) were observed in the area. It is likely that other birds, such as Western meadowlark (*Sturnella neglecta*), and killdeer (*Charadrius vociferous*) forage in the area. Raptors such as the red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), and the Swainson's hawk (*Buteo swainsonii*) would also be expected to pass through the greasewood flat while foraging.

Side blotched lizard (*Uta stansburiana*) and western whiptail (*Cnemidophorus tigris tigris*) were seen in this community. Long-nosed leopard lizard (*Gambelia wislizenii wislizenii*), and desert collared lizard (*Crotaphytus insularis bicinctores*) would also be expected in this habitat, though infrequently as they are larger lizards and would typically prefer habitats with more cover when available.

Figure 3: Terrestrial Vegetation Communities in the Project Area



SOURCE: Ormat Nevada, Inc. 2007, Google Earth Pro 2007, ESRI 2006 and MHA Environmental Consulting 2008



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Table 1: Well Pads* and associated Habitat Type

| Well Pad* | Major Habitat Type | Well Pad* | Major Habitat Type |
|-----------|---------------------------------|-----------|---|
| A | Intermountain Cold Desert Scrub | G | Agricultural Lands, Developed Landscapes, Intermountain Cold Desert Scrub |
| B | Intermountain Cold Desert Scrub | H | Intermountain Cold Desert Scrub |
| C | Intermountain Cold Desert Scrub | I | Intermountain Cold Desert Scrub |
| D | Intermountain Cold Desert Scrub | J | Intermountain Cold Desert Scrub |
| E | Intermountain Cold Desert Scrub | K | Agricultural Lands, Intermountain Cold Desert Scrub |
| F | Intermountain Cold Desert Scrub | | |

* Includes access road where appropriate

No snakes were observed in this community. There were very few rodent burrows. Insects were also relatively absent from the greasewood area, likely a result of the lack of vegetation and water. Snakes would not often be found in this habitat because of the lack of prey and abundant cover. Coachwhip (*Masticophis flagellum piceus*), racer (*Coluber constrictor mormon*), gopher snake (*Pituophis melanoleucus deserticola*), and western rattlesnake (*Crotalus viridis lutosus*) are still expected to be found in the Carson Desert area in relatively low abundance.

Several black-tailed jackrabbit (*Lepus californicus*) were observed in this habitat. Coyote (*Canis latrans*) tracks and scat were seen on several occasions. Small rodent burrows were observed on site and many rodent species, including kangaroo rats (*Dipodomys spp.*), mice, and voles are expected in the greasewood flat.

Intermountain Basins Mixed Salt Desert Scrub

Shadscale has generally been interpreted as the regional dominant shrub of the Great Basin Desert. Shadscale forms more associations than does black greasewood (14 versus 10, respectively (NNHP 2003)) and shadscale shrublands can vary widely. The mixed salt desert scrub habitat in the project differs from the greasewood flat habitat in several ways. First, the dominant shrub is shadscale or spiny saltbush (*Artemisia confertifolia*) and not greasewood. Second, the shrubs are denser and the shrub species assortment is generally more diverse. Finally, there is an understory of grasses and forbs where the greasewood community is primarily devoid of vegetation and covered with alkaline salts. Mixed salt desert scrub is typically associated with range and grazing lands, and the community is closely associated with areas of heavy cattle grazing. Bailey greasewood (*Sarcobatus vermiculatus bailey*), spiny hop sage (*Grayia spinosa*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and winterfat (*Ceratoides lanata* var. *lanata*) were present all present in this community. Some exotic plant species include Russian thistle (*Salsola kali*) and cheatgrass.

The mixed salt desert scrub provides better cover and foraging habitat for wildlife than the greasewood flat, and more animals were observed during the reconnaissance survey. Wildlife observed in the project area included several lizards such as the long-nosed leopard lizard, side blotched lizard, and western whiptail. A single western rattlesnake (*Crotalus viridis lutosus*) was seen in this vegetation community. Other snakes are also common to the area and can be expected to occur on the site. These include coachwhip, racer, common kingsnake (*Lampropeltis californiae*), and gopher snake. Common garter snake (*Thamnophis sirtalis*) and western terrestrial garter snake (*Thamnophis elegans*) could also be found on site given the relative proximity to several canals and emergent wetland areas, such as Grimes Slough.

