CHAPTER 3
AFFECTED ENVIRONMENT

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

3.1 SCOPING AND ISSUE IDENTIFICATION

In accordance with FLPMA and NEPA, this document has been prepared with input from and coordination with interested agencies, organizations, and individuals within the region. During the scoping process for this EA, input was solicited from key agencies or groups with special expertise, interest, or administrative responsibility pertaining to the general geographical area.

Vulcan met with the BOR and the Nevada Division of Wildlife on April 1, 2008 to consider potential project impacts. Issues identified during scoping were land use, water quality, and wildlife resources.

3.2 GENERAL SETTING

The project area is located on Vulcan Power leases in the Salt Wells Lease Area, approximately 13 miles southeast of Fallon, in Churchill County, Nevada. This area lies between 3,910 to 5,160 feet above sea level elevation with distinct topographic changes between the flat playas and the steep terrain of the Bunejug Mountains. Climate is arid with an average annual precipitation of five to seven inches per year. The project area is situated on slightly sloping terrain at the base of the Bunejug Mountains. The entire surface is covered with stony sandy loam to cobbley clay loam soils.

3.3 SUPPLEMENTAL AUTHORITIES

Appendix 1 of BLM's NEPA Handbook (H-1790-1) identifies Supplemental Authorities that are subject to requirements specified by statute or executive order and must be considered in all BLM environmental documents. Supplemental Authorities that may be affected by the Proposed Action are further described in this EA.

Table 3-1 Supplemental Authorities

Supplemental Authority	Not Present *	Present/Not Affected *	Present/May Be Affected**	The following rationale was used to determine that Supplemental Authorities present in the area would not be affected as a result of implementation of the Proposed Action.
Air Quality			X	Carried through EA.
Areas of Critical Environmental Concern	X			
Cultural Resources			X	Carried through EA.
Environmental Justice	X			
Farm Lands (prime or unique)	X			
Fish Habitat	X			
Floodplains		X		The proposed lease is outside the 100-year flood zone (Flood Insurance Rate Maps 320030 0875D and 320030 1025C), and is subject to minimal flooding. The pads and roads would be graveled, and runoff would infiltrate into adjacent soils.
Invasive, Nonnative Species			X	Carried through EA.
Migratory Birds			X	Carried through EA.
Native American Religious Concerns	X			
Threatened or Endangered Species	X			
Wastes, Hazardous or Solid			X	Carried through EA.
Water Quality (Surface/Ground)			X	Carried through EA.
Wetlands/Riparian Zones			X	Carried through EA.
Wild and Scenic Rivers	X			
Wilderness	X			

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

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

3.4 RESOURCES OR USES OTHER THAN SUPPLEMENTAL AUTHORITIES

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

Table 3-2 Resources or Uses other than Supplemental Authorities

Resource or Issue	Not Present *	Present/Not Affected*	Present/May Be Affected**	The following rationale was used to determine that resources present in the area would not be affected as a result of implementation of the Proposed Action or Alternatives.
BLM Sensitive Species			X	Carried through EA.
Land Use			X	Carried through EA.
Native American Trust Assets	X			
Public Health and Safety			X	Carried through EA.
Soils, Geology, and Minerals			X	Carried through EA.
Range Resources			X	Carried through EA.
Recreation/Special Designations			X	Carried through EA.
Socioeconomics			X	Carried through EA.
Visual Resources			X	Carried through EA.
Vegetation			X	Carried through EA.
Wildlife Resources			X	Carried through EA.

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

3.5 RESOURCES OR USES PRESENT AND BROUGHT FORWARD FOR ANALYSIS (ALL RESOURCES)

The following resources are present in the area, may be affected by the Proposed Action, and are carried forward for analysis.

3.A AIR QUALITY

The region of influence (ROI) is located in an area of the intermountain west, which tends to be dominated meteorologically by recurring high and low pressure systems. Summer is often marked by stationary high-pressure systems that develop over the region. These

systems augment clear-sky conditions but also can result in large-scale stagnation of underlying air when light wind conditions persist. Winter weather conditions are influenced predominantly by transient storm systems. Precipitation in the vicinity of the ROI is limited because the Sierra Nevada Mountain Range located approximately 50 miles to the west, acts as a barrier. This barrier results in precipitation in the mountains rather than in the lowlands to the east. Precipitation in the region occurs mostly from December through March. Winter precipitation is typically rain and snow from large-scale weather systems. Summer precipitation is rain, which is often the result of localized activity caused by solar heating, rising air, and associated thunderstorms. This unique climate affects the dispersion of emissions from the project area.

The arid nature of the local climate makes the ROI prone to sudden dust storms on windy days. Dust storms are produced by the interaction of strong winds (which can be as small as little funnels or as large as fast-moving regional air masses), fine-grained surface material, and scanty vegetation, conditions which are widespread in Nevada but that vary greatly from year to year. These dust storms can cause substantial decreases in air quality, to the point of severely reducing visibility. Levels of particulate matter in the air are elevated during and following dust storms.

Nevada is mandated to identify geographic areas that do not meet federal and state air quality standards. The state uses air quality data gathered by monitoring networks to determine the areas within the state not attaining standards. Areas that violate federal or state standards are referred to as "nonattainment areas" for the relevant pollutants. One ozone monitoring station exists in Churchill County at Fallon (NDEP 2003) monitored from 1999 to present. Particulate matter of 10 microns or smaller (PM_{10}) was monitored from 1993 to 1998 (Nevada Bureau of Air Quality Trend Report 2003). The air quality standards for these pollutants are being met.

3.B CULTURAL RESOURCES

The cultural resources of the Salt Wells area have an important role in the Native American, archaeological, and public communities in the region. This category typically includes objects, general locations, discrete sites, structures, and buildings. Here, the category is expanded to include Native American resources, discussed below. Many sites have and continue to contribute significant information to scientific inquiry and to provide vital connections to the traditional knowledge and practices of the aboriginal peoples who still call the area home. In fact, the foundations of much of western Great Basin prehistory and ethnology were developed in this region. The area of potential effect (APE) for cultural resources encompasses the surface area and depths to which the proposed action and facilities operation could disturb cultural resources. These dimensions are elaborated upon further below under "Survey History." It is extended to an indirect APE to include any traditional cultural properties (TCPs), sacred sites, or historic properties that could be indirectly affected by the proposed action.

While sites in the region played a seminal role in the development and understanding of regional prehistory, the historical record has proved just as rich. Regional historic-era developments, initially peripheral to emigrant goals in California, became nationally important with the discovery of the Comstock Lode in 1859. The region is crossed by historic-era corridors that carried people, mail, and goods from eastern cities to growing mining, agricultural, and commercial centers of California, and later to the mining towns and agricultural settlements of western Nevada. Although there are several historic trails in this region managed and protected under the National Trails System Act, none are within close proximity to the APE. The Pony Express route and an early version of the Overland Stage

Route pass about 1.5 miles south of the southernmost drill site. A later version of the stage line went through Stillwater, about 12 miles north of the APE.

The *Cultural Resource Overview, Carson District, West Central Nevada* (Pendleton et al. 1982) presents a detailed background of regional prehistoric and historic-era research and sites. Although this 1982 overview provided an almost complete inventory of prehistoric and historic sites found within the Carson City BLM District and a comprehensive history of research, more than two decades of time and anthropological research and theory have passed since its publication. Much of this research has been presented in survey reports developed as a result of commercial development in the area (Far Western 2004; MACTEC 2007a; WCRM 2008). The following discussions are based on these documents.

Prehistoric Context

The Salt Wells region is rich in prehistoric archaeological sites, with rock shelters, caves, petroglyphs (rock carvings), hunting blinds, quarries, and open-air occupation and temporary camps among the archaeological site types represented. The size, location, and complexity of these sites vary with changes in resource availability, population, and environment that have occurred in the region since its initial occupation.

The archaeological patterns observed in the area parallel those over much of the western Great Basin. The following is a generalized chronological discussion and synthesis developed from these patterns.

Terminal Pleistocene/Early Holocene. The planning area has been used by people at varying intensities since the end of the Pleistocene 12,000 to 14,000 years ago. The Terminal Pleistocene and Early Holocene archaeological record is typically marked by various forms of leaf-shaped, lanceolate, and often fluted points, and various stemmed points, that make up the "Western Pluvial Lakes Tradition" of Bedwell (1970, 1973). Milling equipment, although occasionally present in Terminal Pleistocene and Early Holocene components, is more rare than in later time periods.

The adaptive strategy pursued by these early inhabitants of the Great Basin has been described as Paleoarchaic (Jones and Beck 1999) or Pre-Archaic (Elston 1986). Both labels emphasize similarities to the generalized Archaic strategies of the later Holocene. Site density is relatively low, probably due to low populations and high residential mobility (Elston 1986, 2002; Elston and Zeanah 2002; Willig and Aikens 1988). Sites of this period are found in diverse environments but are often situated to take advantage of shallow lake/marsh systems. During this time, the diversity of obsidian source locations manifest in Great Basin Stemmed-series projectile points is higher than during any subsequent period (Jones et al. 2003; McGuire 2002), suggesting that the foraging ranges of their makers were comparatively large.