Bird species observed include Sage sparrow, western king bird, western meadowlark (*Sturnella neglecta*), mourning dove (*Nedaida macroura*), and California quail (*Callipepla californica*). Several raptor species could use this community for foraging. These include the American kestrel, red-tailed hawk, and Swainson's hawk (*Buteo swainsoni*).

Two coyotes were seen in this vegetation community. Black-tailed jackrabbit was also observed. Other lagomorphs would also be expected in the area, as would raccoon (*Procyon lotor*) and possibly American badger (*Taxidea taxus*). Many small rodents inhabit this community, as indicated by the large numbers of burrows and tracks.

Developed Landscapes

Developed, Open Space-Low Density

Several canals can be found in the project area. They were developed in the early 1900's as part of the Newlands Reclamation Project. The canals are small, channelized conveyance systems. Roads line the banks and obstructions, such as downed trees, are removed from the canals. The waterways are fairly featureless; however, the banks of the canals do provide a small strip of plant species that resembles emergent wetland vegetation. Peach leaf (*Salix amygdaloides*) and sandbar willows (*Salix exigua.*), as well as wetland species such as cattail (*Typha spp.*), bulrush (*Scirpus spp.*), knotweeds (*Polygonum spp.*) and aster (*Machaeranthera spp.*) were observed on the edge of the canal. Along Grimes Slough, exotic salt cedar (Tamarisk spp) is also present. Salt cedar is an invasive species found around waterways. The genus is fast growing and typically out-competes native vegetation. Several large cottonwoods (*Populus fremonti*) are found along the L12 Canal at the northern end of the project. An existing well pad is present at site G. The area is almost entirely devoid of vegetation with the exception of a few grasses and forbs such as squirreltail inland saltgrass and Great Basin wild rye.

Red-winged (*Agelaius phoeniceus*) and yellow-headed (*Xanthocephalus xanthocephalus*) blackbird were seen in this community. The community is likely visited by great blue heron (*Ardea Herodias*), white-faced ibis (*Plegadis chihi*), and several waterfowl species such as mallard (*Anas platyrhynchos*) and cinnamon teal (*A. cyanoptera*). The waters also support northern leopard frog (*Rana pipiens*), which was seen, and likely bullfrog (*Rana catesbeiana*). Several snakes would also be expected including gopher snake, western terrestrial garter snake, common garter snake, and western aquatic garter snake (*Thamnopsis couchi couchi*). Wildlife would visit this community often, as it is a source for water, food, and cover. The canals also provide corridors for movement across through the area, as willows, other vegetation, and the banks of the canals provide cover for migration wildlife. Reptiles may use the edges of the open area at the existing well pad at site G to sun themselves in the early morning and late afternoon. Mourning doves would also visit the area to pick at gravel and sand to aid in digestion.

Agricultural Lands

The western portion of the project is primarily agricultural lands, or is strongly influenced by this habitat. This area was dominated by sweet clover (*Melilotus spp*), alfalfa (*Medicago sativa*), red-stemmed filaree (*Erodium cicutarium*), chicory (*Cichorium*), knotweed (*Polygonum aviculare*), cocklebur (*Xanthium strumarium*), and peppergrass (*Lepidium sp.*). Much of the agricultural areas are no longer actively farmed, but are still in use as grazing lands. Several native species are also found in this community, as they are reestablishing since active farming has ceased. They include salt grass, greasewood, and shadscale.

The areas designated as agricultural support many of the same species found in the mixed salt desert scrub. The moist soil is favorable for several plant species, and this in turn means more insects. As a result, predatory bird species such as western kingbird, blackbirds, ibis, herons, American kestrel, red-tailed hawk, and Swainson's hawk would all be expected in the area.

Several other birds were seen in the area such as Sage sparrow, western meadowlark, mourning dove, and California quail.

Small mammals were also common in the area. Many burrow holes were observed and several black-tailed jackrabbits were seen in this area. This high density of small mammals would attract predatory species such as coyotes, long tailed weasel (*Mustela frenata*), and American badger.