Early Archaic Period. Mazama Ash (ca. 7,000 BP) is the primary stratigraphic marker for the beginning of this period. Evidence of Early Archaic cultural activity in the western Great Basin is widespread, represented by various split-stem projectile points (e.g., Gatecliff, Bare Creek, Martis). In addition to these are numerous flake tool scrapers, bifacial knives, heavy core tools, and, for the first time, abundant ground and battered stone milling equipment. Although few single component Early Archaic sites have been investigated, nearly every major cave deposit and many open-air sites contain at least some Early Archaic material (Elston 1982; Pendleton et al. 1982; Beck 1995). Even more numerous in the region are hundreds of small Early Archaic upland camps.

The Early Archaic period witnessed an overall increase in archaeological site density, a pattern that accelerates in the subsequent Middle Archaic period. Ameliorating climatic conditions at the end of the Middle Holocene (ca. 7,200 to 3,440 BP) may have played a role in this transition, although it is not immediately clear how local environmental changes might have affected specific plant and animal resources. The increased archaeological visibility may also be due to increasing population densities, with the exception of apparent decreases prior to 4,500 BP. Within this framework, the Early Archaic period witnessed the initial rise of settlement hierarchies in this region of the Great Basin, corresponding to the archaeological equivalents of base camps, field camps, and task stations. It has been suggested that adaptive strategies during this period involved water sources, such as rivers and springs, and that substantial occupations were focused on these locations. This may have been a result of the comparatively drier and warmer climate.

Middle Archaic Period. The Middle Archaic period (ca. 4,500 to 1,300 BP) in the western Great Basin witnessed the accelerated elaboration of logistically well-organized adaptive behavioral patterns, marked by increasing cultural complexity (Elston 1982, 1986; Thomas 1982), possibly spurred by the wetter and cooler Late Holocene (3,440 BP to present) climate. This is manifested in the archaeological record through an amazing richness and variety of textiles and other perishable remains, an explosive increase in rock art, and an increasing range of site types. In the western Great Basin, the Middle Archaic is characterized by its distinctive and elaborate material culture, long distance trade and exchange relationships, and overall settlement complexity. Occupations at Gatecliff Shelter, short-term camps at the James Creek and South Fork shelters, and activities at the Tosawihi quarries all increased during the Middle Archaic.

Middle Archaic times also saw the continued development of an unprecedented phase of biface manufacture associated with major basalt, obsidian, and other toolstone quarries (Elston and Raven 1992; Gilreath and Hildebrandt 1995; Hall 1983; McGuire 2002; McGuire and Bloomer 1996). The sizes, locations, and assemblages of Middle Archaic sites suggest that they served many different purposes, with use as long-term residential bases, smaller serially reoccupied camps, communal hunting/butchering localities (Pendleton and Thomas 1983), quarries and stone-working camps (Bloomer 1997), and hunting and gathering stations. Large settlements of Middle Archaic age have been reported throughout western Nevada. Middle Archaic adaptations throughout the western Great Basin (building on changes initiated during the Early Archaic) may have been less residentially mobile, at least compared to the more free-ranging settlement patterns of earlier times. However, expansive exchange networks and long-range, logistically organized forays by male hunting parties appear to have undergone continued elaboration during this period.

Late Archaic Period. Most researchers now agree that the Late Archaic period (ca. 1,300 to 700 BP) was a time of profound cultural change in the western Great Basin induced by severe drought, population increases, resource imbalances, ethnic displacements, changes in technology, social conflict, or some combination of these.

In keeping with the adaptive changes witnessed during the Middle Archaic Period, Late Archaic occupations in the western Great Basin show increasing settlement centralization (Clay 1996; Rosenthal 2000) and subsistence intensification, and a decrease in the area over which groups foraged. Late Archaic deposits marked by Rose Spring and Eastgate-series projectile points are ubiquitous throughout the region and occur in a wider range of settings than do earlier sites. Coinciding with these changes in settlement pattern are numerous technological shifts. House structures become smaller and less substantially built (McGuire 2002), caches are fewer and less elaborate, and many types of perishable artifacts seem to all

but disappear from the record (Elston 1982, 1986; Pendleton et al. 1982). The bow and arrow replace the *atlatl* (a device used for throwing a spear or dart) as the principal weapon during the Late Archaic, contributing to a major reorganization of flaked stone technologies. Bifaces decrease significantly in size, abundance, and morphological formality and are often simply replaced by numerous flake tools. Ground stone milling equipment shows a similar trend toward unshaped artifacts that were rarely cached. On balance, the shift to more expedient technologies—disposable tools that were less adaptable to varied circumstances—suggests that Late Archaic populations were less mobile and foraged more intensively over a limited area, obviating the need to transport or cache more reliable and specialized tools. In sum, Late Archaic settlement-subsistence adaptations appear to have decreased dramatically in the area over which groups foraged, coinciding with a marked increase in settlement centralization and resource intensification, but with little change in social organization.

Terminal Prehistoric Period. Terminal Prehistoric (ca. 700 BP to AD 1820) In fact, a generally sparse archaeological record with respect to settlement patterns. Where they occur, Terminal Prehistoric habitation sites are often situated in entirely different locations than previous settlements. Sites and components dating to this time often have a stand-alone quality; they are usually represented by a single house structure found in an isolated context, not tied to larger middens or residential complexes. House construction techniques are very informal, often leaving no more than shallow, circular zones of soil discoloration suggestive of very short-term, single- or several-season occupations. Their floor assemblages are correspondingly low-density, but heterogeneous, reflecting a range of male- and female related domestic and subsistence-related tasks consistent with a family band occupation.

None of these changes in settlement strategies seem to have been accompanied by significant changes in technology, raw material use patterns, or size of the areas over which people foraged. Quarrying activities at Tosawihi increased and villages were established in less hospitable environments, such as high altitudes, which may signify an expansion of a surplus population. However, if settlement patterns are any indication, Terminal Prehistoric socioeconomic organization underwent a major transformation. Earlier band-like groups residing in large villages seem to have been replaced by family or household units living in independent camps, much like those reflected in the ethnographic record.

Ethnographic Overview

The Native American group whose evidence is most commonly found in the region is the Northern Paiute; a subgroup known as the Toi Ticutta (also referred to as Toidikai) or Cattail-Eaters retain close ties to the project area. The Northern Paiute are a Uto-Aztecan speaking group that ranged over western Nevada and the Owens Valley portion of eastern California. The Northern Paiute were semi-nomadic, moving between environmental zones to take advantage of resources as they became available (BLM 2001b). Fowler (1992) provides extensive background and detailed accounts of lifeways among the Toi Ticutta, who are known to have visited and lived around the Salt Wells Basin.

Lifeways varied according to type and abundance of resources available within a group's territory. The wetland environments of Carson Lake and surrounding basins allowed a more centralized settlement and subsistence strategy than that of neighboring bands. However, the annual round was somewhat consistent from group to group. Winters were spent in multifamily villages, composed of three to ten houses. Winter houses included a conical pole framework built around a shallow depression and covered with tule mats. During spring and summer, small groups moved away from the winter village. They roamed widely, residing in camps located near resource concentrations. Plants provided most of their subsistence, although in some locations, fishing was important. Later in the fall, some groups traveled to

areas where pine nuts could be collected. Fall also was the preferred hunting season. Mountain sheep and deer were hunted, and antelope were taken in communal drives. With the onset of winter, groups once again congregated and lived off stores assembled over the summer and fall (BLM 2001b).

In the 1820s, British and American fur trappers began penetrating the Great Basin, which includes northern and western Nevada. In 1830, Peter Skene Ogden was the first documented non-Indian to enter the Carson City BLM District and encounter Native American populations there (Fowler 1992; d'Azevedo 1986). While there is no direct way to determine when the people first occupied the area, it is clear that by 1830 they were well established and had been in the area for many years. By the 1850s, land acquisitions, ecological changes, and cultural disruptions caused by non-Indians immigrating into the region were curtailing traditional lifeways of the Northern Paiute to the extent that they were becoming dependent on non-Indian communities (Malouf and Findlay 1986).

Native American Resources

Native American resources are defined under various authorities, including FLPMA, the American Indian Religious Freedom Act, EO 13007, the Native American Graves Protection and Repatriation Act, and the NHPA. Under these authorities, federal agencies have the responsibility for managing Native American resources by, in part, considering them in land use planning and environmental documentation and mitigating, where possible, impacts on places or resources important to contemporary Native Americans and federally recognized tribes.

Slight differences in definitions among the authorities notwithstanding, these resources can be generally defined as places or resources, such as plants and animals, associated with cultural practices or beliefs of a living community that are rooted in a tribal community's oral traditions or history, and are important in maintaining the continuing cultural identity of the community. In practice, this means identifying, evaluating, and managing ethnohistoric sites and resources, traditional use areas, sacred and ceremonial sites, and TCPs.

Since tribal heritage resources are defined culturally by the people and groups that value them, these resources can be identified and managed only in consultation with the people infusing them with cultural value. In the final analysis and decision-making, a federal agency has the legal authority to determine how these resources would be managed and what, if any, mitigation would be used to avoid undue and unnecessary impacts on these resources.

Ethnographic information indicates that Northern Paiute occupied the Salt Wells area, and their way of life is characterized by the concept of living in harmony with the natural environment. Rituals and ceremonies ensure that plants, animals, and physical elements flourish. The continued welfare of the people depends on these rituals and ceremonies being performed properly and the resources being available. The manner of performing the rituals and ceremonies, the places at which they are performed, and perhaps even the time of their performance are often prescribed.