Lizards were less abundant in the area. The thicker grass and forb cover makes movement for these ground dwelling rodents difficult. Snakes would be better suited for this habitat and coachwhip, racer, common kingsnake, western rattlesnake, gopher snake, common garter snake, and western terrestrial garter snake all would be expected in this habitat.

THREATENED, ENDANGERED, PROPOSED FOR LISTING, AND CANDIDATE SPECIES

Federal Status Species

The USFWS electronic listing of federally listed threatened, endangered, proposed for listing, and candidate species was reviewed in September 2007 to determine what species may be found in the project area (www.fws.gov/nevada/protected_species/index.html 2007). Only the bald eagle (*Haliaeetus leucocephalus*), a federally listed threatened species could be found. Bald eagles may fly over the project area or may prey on species living within the habitats there. The potential for their occurrence on well pads or access roads is low (refer to Table 2).

SPECIAL STATUS SPECIES

BLM Sensitive Species

The BLM maintains a list of special status species that it considers when making management decisions and assessing environmental impacts. BLM Manual 6840 defines sensitive species as "... those species not already included as BLM Special Status Species under (1) Federal listed, proposed or candidate species; or (2) State of Nevada listed species. Native species may be listed as "sensitive" if it: (1) could become endangered or extirpated from a state or significant portion of its range; (2) is under review by the FWS/NMFS; or (3) whose numbers or habitat capability are declining so rapidly that Federal listing may become necessary, or (4) has typically small and widely dispersed populations; (5) inhabits ecological refugia, specialized or unique habitats; (6) is state-listed, but is better conserved through application of the BLM sensitive species status." It is BLM policy to provide sensitive species with the same level of protection that is given to federal candidate species. The major objective of this protection is to preclude the need for federal listing (USDI-BLM 2003). These species are presented in Table 2.

Plants

Three plant species were identified as having potential to occur on the project site (either on access roads and/or well pad sites). The species are described below. None of the species were identified during the survey.

Nevada Oryctes (*Oryctes nevadensis*). This annual species is known from Inyo County to western Nevada. In the Lahontan Basin, it occurs in loose sandy soils in dry washes and desert foothills in chenopod scrub and Mojavean desert scrub at elevations of 1,100 m to 2,535 meters. This annual appears only in years with optimal rainfall and temperature patterns, and is therefore difficult to inventory. Surveys for *Oryctes* were conducted during the baseline surveys. None of this species was observed in the lease area (Westec 1988). The closest known occurrence is approximately ten miles east of the proposed site (NNHP 2007). The NNHP considers the Nevada oryctes to be imperiled due to rarity and/or other demonstrable factors.

Nevada dune beardtongue (*Penstemon arenarius*). This plant commonly occurs in deep, volcanic, sandy soils at 1200-1350 m elevation. Common associates include fourwing saltbush (*Atriplex canescens*), littleleaf horsebrush (*Tetradymia glabrata*), and greasewood (*Sarcobatus vermiculatus*).

Table 2: Special Status Species with Potential to Occur in the Project Region

| Common Name | Scientific Name | Listing Status | Potential to Occur on Site |
|---|---|--|----------------------------|
| FEDERALLY LISTED ENDANGERED OR THREATENED SPECIES | | | |
| Bald Eagle | <i>Haliaeetus leucocephalus</i> | USFWS: LT BLM: S | Low |
| OTHER SPECIAL STATUS SPECIES | | | |
| Plants | | | |
| Nevada Oryctes | <i>Oryctes nevadensis</i> | USFWS: FSC BLM: N NNPS: watch list | Low |
| Nevada dune beardtongue | <i>Penstemon arenarius</i> | USFWS: FSC BLM: N NNPS: watch list | High |
| Lahontan beardtongue | <i>Penstemon palmeri var macranthus</i> | USFWS: -- BLM: Ns NNPS: watch list | Low |
| Invertebrates | | | |
| Nevada viceroy | <i>Limenitis archippus lahontani</i> | USFWS: -- BLM: Ns | High |
| Birds | | | |
| Swainson's Hawk | <i>Buteo Swainsoni</i> | USFWS: -- BLM: N | Low |
| White-faced Ibis | <i>Plegadis chihi</i> | USFWS: FSC BLM: P | Low |
| Black tern | <i>Chlidonias niger</i> | USFWS: FSC BLM: N | Low |
| Long-billed curlew | <i>Numenius americanus</i> | USFWS: -- BLM: N | Low |
| Mammals | | | |
| Pygmy Rabbit | <i>Brachylagus idahoensis</i> | USFWS: FSC BLM: Ns | Low |
| Western Small Footed Myotis | <i>Myotis ciliolabrum</i> | USFWS: FSC BLM: N | Low |
| Western pipistrelle bat | <i>Pipistrellus hesperus</i> | USFWS: -- BLM: N | Low |
| Pallid bat | <i>Antrozous pallidus</i> | USFWS: -- BLM: Ns | Low |
| <p>USFWS = United States Fish and Wildlife Service FSC = Species of Concern LT = Listed Threatened – likely to be classified as Endangered in the foreseeable future if present trends continue</p> <p>BLM = Bureau of Land Management S = Nevada special status species – USFWS listed, proposed or candidate for listing, or protected by Nevada state law N = Nevada special status species – designated sensitive by state office P = Proposed Nevada special status species – designated proposed sensitive by state office Ns = BLM sensitive species – designated sensitive but not special status by state office NNPS = Nevada Native Plant Society</p> | | | |

SOURCE: USFWS 2007; NNHP 2001; NNHP 2007; BLM 2006, NatureServe 2007

It is endemic to western Nevada, where it is known from sandy areas of three counties but is not abundant at any one site. As it is known to occur within the Carson Desert watershed in Churchill County and is associated with greasewood, it has a potential to occur in the project area. (NatureServe 2007).

Lahontan beardtongue (*Penstemon palmeri* var. *macranthus*). This beardtongue is found along washes, roadsides and canyon floors, particularly on carbonate-containing substrates, usually where subsurface moisture is available throughout most of the summer. It may be restricted to calcareous substrates (NatureServe 2007). Although not known within or near the project area, the roads may be suitable habitat for this species and it has a very low potential to occur.

Animals

Four bird species, three mammal species, and one invertebrate species were identified as potentially occurring on the project site. These species are described below. The only species observed in the project area during the survey was the white-faced ibis. While not expected to occur within the project boundaries, pygmy rabbit is discussed below with reasoning for lack of habitat.

Birds

Swainson's Hawk (*Buteo swainsonii*). This hawk can be found in open grasslands, prairies, farmlands, and deserts that have some trees for nesting. They spend summer in the western half of North America and winter in eastern Argentina, Paraguay, and southern Brazil (Sibley 2000). Swainson's hawks mainly hunt mice, ground squirrels, rabbits, birds, and reptiles during the breeding season, and largely live off insects such as grasshoppers, locusts, and beetles during the non-breeding season (Clark and Wheeler 2001). The project area could provide suitable foraging habitat for the hawk.

White-faced Ibis (*Plegadis chihi*). The White-faced ibis breeding habitat is typically freshwater wetlands, including ponds, swamps and marshes with pockets of emergent vegetation. They also use flooded hay meadows and agricultural fields as feeding locations. Its breeding range extends from the western USA south through Mexico, as well as from southeastern Brazil and southeastern Bolivia south to central Argentina, and along the coast of central Chile. Its winter range extends from southern California and Louisiana south to include the rest of its breeding range. Ibis nest in areas where water surrounds emergent vegetation, bushes, shrubs, or low trees. White-faced Ibis usually use old stems in cattails (*Typha* spp.), hardstem bulrush (*Scirpus acutus*) or alkali bulrush (*S. paludosus*) over shallow water as their nesting habitat (DuBois 1989). During migration, White-faced Ibis use more varied habitats for resting and feeding sites, ranging from wooded streams, mudflats, and grassy fields to small marshes and sewage ponds (Locatelli and Blankenship 1973, Baumgartner and Baumgartner 1992). They typically feed in freshwater marshes on crayfishes, frogs, fishes, insects, newts, earthworms, crustaceans, etc. (Terres 1980). None of the proposed drill pads or roadways are associated habitats that would be frequented by the Ibis, however, suitable habitat for the Ibis does occur both north and south of the project at the Stillwater Wildlife Refuge and in the wetland area surrounding Carson Lake. One white-faced Ibis was observed flying over the project area during the June 29, 2007 survey.