Religious expression takes several primary forms, including ceremonies, individual prayer, and use of power spots for vision questing, curing, and doctoring. The most frequent form of expression is the individual prayer. Prayers are made to the spirits and were especially important in connection with places where spirits may live or places regarded as power spots.

The concept of *Spirit Power* (*Puha,* in Northern Paiute) and its impact on places, people, or events provides the basis for understanding the nature and distribution of places important to Northern Paiute people in the Salt Wells area. As described in Fowler (1992 and d'Azevedo 1986) the Northern Paiute believe that the universe is a living thing, in which everything has differing amounts of *Spirit Power*. The amount or intensity of *Spirit Power* can change through time and across space in ways that cause events, or allow individuals or groups to do things. Important events happen at particular places because those places have more *Spirit Power* than others. Important people arise because they have high *Spirit Power* relative to others, and important groups arise because they have relatively high *Spirit Power*. Conversely people and places can lose *Spirit Power* and fall into obscurity. *Spirit Power* can also be dangerous, and ordinary people do not casually seek it (Fowler 1992). It can come to people against their wishes and transform them into either good or evil shamans.

The belief in *Spirit Power* is also the basis for the tribal argument that all lands and resources are sacred. While this argument is meaningful to tribes, it is rarely useful in land use planning. Therefore, the preparers of this EA have focused on places where ethnographic literature and past consultation suggest that high levels of *Spirit Power* have created especially significant places and resources and that these need specific management attention. These places include ethnohistoric sites, traditional use areas, and sacred sites. There is obvious overlap in the site types, and a place can be reasonably put into any or all of them. However, in this EA, each place or resource is placed in only one category.

Ethnohistoric Sites: Tribal ethnohistoric sites are most familiar to non-Indians because they are similar to the kinds of site generally considered to be of historic interest. Ethnographic sites may include those that could also be considered sacred or ceremonial and ethnohistoric. This is because these sites are primarily defined by their prominence in living oral history and are recognized by elders as most important for physically mapping tribal history and culture. As summarized in Bengston (2003) for the Northern Paiute, important ethnohistoric sites include those that are sacred or used for habitation, trails, ceremonial locations, battle sites, and burials.

Traditional Use Areas: Any traditional lifeway, such as ranching, or ethnographic lifeway that depends directly on natural resource extraction, would over time develop places that are particularly important for their resources and history of resource extraction. Eventually, these areas assume significant roles in defining and maintaining the traditional lifeway. These traditional use areas become even more significant when the traditional lifeway is threatened by uncontrollable external changes. Contemporary tribal identity and lifeways are developed and maintained by intergenerational use of traditional use areas.

In contrast with many other types of tribal heritage resources, associated with general tribal activities, traditional use areas can be associated with individuals. In addition, what non-Indians regard as identical resources in identical places (e.g., any pinyon tree or grove is the same as any other) may in fact be very different because they have varying amounts of *Spirit Power* and may be used by a particular family or individual because of a special connection, through *Spirit Power,* between the place and the person. As summarized in Bengston (2003) for the Northern Paiute, important traditional use areas include: pinyon gathering locations; basketry material sites; medicinal plant and mineral gathering sites; and group hunting (rabbit, antelope, or sheep drives) and fishing locations.

Sacred Sites: As defined in EO 13007, sacred site means any specific, discrete, narrowly delineated location on federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as

sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion. As summarized in Bengston (2003) for the Northern Paiute, important sacred sites include sacred geography—places that figure prominently in tribal mythology, such as origin locations, or prominent geographic points, such as mountain peaks, waters, especially lakes, rivers, and hot springs, and ceremonial sites.

Sacred Geography: Mountain ranges incorporate mountain peaks and caves and these allow mountains to gather and hold *Spirit Power* and are important tribal heritage resources throughout the Salt Wells region. Mountains host resources, such as pinyon and stream origins, that are essential to survival. All mythological origin points and creation sites of the region are found at mountain peaks (Fowler 1992). Shamans, doctors, and others seeking supernatural power would find it in mountain caves, and ordinary people went to caves to leave offerings soliciting supernatural help (Fowler 1992). Mountain peaks considered most sacred to Northern Paiute include Job's Peak and Mount Grant (Bengston 2003).

Waters: Since *Spirit Power* flows through the earth and all living things, water (also a scarce resource in a desert ecosystem) is sacred to the Northern Paiute (Fowler 1992). Water figures prominently in origin stories and other mythology. Lakes, rivers, major springs, and especially hot springs are centers for shamanistic, medicinal, and ceremonial activities. Shamans, mythological heroes, and mythological villains travel along water *(Spirit Power)* networks and use them to communicate with the spirit world. People also make offerings at springs and other waters to gain favor with spirit beings (Fowler 1992).

Water babies are small very powerful spirit beings who inhabit deep-water sources, such as major springs, rivers, and lakes (Fowler 1992). They are a source of power for doctors and shamans but can hurt ordinary people (Fowler 1992). Water babies make water flow and an active water source would dry up if they abandon it (Fowler 1992). As water baby habitat, Lake Tahoe and Pyramid, Walker, Soda, and Mono Lakes are sacred, as are the Truckee, Carson and Walker Rivers (Fowler 1992). Because the water in hot springs is heated deep within the earth, hot springs are water baby habitat and thus considered sacred by the Northern Paiute. Marshes and small seeps and springs are too shallow to support water babies and are generally not considered to be strong *Spirit Power* sources.

Ceremonial Sites: Among the Northern Paiute (Fowler 1992; Bengston 2003) there are places with high *Spirit Power* where shamans and healers do their work and where ordinary people go to connect with the supernatural (Bengston 2003). Such places include rock art sites, caves and springs where individuals gain *Spirit Power*, dance sites, doctor (or medicine) rocks, hot and cold springs, and places where objects have been ritually placed (Bengston 2003). Some of these places contain physical evidence of use; others do not. Shamanistic rock sites are of particular importance to Northern Paiute and are used as prayer/offering places to seek medicinal relief or supernatural favors (Fowler 1992). The rocks themselves usually have numerous cupules pecked into them and have small offerings (coins, bullets, notes, buttons, etc.) left on or near them. Among the ceremonial sites recorded for the Northern Paiute are rock art sites, which have been of interest to archaeologists for decades.

Traditional Cultural Properties: The term TCP was coined in National Register Bulletin 38 to refer to a property that may be eligible for inclusion on the National Register of Historic Places (NRHP) because of its association with cultural practices or beliefs of a living community that are rooted in that community's history and that are important in maintaining the continuing cultural identity of the community. This was further clarified in a 1992 amendment to the NHPA that stated, "properties of traditional religious and cultural importance to an Indian tribe may be determined to be eligible for inclusion on the National

Register." Although the term TCP is not found in the NHPA or its implementing regulations, it has become important for determining eligibility and compliance with Section 106 of the NHPA.

There are regulatory limitations on the NRHP eligibility that limit its value in a general planning context. Because of this, the concept of TCP is used here only when tribes have specifically identified a resource as a TCP. This is not to say that the resources discussed here are not eligible for the NRHP and thus not subject to Section 106 of the NHPA; they may well be eligible even if not identified as a TCP by a tribe and subject to Section 106.

Historic Context

Researchers have developed four periods or themes, as described in MACTEC (2007a), in which the Historic Period of the lower Carson River and Salt Wells Basin can be discussed: Exploration, Emigration and Settlement, Development, and Modern (Pendleton et al. 1982; Elliot 1987).

Exploration. Euro-American fur trappers and traders made their first forays into the central Great Basin during the Exploration period (AD 1820 to 1850), amid competition from British and American firms to exploit the Humboldt River trapping grounds and other regional streams. Between 1826 and 1830, both Jedediah Smith of the Rocky Mountain Fur Company and Peter Skene Ogden of the Hudson's Bay Company led expeditions across modern-day Nevada. However, fur-trapping potential was always marginal in the Great Basin, and expeditions ended in the early 1840s. As fur trapping declined, official government mapping and exploration expeditions were expanded into the Great Basin, partially to establish an American presence in what was, until 1848, Mexican territory. The Walker expedition in 1833 and the John C. Fremont expeditions between 1843 and 1853 are likely the most notable. Fremont's expeditions produced comprehensive maps and descriptions of the region, providing invaluable resources for later settlement and development.

Emigration and Settlement. The Emigration and Settlement Period (AD 1840 to 1880) encompasses the phases of westward migration to and the settlement of California, the California Gold Rush of the late 1840s, and the settlement and development of the Comstock following the 1859 silver strikes. The first reservations for the Northern Paiute were identified and occupied in 1859 at Walker Lake and Pyramid Lake (although they were not established by Congress until 1874).