Black Tern (*Chlidonias niger*). The black tern has breeding habitats in marshes, along sloughs, rivers, lakeshores, and impoundments, or in wet meadows, typically in sites with mixture of emergent vegetation and open water. Cattails, bulrushes, burreed, and/or phragmites commonly are present in nesting areas (NatureServe 2007). Although the project sites are not located in breeding areas, black terns have a potential to breed near the canals within the lease area, and may fly over the project sites.

Long-billed Curlew (*Numenius americanus*). This bird species is known to occur within the Carson Desert watershed. It nests in prairies and grassy meadows, generally near water, and on flat ground with short grass, often near a rock or other conspicuous object (NatureServe 2007). It is not expected to nest within the project area, but may forage for insects onsite.

Mammals

Pygmy Rabbit (*Brachylagus idahoensis*). Pygmy rabbit is found in shrub-grasslands on alluvial fans, floodplains, plateaus, high mountain valleys, and mountain slopes, where suitable sagebrush cover and soils for burrowing are available. Some occupied sites may support a relatively sparse cover of sagebrush and shallow soils, but these usually support patches of dense sagebrush and deeper soils. Big sagebrush was the dominant shrub at all occupied sites, averaging 21.3 to 22.6% coverage; bare ground averaged 33% and forbs 5.8%. Average height of sagebrush in occupied sites was 0.4 meter (Rauscher 1997). Pygmy rabbits selectively use dense and structurally diverse stands of sagebrush that provide access to a relatively constant supply of food and protection from predators and thermal extremes. Big sagebrush (*Artemisia tridentata*) is the primary food source (up to 99% of the winter diet), but grasses and forbs are eaten in mid- to late summer, and can comprise up to 40% of the diet during that season (Green and Flinders 1980). The project has very little sagebrush to provide food and cover for the pygmy rabbit and the soil is dense and often wet at times, making it unfit for burrowing. The rabbit is not expected to occur in the project area.

Western Small-footed Myotis (*Myotis ciliolabrum*). This small bat has a wide ecological range, from rock outcrops on open grasslands to canyons in the foothills to lower mountains with yellow pine woodlands. It is primarily an inhabitant of desert regions where it is most commonly encountered in lowland habitats near open water, where it prefers to forage. Day roosts are variable, but include cracks and crevices in cliffs, beneath tree bark, in mines and caves, and in buildings. Night roosts are under a variety of natural and manmade structures. Hibernacula include caves, mines, and tunnels, where the animals usually hang singly, often exposed. A search of existing data shows no site specific surveys have been conducted to determine the presence or absence of this bat species in the project area. However, the habitat in the project area does not appear to contain roosting habitat for this bat species. Rocky outcrops in the nearby Bunejug and Cocoon mountains may support roosting habitat for bats. Therefore, if present, bats using the project area would be limited to foraging for insects over vegetation. Building structures within the project area could provide roosting habitat for the bat.

Western Pipistrelle Bat (*Pipistrellus Hesperus*). This bat breeds in deserts and lowlands, desert mountain ranges, desert scrub flats, and rocky canyons. Day and night roosts include rock crevices, under rocks, burrows and sometimes buildings or mines. The bat may hibernate in a cave, mine, or rock crevice. The western pipistrelle bat typically visits water and drinks immediately after emergence each evening. Young are born in rock crevices or in buildings. It is known to hibernate but is sporadically active throughout the winter in some areas. The bat species emerges well before dark and remains out later in morning than other bats. It is most active early in evening and rests during night until feeding again near dawn. There is a low potential for this bat to occur on the project site due to a lack of rocks and suitable crevices. Building structures within the project area could provide roosting habitat. (NatureServe 2007)

Pallid Bat (*Antrozous pallidus*). This bat is known to occur in the Carson Desert watershed within Churchill County. It breeds in arid deserts and grasslands, often near rocky outcrops and water. It is present but less abundant in evergreen and mixed conifer woodland. The bat will usually roosts in a rock crevice or building, and less often in cave, tree hollow, or mine. There is a potential for the pallid bat to occur within the lease area. Building structures within the project area could provide roosting habitat. (NatureServe 2007)

Invertebrates

Nevada Viceroy (*Limenitis archippus lahontani*). This butterfly is known to occur where its host plant, sandbar willow, is located. NatureServe (2007) lists a colony near Fallon, Nevada. Sandbar willow is located along the canals in the lease area, and the Nevada viceroy likely occurs there.

Neo-tropical Migratory Birds

On January 11, 2001, President Clinton signed Executive Order 13186 (Land Bird Strategic Allotment) placing emphasis on conservation and management of migratory birds. The species are not protected under the Endangered Species Act, but most are protected under the Migratory Bird Treaty Act of 1918. No BLM policies have been developed to provide guidance on how to incorporate migratory birds into NEPA analysis. However, advice based on past USFWS

Memorandums of Understanding (MOUs) list items the USFWS believes are fundamental for the analysis of impacts to and planning for these birds. These items are (1) effects to highest priority birds listed by Partners in Flight; (2) effects to important bird areas (IBA's); (3) effects to important overwintering areas.

Avifaunal Biomes that are found on the allotment are described by Partners in Flight (PIF) [Beidleman 2000], PIF-Nevada (Neel 1999) and Nevada Wildlife Action Plan (Nevada Wildlife Action Plan Team 2006). The Intermountain West is the center of distribution for many western birds. Over half of the biome's Species of Continental Importance have 75% or more of their population here. Many breeding species from this biome migrate to winter in central and western Mexico or in the Southwestern biome (Beidleman 2000). The species of concern listed by PIF that could occur in the lease area are discussed below by biome.

Salt Desert Scrub

This biome experiences harsh climactic variation and is often dominated by salt-tolerant shrubs. Species of concern associated with this habitat type in the land sale area are the Loggerhead shrike (*Lanius ludovicianus*) and the Burrowing owl (*Athene cunicularia*). Issues related to this habitat type include physical destruction of salt desert shrubs, habitat conversion and use of rangeland pesticides (Neel 1999).

Western Shrublands

Shrubsteppe was identified as the highest priority habitat for conservation for breeding birds. This habitat type supports the largest nesting-bird species list of any upland vegetation type in the West (Beidleman 2000). Species of concern associated with this habitat type in the plan area are the Sage grouse (*Centrocercus urophasianus*), Brewer's sparrow (*Spizella breweri*), Sage sparrow (*Amphispiza belli*), and the Sage Thrasher (*Oreoscoptes montanus*) (Neel 1999, Beidleman 2000, Nevada Wildlife Action Plan 2006). Issues related to this habitat type include fragmentation from man-caused activities. Threats to this habitat type include overgrazing of grasses and forbs that alter community structure, invasion of non-native grasses and fire suppression / crown-killing wildfire (Beidleman 2000). Loss of shrub understory, increasing human infrastructure which fragments and degrades habitat, and increases in soil erosion were also identified (Nevada Wildlife Action Plan 2006).

Impacts

VEGETATION

Most pad and access road construction would have temporary impacts to vegetation. Constructing well pads and access roads would remove an average of 2.3 acres of vegetation per site for the period of construction, drilling, and testing (about 2.06 acres per pad and 0.22 acres per access road). The vegetation that would be cleared does not provide high quality habitat for wildlife. Much of the area has a history of disturbance or is being used as grazing lands and is therefore highly disturbed.

Each pad would be reclaimed after drilling and testing if no commercially viable resource is found. Reclamation would include restoring grade, and placing the stockpiled topsoil back over the well pad. A diverse perennial seed mix certified as being free of noxious weed materials would be used to seed the areas, if the well pad and access road needs to be re-vegetated. Reclamation would have a beneficial impact on vegetation.