The Bidwell-Bartleson group was the first emigrant party to make the trans-Sierran journey to California, following the Humboldt River through Nevada in 1841 and crossing the Sierra Nevada at Sonora Pass. They were followed in 1844 by the Stevens party that established an alternative route along the Truckee River, crossing the Sierra instead at Donner Pass. The trickle of settlers and gold-seeking emigrants increased during the 1840s and 1850s. The Carson River Route of the California Trail eventually became a major thoroughfare. Some of the earliest permanent settlements were established along the route as supply points. These included Mormon Station, or Genoa, in Carson Valley in 1850 and Ragtown, 20 miles northwest of the project area on the Carson River. Ragtown, with its seasonal camps of merchants, was the first freshwater source emigrants would have encountered after crossing the Forty Mile Desert. A permanent post was established in 1854.

Comstock silver strikes in 1859 brought additional prospectors to the Virginia Range, approximately 55 miles west of the project area. Industrial development of lode mining and milling there created an expanded, relatively urbanized population in Virginia City, Gold Hill,

and Silver City. Farming and ranching expanded along the Carson River and nearby valleys to support the new population centers. Other previous metal discoveries and urban development followed across central Nevada, although such instances were often short-lived. Some of these mineral discoveries were close to the project area and included salt deposits at San Springs and borax along the western edge of Eight Mile Flat. Salt was an important component of nineteenth century ore processing and borax an important commodity in and of itself.

The new population centers and mineral discoveries gave rise to regional wagon road networks connecting markets to supply points and mineral sources to mills. Of these freight roads, the Reese River Road passes just north of the project area, and the Fort Churchill to Sand Springs Road is just south of the project area. Many of the initial roads ran east-west for delivery to California, but with the completion of the transcontinental railroad along the Humboldt River corridor in 1869, freight roads running north-south linking railheads with interior mining districts began to be established. One of these roads was the Wadsworth and Columbus Freight Road, which runs through the project area.

Development. Evolution of agriculture and transportation along the lower Carson River east of the project area characterize the Development Period (AD 1880 to 1941). However, much of that evolution had little direct impact on the Salt Wells Basin or the neighboring Bunejug Mountains. Extensive areas of the Carson Desert became irrigated and Fallon was developed as an urban center as a result of the National Reclamation Act of 1902 and construction of the Newlands Project. Some wagon road networks were expanded and developed into Nevada's federal highway system. The Reese River Road north of the project area became the Lincoln Highway and was renamed in the 1920s to US Highway 50.

The importance of mining in Nevada's economy faded between 1880 and 1900 as no new discoveries were made and areas that had been developed in connection with mining declined. The "Central Route," south of the project area, faded in importance and was gradually abandoned during the mining depression. Tonopah and Goldfield produced a boom in the early 1900s, and smaller districts, closer to the project area, such as Wonder (1906), Fairview (1906), Rawhide (1908 to 1920), and Westgate (1915), also contributed to mining and milling and energized the local freighting networks.

Modern. The Modern Period (AD 1941 to present) has experienced continued agricultural growth in the Fallon area, even though the Newlands Project is limited in the amount of land that can be irrigated. Fallon Naval Air Station was established just southeast of Fallon in 1942 in support of World War II efforts. It was deactivated for a time after World War II but was reopened as a Navy Auxiliary Air Station in 1951. The base provides training facilities for Navy and Marine Corps pilots and ground crews. One flight path to the base landing strip passes directly over the project area.

The last Northern Paiute reservation was established at Bridgeport in 1972 (Clemmer and Stewart 1986). The Northern Paiute had land claims adjudicated through either the Federal Indian Claims Commission or the Federal Court of Claims. These settlements were accepted by the tribe decades ago, and there are no outstanding claims to be adjudicated.

Inventories

Survey History

Between March 4 and March 8, 2008 and May 13 and May 16, 2008 archaeologists from Western Cultural Resource Management, Inc. (WCRM) conducted a Class III Cultural

Resource Inventory of 11 drill pad locations and their corresponding access roads totaling approximately 432 acres of land, 360 acres administered by the BLM and 72 acres administered by the BOR, for the Vulcan Power Company Salt Wells Geothermal Project in Churchill County, Nevada. Survey methods focused around the identification, recordation, and NRHP evaluation of all cultural resources within the lands surveyed. The overall process began with a pedestrian survey in which drill pads and access roads were surveyed by walking 30 meter transects. For Pads 10, 11, 12, 14, 14a, and 15, WCRM first surveyed the proposed square drill pad (500-ft by 500-ft) for each location. If sites were encountered, the crew surveyed additional areas within a 945-foot radius to find a possible new location for the drill pad. For Pads 16, 17, 18, 19, and 20, WCRM surveyed the entire 945-foot radius are around each location as well as the 500-ft by 500-ft pads. WCRM also surveyed a 100-foot wide access road corridor for each drill pad; on Pads 11, 12, 16, 17, 18, 19, and 20, pre-flagged corridors were surveyed. On Pads 14, 14a, and 15, WCRM selected road corridor routes and surveyed them; when a site was found in the first access road corridor for Pad 14, a second access road corridor was surveyed. On Pad 10, located on Star Flat, the crew surveyed the entire area south of the drill pad to the modern bladed road, which would be used for access, clearing all of it for a short access route.

Previously, MACTEC conducted a Class III cultural resources survey of the initial 10-pad project area in October and November 2006. This inventory included archival research, pedestrian survey, and eligibility evaluation of prehistoric and historic sites around the proposed drill sites, cold water well, and along a corridor straddling any proposed access roads. The APE for the proposed project was defined by MACTEC as a 500-by-500-foot area around each drill site, a 100-foot buffer zone in all directions around the cold water well, a 100-foot corridor along the centerline of proposed new access roads, and a fifty-foot wide corridor on each side of existing roads, measured from the road edge (MACTEC 2006 and 2007a). During the course of the inventory, proposed access roads and drill sites were relocated by Vulcan Power whenever possible to avoid archaeological sites. MACTEC also surveyed new roads and drill sites established as part of avoidance efforts. If archaeological sites were identified within these areas, the road or drill site was again relocated so as to avoid the sites.

The Wadsworth and Columbus Freight Road was determined eligible for the NRHP and recorded in 2007. MACTEC provided a treatment plan and interpretative article in 2007, prior to the blading and upgrading of the road.

Other previous surveys in the project area primarily included small archaeological surveys associated with geothermal exploration within the Salt Wells lease area, road access, and Nevada Department of Transportation gravel extraction (York 1976; Hattori and McLane 1980; Hattori 1984; Far Western 2004).

Findings

WCRM recorded five new sites, revisited and updated one previously recorded site, and recorded 13 isolated features and artifacts.

WCRM evaluated five archaeological sites per NRHP criteria. WCRM recommended four sites as not eligible to the NRHP because of the lack of time-diagnostic artifacts, low artifact density, and low likelihood of containing buried deposits. Vulcan relocated pads to avoid potential conflicts with these sites. One site was potentially eligible to the NRHP but Vulcan avoided the site by relocating drilling to a new pad location, and the site was left unevaluated.

WCRM recommended a segment of the Wadsworth and Columbus Freight Road as a non-contributing element to the overall road site, which site was determined eligible by MACTEC in 2007. Due to the loss of integrity to the portion of the road within the project area, this segment was found to be a noncontributing element of the NRHP-eligible site. WCRM, therefore, proposed a recommendation of No Effect/No Further Work for all five newly recorded sites and the previously recorded site.

Native American Resources

Cultural resources are considered Native American Resources (see previous section). Based on the ongoing consultation with the Fallon Paiute-Shoshone Tribe, prehistoric cultural resources identified during the Class III survey would be avoided. In the event of an inadvertent discovery, the tribe would be contacted. Consultation would be ongoing with the tribe until completion of the project.

3.C INVASIVE, NON-NATIVE SPECIES

Several non-native and invasive plant species, including cheatgrass and Russian thistle, were observed and widespread at most of the sites. Halogeton was sparse but present at several locations. Most disturbed areas supported populations of Russian thistle, and it was prevalent along most dirt roads in the area. Cheatgrass was widespread and appeared as an understory species throughout the project vicinity. Halogeton was largely confined to areas with fairly firmly packed soils, such as vehicle turnouts. Stands of Halogeton should be identified and avoided to deter spread by human vectors. A Halogeton management plan would be included in site development specifications (WBS 2008). Salt cedar (*Tamarix* sp.) and tall whitetop (*Lepidium latifolium*) are the two noxious weed species identified by the state of Nevada (NAC 2003) that occur in the area. They were not observed at any of the sites during field surveys.

3.D 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 are protected under the Migratory Bird Treaty Act of 1918. Management of these species is based on Instruction Memorandum – IM 2008-050 dated December 18, 2007. The species list of concern for analysis is included in the IM. Table 3-3 shows the species of concern that could occur in the general project area (BLM 2007).

The Lahontan Valley Wetlands is an Important Bird Area (IBA) associated with the general project area. There are no identified important wintering areas within the general project area (McIvor 2005).

Table 3-3 BIRDS OF CONCERN on CCFO as per IM 2008-050 List

Game Birds of Conservation Concern on CCFO	
Canvasback	*Aythya valisineria*
Dove, Mourning	*Zenaida macroura*
Duck, Ring-necked	*Aythya collaris*
Duck, Wood	*Aix sponsa*
Mallard	*Anas platyrhynchos*
Pigeon, Band-tailed	*Columba fasciata*
Pintail, Northern	*Anas acuta*

Bird Species of Conservation Concern on CCFO	
Avocet, American	*Recurvirostra americana*
Blackbird, Tricolored	*Agelaius tricolor*
Bitten, American	*Botaurus lentiginosus*
Cuckoo, Yellow-billed	*Coccyzus amenicanus*
Curlew, Long-billed	*Numeniua americanus*
Eagle, Golden	*Aquila chrysaetos*
Falcon, Peregrine	*Falco peregrinus*
Flycatcher, Olive-sided	*Contopus cooperi*
Goshawk, Northern	*Accipiter gentilis*
Harrier, Northern	*Circus cyaneus*
Hawk, Ferruginous	*Buteo regalis*
Hawk, Swainson's	*Buteo swainsoni*
Hummingbird, Costa's	*Calypte costae*
Hummingbird, Rufous (Alpine Co. only)	*Selasphorus rufus*
Jay, Pinyon	*Gymnorhinus cyanocephalus*
Nuthatch, Pygmy	*Sitta pygmaea*
Owl, Burrowing	*Athene cunicularia*
Owl, Flammulated	*Otus flammeolus*
Owl, Short-eared	*Asio flammeus*
Owl, Spotted	*Strix occidentalis*
Phalarope, Wilson's	*Phalaropus tricolor*
Plover, Snowy	*Charadrius alexandrinus*
Sage Grouse, Greater, Columbia Basin pop.	*Centrocercus urophasianus*
Sapsucker, Red-naped	*Sphyrapicus nuchalis*
Sapsucker, Williamson's	*Sphyrapicus thyroideus*
Shrike, Loggerhead	*Lanius ludovicianus*
Sparrow, Brewer's	*Spizella breweri*
Sparrow, Sage	*Amphispiza belli*
Swift, Black (Alpine Co. only)	*Cypseloides niger*
Vireo, Gray	*Vireo vicinior*
Warbler, Black-throated Gray (east part of CCFO only)	*Dendroica nigrescens*
Warbler, Virginia's	*Vemivora virginiae*
Willet	*Tringa semipalmata*
Woodpecker, Lewis's	*Melanerpes lewis*
Woodpecker, White-headed	*Picoides albolarvatus*

Based upon Floyd (2007), Table 3-4 identifies the species of concern that could occur in the general project area to breed, forage, or fly over.

Table 3-4 BIRDS OF CONCERN POTENTIALLY OCCURRING IN THE PROJECT VICINITY

Game Birds of Conservation Concern on CCFO	
Canvasback	*Aythya valisineria*
Dove, Mourning	*Zenaida macroura*
Mallard	*Anas platyrhynchos*
Pintail, Northern	*Anas acuta*

Bird Species of Conservation Concern on CCFO	
Avocet, American	*Recurvirostra americana*
Curlew, Long-billed	*Numeniua americanus*
Eagle, Golden	*Aquila chrysaetos*
Harrier, Northern	*Circus cyaneus*
Hawk, Ferruginous	*Buteo regalis*
Hawk, Swainson's	*Buteo swainsoni*
Hummingbird, Costa's	*Calypte costae*
Owl, Burrowing	*Athene cunicularia*
Owl, Short-eared	*Asio flammeus*
Phalarope, Wilson's	*Phalaropus tricolor*
Plover, Snowy	*Charadrius alexandrinus*
Shrike, Loggerhead	*Lanius ludovicianus*
Sparrow, Brewer's	*Spizella breweri*
Sparrow, Sage	*Amphispiza belli*
Willet	*Tringa semipalmata*

3.E WASTES, HAZARDOUS OR SOLID

Geothermal exploration generally includes hazardous and solid waste within project area airspace. Petroleum products and other common hazardous materials are stored in the project area in impermeable, sealed, and secured containers, when drilling equipment is on-site. All chemicals are stored, handled, and disposed of in a manner consistent with the rules, procedures, and regulations outlined on the Material Safety Data Sheets (MSDS).

3.F WATER QUALITY (SURFACE/GROUND)

The ROI for water resources is the surface and groundwater in the area of the geothermal leases and access roads.

Surface Water

There are no permanent bodies of surface water in the ROI. Most of the runoff from the east slope of the Bunejug Mountains drains to an unnamed wash that discharges to Eight Mile Flat east of the project area. Runoff from the mountains also drains toward Star Flat to the north and to the Carson Lake Irrigation Ditch to the west. Water that collects in the playas during the winter eventually evaporates due to the low permeability of the soils.

The ROI overlies the transition zone (called the alluvial apron or bajadas) on the rocky lower slopes of the Bunejug Mountains and between Eight Mile Flat and Star Flat. Pad 10 is located at the southern edge of the Star Flat, an enclosed basin surrounded by the mountains, Highway 50, and the two main access roads to the lease. The playa collects runoff in winter and has no surface connection to Carson Lake or Eight Mile Flat. Vulcan would add gravel and other material from the Munoz quarry or the on-site borrow pit to raise elevation of the pad and access road by approximately one foot. Pads 11, 12, 14, and 15 are located on the slightly elevated terrain between Eight Mile Flat and Star Flat. Pads 16, 17, 18, 19, and 20 are on the plain below the western slopes of the Bunejug Mountains.

On the west side of the road that runs along the south margin of Eight Mile Flat are a number of springs. There are also springs on the east side of the road within Eight Mile Flat. The water discharged at these springs evaporates fairly rapidly when it emerges at the ground surface.

Groundwater

Available groundwater data are not sufficient to determine how groundwater flows are distributed between the Carson Desert, Eight Mile Flat, and Fourmile Flat accurately. Groundwater flow in the area is complex and is dependent on aquifer properties, sources and amounts of recharge, and the thermal regime.

The two principal types of aquifers are permeable units within the unconsolidated basin fill deposits and bedrock aquifers. The shallowest groundwater is a result of recharge at higher elevations and incident precipitation on playa surfaces. Shallow groundwater discharges to the springs on the margins of Eight Mile Flat. Some of the precipitation that falls on the ranges flows into deeper unconsolidated deposits that underlie clay lakebed deposits. In some areas, such as permeable fault zones, groundwater flows to depths that result in heating of the water. The chemistry of the subsurface deposits contacted by the water, the amount of time the water is in contact with the deposits, and the temperature of the water all contribute to the chemical composition of the water. Therefore, chemistry can be an indicator of the thermal history of the groundwater. The groundwater on the Vulcan Salt Wells leases reflects this thermal history. For example, the water well that Vulcan drilled in 2007 exhibits thermal characteristics.

The heated water can rise to the surface and be expressed as thermal springs, seeps, and wet areas. Coolbaugh et. al. identified areas associated with upwelling of geothermal water (Coolbaugh et. al. 2006). The thermal water is also expressed as low volume and ephemeral springs and warm ground. Coolbaugh also noted the presence of cold springs in the Salt Wells basin in the winter of 2005 following a period of recent rain and snow. The springs dried up in the summer of 2005 and reappeared in the winter of 2006.

Most of the shallow recharge to the Salt Wells Basin probably ends up evaporating from the surface of the basin or being transpired by plants along the basin margins. As of 1988, there was reportedly only one domestic well and several stock wells in the Salt Wells Basin, accounting for a relatively minor amount of water losses, on the order of several acre-feet per year. The well that Vulcan drilled in 2007 for use in construction does not yield enough water to meet all the needs of the project. The total flow from springs and artesian wells was estimated to be about 113 acre-feet per year (WESTEC 1988).

Springs appear to be more numerous toward the northern end of the project area. There is very little groundwater recharge within the ROI itself. The water quality of the springs is not well known, but within the playa deposits it likely contains significant total dissolved solids concentrations. Thermal springs sampled by Coolbaugh et. Al have a distinct thermal composition and contain chloride concentrations greater than 1,000 milligrams per liter (mg/L), which greatly exceeds the World Health Organization (WHO) health guideline of 250 mg/L. A stock well at Rock Springs, east of the project area, contained total dissolved solids concentrations greater than 3,000 milligrams per liter (mg/L or ppm; WESTEC 1988).

A hydrologic study of the Salt Wells Basin was conducted in 1977 by GeothermEx, Inc., for Anadarko Production Company. A summary of the results of the study was presented in the Environmental Baseline Study prepared by WESTEC (1988). The study found that most of the wells within the basin do not yield potable water. The wells generally have moderate levels of dissolved solids concentrations dominated by sodium chloride. Some of the wells also contain high sulfur concentrations. Total dissolved solids concentrations in groundwater from wells on the basin floor typically range from 3,000 to 50,000 mg/L, while concentrations on the margins of the basin are typically less than 3,000 mg/L (WESTEC 1988).

3.G WETLANDS AND RIPARIAN ZONES

Playa and ephemeral wash were observed at the proposed drilling sites. No riparian areas were observed during field surveys; nearby, however, east of the road within the western side of Eight Mile Flat, there are springs and associated wetland vegetation, including ephemeral salt grass meadows.

Playas are ephemeral wetlands, characterized by a defined basin, hard, cracked, clayey soils, and salt on the soil surface. Pad 10, indicated in Figure 2 -1, is located on a playa. While the US Army Corps of Engineers may take jurisdiction over playas and wetlands as "special aquatic sites," the US Army Corps of Engineers is not expected to take jurisdiction over this site, which does not abut and has no surface connection to waters of the US.

The edges of playas are usually marked by a distinct break in vegetation from extremely low-lying species within the playas to more shrubby plant types outside of the playas, as well as a distinct topographical change from very flat inside the playas to more varied terrain outside of the playas.