Well pads found commercially viable or viable as an injection well would not be reclaimed; however, due to the low quality of the dominant vegetative community affected and its abundance in surrounding areas, impacts to vegetation from the proposed project would not be adverse.

The best habitat found in the project area is the riparian areas found in association with the canals and Grimes Slough. None of these riparian or wetland communities would be affected by the proposed project.

WILDLIFE

Constructing the well pads and necessary access roads would remove approximately two acres of vegetation per pad and additional 3.6 acres total for access roads. The vegetation in the project that would be affected from site clearing is not of high quality. Much of the area has a history of disturbance, or is being used as grazing lands. Many of the plant species found in the areas proposed for clearing are non-native species. Impacts to vegetation would be less than significant.

Areas proposed for clearing do not provide high quality habitat for wildlife in most instances. The best habitat found in the project area is represented by the narrow strips of emergent wetland-like vegetation found in association with the canals and Grimes Slough. This habitat area would not be affected by the proposed project. Removal of vegetation as proposed would likely displace several small mammals and reptiles inhabiting the area. The animal species found in the area are common to the Great Basin and no special status species are expected inhabit these locations. The surrounding areas provide habitat for these animals to relocate. No mitigation is necessary.

Raptors would lose foraging habitat with clearing or project sites; however, this area represents only a small amount of available foraging habitat in the region. Raptors are very mobile predators that forage over several square miles per day. The surrounding area provides ample foraging habitat for raptors. There are no roosting trees within 1,000 feet of any of the proposed well pad site. No mitigation for raptors is necessary.

Several large pieces of equipment, as well as trucks, and worker vehicles would access the well sites. Vehicles could crush vegetation and terrestrial wildlife. They can also injure or kill animals if the event of a collision. Keeping vehicles at low speeds, as proposed by Ormat in the POE, would reduce the chance of vehicle caused wildlife mortality. Vehicles would also remain within the cleared areas and roadways. Impacts would be less than significant.

Noise from construction would not cause impacts to wildlife as the area is directly adjacent to the Fallon NAS runway (0.8 miles) and jet and plane noise reaches levels upwards of 90 decibels in the area (US Navy 1991).

Well pads that are not retained as production well pads would be reclaimed. Reclamation would result in many of the same impacts as construction. Reclamation would cause some small scale disturbance of vegetation, but overall would result in increased habitat quality as it would facilitate the revegetation of the existing well pad. No non-native species would be used for revegetation.

Nesting birds may be affected by the removal of vegetation and disturbance at the well sites.

Threatened, Endangered, Proposed for Listing, and Candidate Species

Federal Status Species

Bald eagles may fly over the project area or may prey on species living within the habitats there. While project activities would reduce some foraging habitat, the surrounding habitat areas provide an ample amount. Potential impacts to the bald eagle would be less than significant. No mitigation is necessary.

Special Status Species

BLM Sensitive Species

Plants

Three special status plant species have a potential to occur in the project area. Nevada oryctes and Lahontan beardtongue have a low potential to occur and Nevada dune beardtongue has a higher potential. Constructing well pads and access roads would destroy any of these plants if they were present. The following mitigation measure would reduce potential impacts to less than significant levels.

Biology-1: A certified biologist will do a site assessment prior to any project activities. If Nevada oryctes, Lahontan beardtongue, or Nevada dune beardtongue are found to be present, they will be marked with fencing and flags and be avoided. If avoidance is not possible, the plant(s) will be transplanted to an area adjacent to the area of construction, and marked with fencing and flags.

Animals

Birds

All the birds listed in Table 2 have a low potential occurrence on the project site. No nesting areas exist at well pad or access road locations. The birds may forage in the area for food, but are more likely to do so in areas away from the project sites where food is more abundant. These birds may be seen flying over the well pads and access roads, such as the white-faced ibis was on June 29, 2007. Impacts to birds would be less than significant

Mammals

None of the bats listed in Table 2 are expected to roost or hibernate at proposed well pad and access road sites. Their potential to occur is low. Any structures built at the wellpad sites could provide new roosting habitats for these bats. Effects would be less than significant.