The Western Botanical Services, Inc. survey found that the only vegetation observed on Pad 10 was greasewood (*Sarcobatus vermiculatus*). The Carter Schleicher Consulting survey found rabbitbrush (*Chrusothamnus nauseosus*) 150 feet west of Pad 14 and rush (*Juncus sp.)* and common wheat grass (*Elymus sp.*) 1,550 feet south of Pad 15. A salt crust covers most of the playa and no wetland plants were observed within 1,550 feet of the sites..

3.H BLM SENSITIVE SPECIES

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 USFWS/NMFS [National Marine Fisheries Service]; 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).

The special status species that may occur within the proposed drilling areas were identified through a search of the Nevada Natural Heritage Program (NNHP) database for Churchill County (NNHP 2004) and discussions with BLM (2005 and 2008). These species are presented in Table 3-5.

There have been no documented occurrences of the species listed in Table 3-5 at the proposed well sites. Species listed in Table 3-5, however, have the potential to occur in the region. The pads and nearby playas and salt desert scrub may provide breeding and foraging habitat for species in Table 3-5. The well sites are six miles south of the Stillwater National Wildlife Refuge and adjacent to or within four miles of Carson Lake and Pasture and the black tern and Sand Hill crane may fly over the area. One burrowing owl was observed on lands adjacent to the project location (WESTEC 1988). Further, two reconnaissance-level surveys in 2006 did not observe any of the species listed in Table 3-5 (Tetra Tech 2006; EMPS 2006).

Table 3-5 BLM Sensitive Species that May Occur in the Proposed Drilling Areas

Common Name	Scientific Name
Birds	
Ferruginous hawk	*Buteo regalis*
Western burrowing owl	*Athene cunicularia hypugaea*
Swainson's hawk	*Buteo swainsoni*
Golden eagle	*Aquila chrysaetos*
Short-eared owl	*Asio flammeus*
Snowy plover	*Chadarius alexandrinus*
Loggerhead shrike	*Lanius ludovicianus*
Vesper sparrow	*Pooecetes gramineus*
Long-billed curlew	*Numenius americanus*
Prairie falcon	*Falco mexicanus*
Black tern	*Chlidonias niger*
Sand Hill crane	*Grus canadensis*
Mammals	
Pale Townsend's big-eared bat	*Corynorhinus townsendii*
Spotted bat	*Euderma maculatum*
Small-footed myotis	*Myotis ciliolabrum*
Fringed myotis	*Myotis thysanodes*
Little brown myotis	*Myotis lucifugus*
California myotis	*Myotis californicus*
Pallid bat	*Antrozous pallidus*
Silver-haired bat	*Lasionycteris noctivagans*
Hoary bat	*Lasiurus cinereus*
Long-eared myotis	*Myotis evotis*
Long-legged myotis	*Myotis volans*
Western pipistrelle	*Pipistrellus hesperus*
Brazilian free-tailed bat	*Tadarida brasiliensis*
Amphibians	
Northern leopard frog	*Rana pipiens*
Plants	
Nevada Oryctes	*Oryctes nevadensis*
Scented (Lahontan) beardtongue	*Penstemon palmeri* var *macranthus*
Nevada sanddune beardtongue	*Penstemon arenarius*

Source: NNHP 2004; BLM 2005 and 2008

3.I LAND USE

The proposed project would develop an additional ten well pads and access roads in the project area in Churchill County, Nevada. The proposed facilities would occupy approximately 34 acres of the 15,354 acres under lease to Vulcan federal (Figure 2-1). The BLM manages the surface of 12,794 acres of these leases, and the BOR managers 2,560 acres on the western side of the leases. The BLM administers geothermal leasing on both BLM and BOR lands.

The Carson Lake and Pasture area is west of the BLM-managed Vulcan Salt Wells leases. The proposal to transfer the federally owned Carson Lake and Pasture from the BOR to the State of Nevada was developed pursuant to Section 206(e) of Public Law 101-618, enacted in 1990 (Reclamation 2004). However, the transfer has not occurred, and the Nevada Department of Wildlife is managing the area (Grenier 2006). Carson Lake and Pasture is a 30,000-acre wetland within Reclamation's Newlands Project. The wetland is a component of the Western Hemisphere Shorebird Reserve Network and is one of the most valuable in northern Nevada. The Carson Lake and Pasture area extends 0.5 miles into the Vulcan leases (see Figure 3-1). None of the proposed facilities would be within the boundaries of Carson Lake and Pasture.

Surrounding lands are mostly BLM, Reclamation, US Fish and Wildlife Service, and US Navy lands. There are also a few small in-holdings of private land; the City of Fallon is approximately six miles northwest of the project area, and Naval Air Station Fallon is also west of the project area. Surrounding BLM land has been approved for more extensive geothermal development in the form of geothermal power plants and transmission lines, however no power plants have yet been constructed.

3.J PUBLIC HEALTH AND SAFETY

Public health and safety issues from geothermal exploration generally include hazardous materials, wildfires, worker safety, and aircraft safety within project area airspace. Petroleum products and other common hazardous materials are stored in the project area in impermeable, sealed, and secured containers, when drilling equipment is on-site. All chemicals are stored, handled, and disposed of in a manner consistent with the rules, procedures, and regulations outlined on the Material Safety Data Sheets (MSDS). The Great Basin is known for its year-round dry climate and occurrence of wildfires from July through September, sometimes lasting until December. The project area is populated by sparse vegetation and has minimal fire history.

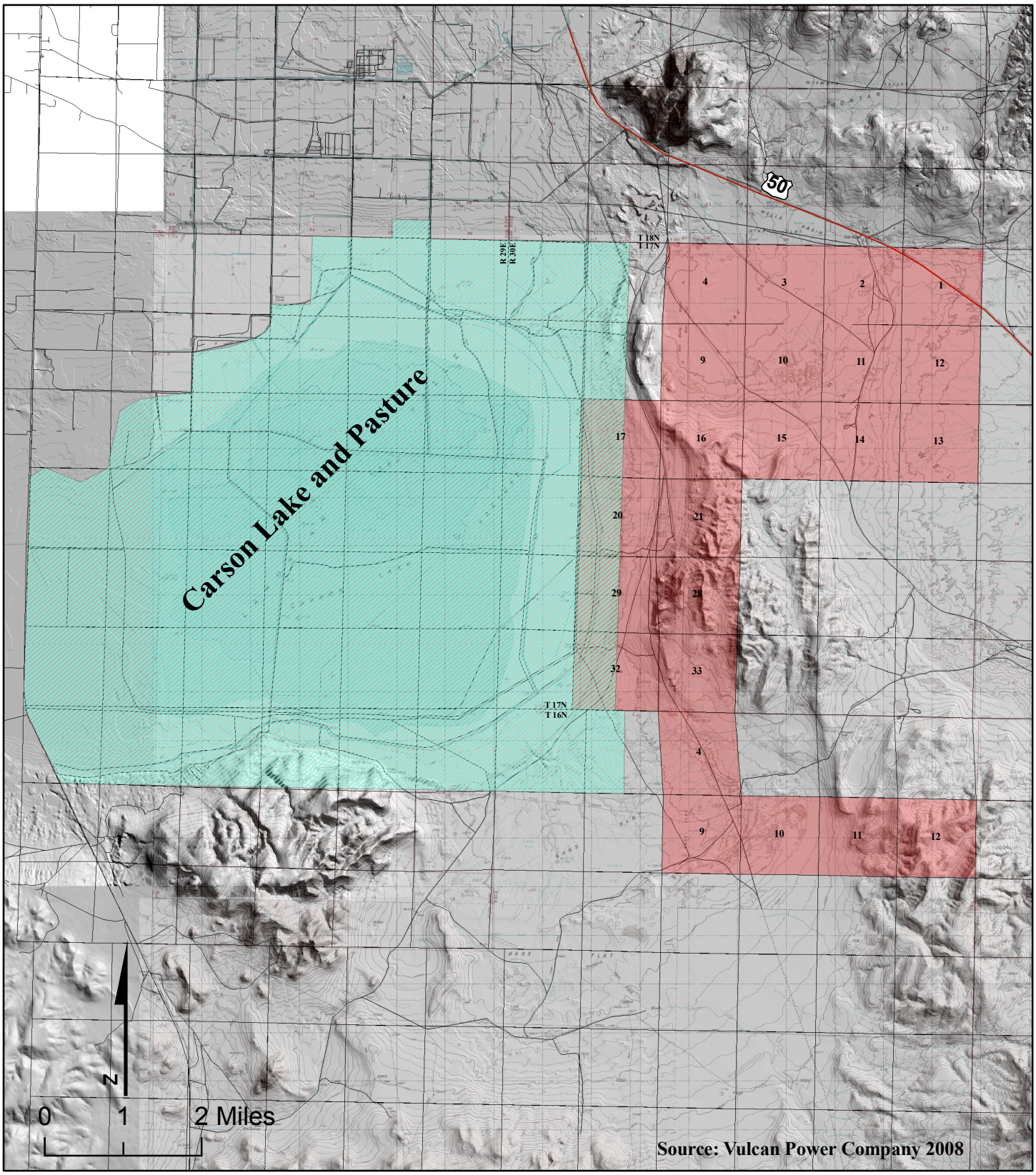
3.K RANGE RESOURCES

Livestock Grazing

The BLM manages livestock grazing in allotments within the district. This section describes grazing resources and regulations in the ROI for the proposed action. The ROI for grazing resources is the allotments within the project area.

The BLM manages grazing under the authority of the Taylor Grazing Act of 1934, FLPMA (1976), and the Public Rangelands Improvement Act of 1978. Under this management, ranchers may obtain permits for an allotment of public land on which a specified number of livestock may graze. The number of permitted livestock on a particular allotment is determined by how many animal unit months (AUMs) that land can support. The BLM operates a program to stabilize or improve the ecological condition of the allotments. This program includes proper management of livestock grazing and such improvements as fences and water developments.

The project area overlaps approximately 3,422 acres of the Rock Springs Grazing Allotment, 1,846 acres of the Bass Flat Grazing Allotment, and 161 acres of the Salt Wells Grazing Allotment. Table 3-6 provides an overview of the grazing activity on the project area. Based on the AUMs for each allotment, the grazing allotment within the project area supports approximately 132 AUMs.



Legend

Vulcan Lease Area

Carson Lake and Pasture

Roads

Carson Lake and Pasture Boundary

Carson City District Office, Nevada

Figure 3-1

Table 3-6 Grazing Allotments in the Project Area

Allotment Name	Total Allotment Acreage	AUMs on Allotment	Acreage of Overlap with Project Area (Proportional AUMs)	Cattle Currently on Allotment
Bass Flat	46,789	1,598	1,846 (63 AUMs)	320
Rock Springs	28,394	535	3,422 (64 AUMs)	98
Salt Wells	58,611	1,626	161 (4.5 AUMs)	270

3.L RECREATION/SPECIAL DESIGNATIONS

The ROI is the drilling sites and access roads within the project area. Off-highway vehicle activities, hiking, and wildlife viewing are major types of casual/dispersed recreational use in the ROI. Also, several BLM-permitted off-highway vehicle races pass through the region, as well as horse endurance rides and the annual Pony Express Re-Ride in June. The main north-south road is used for off-highway vehicle races. Off-highway vehicle race events occur on weekends and temporarily restrict use of the roads during the race event.

The Pony Express Trail, the Overland Stage Route, and portions of the California Trail, pass near the ROI. The trails and associated segments are of national significance, are managed and protected under the National Trails System Act, and continue to provide recreational opportunities for those who live in and visit the area. Recreation associated with this trail includes retracing pioneer routes and visiting historic monuments.

The Grimes Point Archaeological Area is on the north side of US Highway 50, outside of the ROI. The CCFO of the BLM administers the site. The Grimes Point area is popular for hiking, picnicking, touring Hidden Cave, and viewing petroglyphs (prehistoric rock art).

3.M SOCIOECONOMICS

The project area covers approximately 15,354 acres of public land in Churchill County, Nevada. Churchill County was identified as the ROI for socioeconomic analysis, since most of the effects on the population and economy would occur within this local region. Data for the city of Fallon is presented where appropriate, since Fallon is the county's only incorporated city and the city closest to the project area.

Population

Between 1990 and 2007, the population of Churchill County increased by 34 percent, which is approximately half the state's growth rate of 66.3 percent. Thirty-one percent of the county's population resides in Fallon, which grew by 23.8 percent between 1990 and 2007 (Table 3-5). By 2026, the population of Churchill County is projected to grow by 8,530 to 35,720 (an increase of 23.9 percent over 2007) (NSBDC 2007), while the population of Nevada as a whole will have increased by 1,851,652, or 73 percent, to 4.3 million (Table 3-5).

Table 3-7 Population Changes, 1990-2007

	1990	2000	2007	% Change 1990-2007
Churchill County	17,938	23,982	27,190	34%
Fallon	6,438	7,536	8,452	23.8%

US Census Bureau 1990a, 1990b, 2000a; NSBDC 2007

Housing

Between 1990 and 2000 the total number of housing units in Churchill County, Fallon, and the state increased by 33.5 percent, 20.7 percent, and 59.5 percent, respectively. Owner occupancy increased in Churchill County and the state but decreased in Fallon from 47.8 percent in 1990 to 45.2 percent in 2000 (see Table 3-6). In all of these areas vacancy increased between 1990 and 2000, and renter vacancy was greater than owner vacancy (US Census Bureau 1990b, 2000b).

Table 3-8 Housing

	Churchill County
Total Units	
1990	7,290
2000	9,732
Percent Change	33.5%
Owner-Occupied	
1990	63.1%
2000	65.8%
Vacancy	
1990	8.6%
2000 (number)	8.4% (820)

Source: US Census Bureau 1990b, 2000b
[1]Percent of units that are occupied by owner

Employment and Economy

Churchill County, with a labor force of 12,415, had an unemployment rate of 4.2 percent in 2005 (BLS undated). Between 2001 and 2004, the largest decreases in employment in Churchill County were in the manufacturing sector (18.2 percent) (BEA 2006a). The top five employers in Churchill County include the Churchill County School District, Churchill Community Hospital, the Department of Defense, Wal-Mart Stores, and Boeing Aerospace Operations (Nevada Workforce 2006).

Of the private employment sectors, the retail trade sector, administrative and waste sector, and the real estate and rental and leasing sector employed the largest portions of the labor force with 10.3 percent, 8.5 percent, and 7.8 percent of total employment, respectively. The government sector employed the highest percentage (20 percent) of workers, with most in state and local government (9.0 percent) and the military (7.0 percent).

For Churchill County in 2004 the per capita personal income was $32,171, an increase of 22.6 since 2001 (BEA 2006b). In terms of earnings, the largest industries in 2004 in Churchill County were government and services (with $196.6 million and $101.3 million in earnings, respectively) (BEA 2006c).

Schools

The Churchill Unified School District includes ten schools (six elementary schools, a junior high school, a high school, a charter high school, and an alternative education school) and provides K-12 education for approximately 4,185 students (NCES 2006). All but one of the schools within this district are within Fallon.

3.N SOILS, GEOLOGY, AND MINERALS

This section is an overview of regional and site-specific geology, soils, and mineral resources. The ROI is the land within and adjacent to the potential drill sites. Figure 2-1, in the previous chapter, shows the topographic features of the study area described in this section. The ROI is in the Basin and Range geomorphic province, which is characterized by small north- and northeast-trending ranges and alluvium-filled valleys containing terminal lakes.

Physiography

The study area is in the western part of the Basin and Range physiographic province. The project area is southwest of Fallon Naval Air Station, including the northwestern edge of the Salt Wells Basin, the northern part of the Bunejug Mountains, and the eastern edge of Carson Lake. The highest elevation in the Bunejug Mountains, south of the project area is about 4,892ft (1,491 meters) above mean sea level (msl). The land slopes down to the west and north to an elevation of about 3,910-ft (1,192 meters) msl.