The pygmy rabbit is not expected on any project sites due to less than ideal habitat. Burrows and habitat would be disturbed by project construction if they are present. The following mitigation measure would reduce impacts to less than significant levels.

Biology-2: A certified biologist will do a site assessment prior to any project activities. If any occupied pygmy rabbit burrows are located, the burrows will be marked with flags and avoided. If the burrows cannot be avoided, the pygmy rabbits will be located and shepherded to an adjacent area that has a more suitable habitat.

Invertebrates

The Nevada viceroy is likely to occur alongside the canals in the lease area. They may fly through the area but are not expected to be directly affected by project activities. Impacts would be less than significant

Neo-tropical Migratory Birds

The project may result in direct impact (e.g., nest disturbance or abandonment during incubation or nestling stages) and/or indirect impacts (e.g., temporary shifts in foraging patterns or territories, noise or light pollution, etc.) to sensitive bird species protected under the MBTA, MBTRA or CFGC. Project-related impacts can be avoided or minimized through the implementation of mitigation measure Biology-1.

Biology-3: A certified biologist will conduct nesting surveys for migratory birds prior to the onset of construction activities and establish non-disturbance buffers around active nests or use onsite biological monitors when construction occurs within the vicinity of active nests during the breeding season from February 1st to August 31st for most species.

References

- Baumgarnter and Baumgarnter. 1992. Oklahoma bird life. University of Oklahoma Press, Norman, Oklahoma.
- Barbour, M.G. and J. Major. 1988. Terrestrial Vegetation of California. California Native Plant Society.
- Clark and Wheeler 2001. *A Field Guide to Hawks of North America*.
- DuBois. 1989. Arising, alighting ibis. *Montana Outdoors* 20(6):30-33
- Green and Flinders. 1980. Habitat and dietary relationships of the pygmy rabbit. *Jour. Range Mgmt.* 33(2):136-142.
- Haug et al. 1993. Burrowing Owl: The Birds of North America, No. 61 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C. 20 pp.
- Locatelli and Blankenship. 1973. White-faced Ibis in Humboldt County, California. *Murrelet* 54: 11-12.
- Morgan. 1982. *Hydrogeology of the Stillwater Geothermal Area, Churchill County, Nevada*. US Geological Survey Open-File Report 82-345.
- NatureServe.org. 2007. NatureServe Explorer. www.natureserve.org/explorer [accessed September 26, 27 and 28, 2007]
- NNHP. 2003. Nevada Natural Heritage Program. National Vegetation Classification for Nevada. Department of Conservation and Natural Resources, Carson City, Nevada. 26 September, 2003.
- _____. 2007. Nevada Natural Heritage Program. Nevada Rare Plant Atlas. Website: heritage.nv.gov/atlas/atlasndx.htm
- Pavlik, B. M. 1989. Phytogeography of sand dunes in the Great Basin and Mojave deserts. *Journal of Biogeography* 16: 227-238.
- Rauscher. 1997. Status and distribution of the pygmy rabbit in Montana. Montana Department of Fish, Wildlife & Parks, non-game program.
- Sibley and Monroe. 1990. Distribution and taxonomy of birds of the world. Yale Univ. Press, New Haven.
- Sibley. 2000. National Audubon Society The Sibley Guide to Birds. Alfred A. Knopf, New York, New York.
- State of Nevada. 2007. Department of Conservation and Natural Resources, Division of Water Resources. Nevada Water Facts, Water Resource Issues in Nevada. Website: water.nv.gov/Water%20Planning/wat-fact/issues.htm#newlands
- Terres. 1980. The Audubon Society encyclopedia of North American birds. Alfred A. Knopf, New York.
- TNC. 1994. The Nature Conservancy. *Final Draft Standardized National Vegetation Classification System*. Prepared for United States Department of Interior, National Biological Survey and National Park Service. November 1994.

USFWS. 2007. *List of Federal Endangered and Threatened Species that may be Affected by the Carson Lake Geothermal Project.*

WESTEC. 1988. WESTEC Services, Inc. Environmental Baseline Study, Salt Wells Basin, Nevada, January 1987-1998