Geology

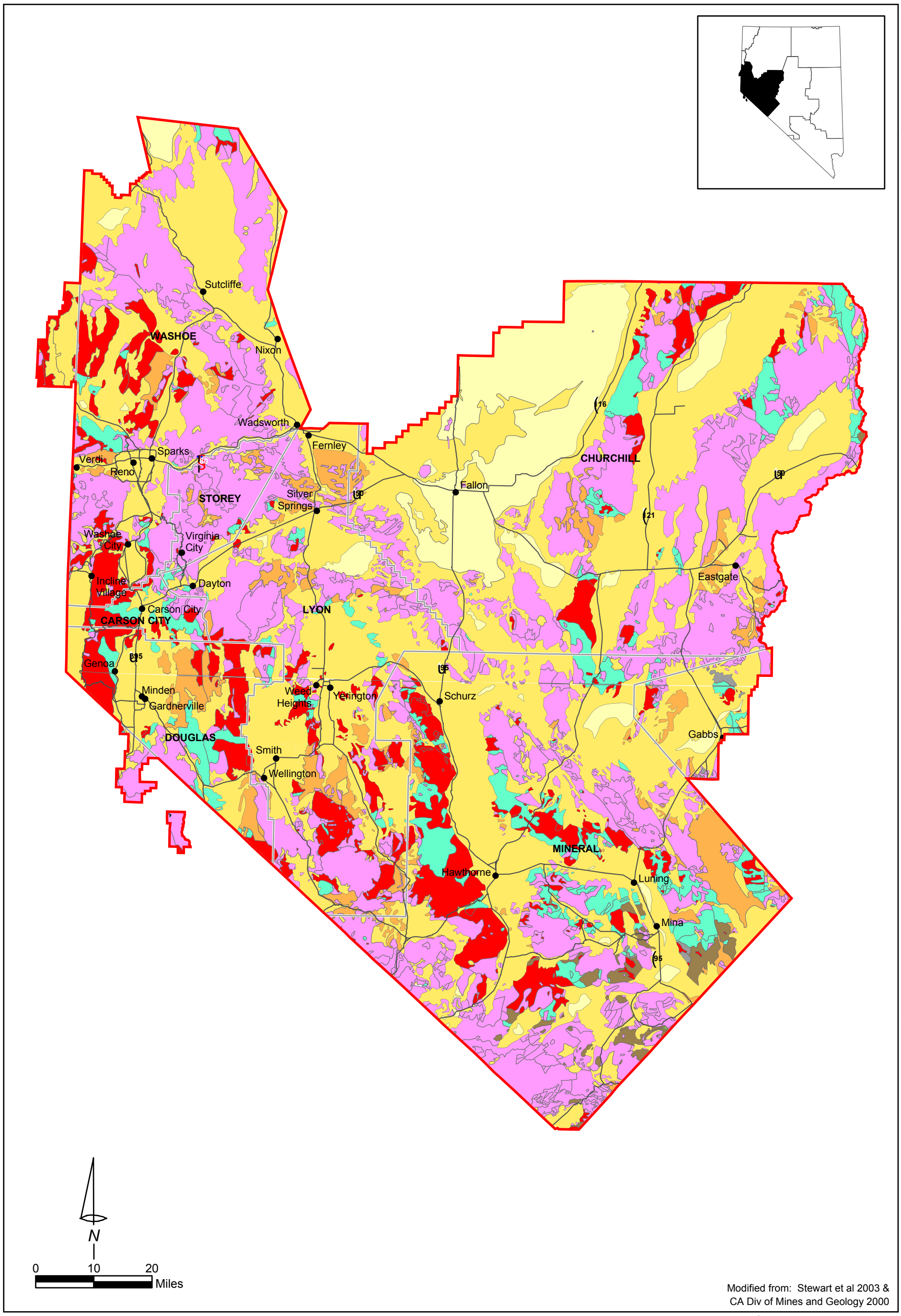
Regional Geology

The faulting that formed the mountain ranges in the region began relatively recently in geologic time (about 16 million years ago) and resulted from extension and thinning of the earth's crust in the region between the Sierra Nevada and Rocky Mountains. The extensional tectonic regime caused vertical block faulting, in which small blocks of crust dropped downward to create small basins, while adjacent blocks of crust tipped upward and formed ranges. The crustal extension was accompanied by a large amount of volcanic activity, which has varied in character and intensity. Massive volumes of pyroclastic materials (e.g. volcanic ash) covered some areas of the Basin and Range province to depths of many hundreds of feet. The region remained enclosed, therefore, as the ranges eroded, the sediments filled the local basins. Many basins contain alluvial sediments thousands of feet thick. During the last 100,000 years, the basins contained large lakes ancient shorelines of which can still be seen high above the current valley floors in many basins.

The exposed rocks in the mountain ranges surrounding the Salt Wells Basin are mainly Tertiary volcanic rocks and sediments derived from them (Stewart 1980; Stewart et al. 1978). These relatively young rocks are underlain by Mesozoic sedimentary and volcanic rocks. The cores of the mountain ranges consist mainly of Mesozoic granitic rocks, which intruded older rocks. However, there are few exposures of these older rocks in the region. Mesozoic rocks are exposed on the east side of the basin. The Bunejug Mountains are primarily composed of Pliocene basalt. The Salt Wells Basin and Carson Lake and the surrounding margins are underlain by playa lakebeds.

Figure 3-2 is a geologic map of the CCDO, modified from the digital geologic map of Nevada (Stewart et al. 1978).

The thin crust means that molten rock is relatively close to the surface, at depths of just a few miles or less. In many locations, especially near fault zones where the rock is highly fractured and heat and groundwater move more freely through the rock.
Geothermal activity in the Salt Wells area is thought to be associated with the intersection of the Rainbow Fault Zone and the Wildcat Fault Zone. The bedrock fracturing and vertical offset resulting from the faulting allows both groundwater and heat to penetrate the bedrock to relatively shallow depths (less than 500-ft), enabling the heated water to be exploited as a relatively low-cost energy source.



Legend

Carson City District Office

County Boundaries

Geologic Units

Quaternary: Alluvial; Playa

Tertiary: Volcanic; Sedimentary

Mesozoic: Plutonic, Volcanic; Sedimentary (Includes some volcaniclastics and other sediments of volcanic origin); Uncertain

Paleozoic: Sedimentary; Ultramafic

No warranty is made by the Bureau of Land Management for use of the data for purposes not intended by BLM.

Geologic Map

Salt Wells Geothermal Drilling EA

Carson City District Office, Nevada

Figure 3-2

Seismicity

Crustal extension and block faulting in the region are ongoing, making the region seismically active. Recently active faults are fairly common in the vicinity of the ROI.

The two largest nearby faults are the Rainbow Fault Zone, which has been mapped north of the Salt Wells Basin on the east side of the Rainbow Mountains, and the Wildcat Fault Zone at the foot of the ranges south of Carson Lake west of the Bunejug Mountains. The Rainbow Fault Zone may extend southward beneath the Salt Wells Basin (WESTEC 1988).

The most recent earthquakes on the Rainbow Mountain Fault Zone were two magnitude 6.8 events that occurred in 1954 and were centered about 15 miles (25 kilometers) north of the Salt Wells Geothermal leasing area (WESTEC 1988). These earthquakes reportedly caused extensive damage to nearby waterworks and roads. The US Geological Survey (USGS) estimates that there is about a 95 percent chance that peak bedrock acceleration in an earthquake would exceed 30 to 40 percent of the acceleration of gravity within the next 50 years in the project region (USGS 2002). This is a moderately, high bedrock acceleration. Ground shaking could be more intense in areas underlain by unconsolidated basin fill materials. The project area is in Seismic Zone 4 (the highest zone rating) of the Uniform Building Code.

Mineral Resources

While the circulation of heated, mineral-laden groundwater (hydrothermal fluids) through fractured rock has also resulted in precipitation and concentration of economic minerals, including gold, silver, copper, zinc, mercury, and many others in the region, most of the study area is underlain by basin fill deposits and no significant metallic ore deposits have been identified. In addition, there are no active mining claims or oil and gas leases in the salt wells geothermal lease area (BLM 2007).

Soils

On the western slope of the Bunejug Mountains, the soils are dominated by the Labou-Rock outcrop complex and the Pirouette-Osobb association. Further down the slope, the Bangor sandy loam, and badlands grade into playa deposits on the eastern side of Carson Lake.

The Pirouette-Osobb association consists of nearly level to moderately steep soils in large areas of rolling uplands. The soils are generally shallow (about 20 inches), well-drained, stony sandy loam to cobbley clay loam, derived from tuffs and basalts and including areas of rock outcrop. Average annual precipitation is about five to seven inches. The soils are used for grazing and wildlife habitat.

The Bango soils consists of very deep, well drained to somewhat excessively drained soils with negligible to slow surface runoff and moderately slow to rapid permeability. They are formed in alluvium over lacustrine deposits. Bango soils are on smooth lake terraces and have a sandy loam surface layer, underlain by cobbley or gravelly sandy loam and by strongly alkaline sandy and silty loam. The soils are suitable for livestock grazing and wildlife habitat. The soils can produce alfalfa, pasture, and grains, if irrigated, but they are not classified as prime farmland (USDA 2006). Badlands are large bands of moderately steep shorelines of ancient Lake Lahontan. The soils are severely eroded and highly alkaline and are generally barren of vegetation. Playa soils occur on nearly level basin floors and consist of clayey material that ranges from sand to clay and are strongly alkaline. Drainage is poor and water tends to pond on the soils. They are generally barren of vegetation (SCS 1975).
On the northern slopes the Biddleman association grades into the Isolde-Parran complex and further down slope, into playa deposits.

The soils belonging to the Biddleman association occur in broad bands bordering uplands on high shoreline terraces with slopes of 0 to 15 percent. The soils are about 60 percent Biddleman gravelly sandy loam. The Biddleman series consists of very deep, well-drained soils with medium or high surface runoff and moderately slow permeability in the subsoil and very rapid permeability in the underlying sandy material. The soils are used for limited grazing and wildlife habitat (USDA 2006).

The Isolde series consists of very deep, excessively drained soils with negligible to low surface runoff and very rapid permeability. The soils formed in eolian sand derived from mixed rocks. Isolde soils are on dunes with slopes of 0 to 30 percent. The dunes are semi-stabilized by vegetation and are superimposed over various other landforms of intermontane basin landscapes. Isolde soils are used for rangeland and wildlife habitat (USDA 2006). Parran soils are very deep, nearly level, and somewhat poorly drained soils that formed in clayey alluvium. They occur on low lake terraces and in basins. The soils are used for limited grazing.

3.O VEGETATION

The project area was previously surveyed by two Tetra Tech biologists on October 16-17, 2006 and an EMPS biologist surveyed the proposed freshwater well site on November 29, 2006. Western Botanical Services Inc. (WBS) conducted a vegetation survey of Pad 10 and the surround area on July 15, 2008, and Carter Schleicher Consulting conducted a biology survey of Pads 10, 14, and 15 and their surrounding areas on January 17, 2009.

Native Vegetation Communities

In general, vegetation found in the ROI is typical of the Great Basin. The sites are predominantly composed of two different Great Basin vegetation communities: greasewood, and salt and alkali flat.

The greasewood vegetation community is found around the majority of the proposed sites. Five sites are located on the western side of the Bunejug Mountains, and five others are found between the Bunejug Mountains and the adjacent Eight Mile Flat. Observed species in this plant community include shadscale (*Atriplex confertifolia),* winterfat (*Krascheninnikovis lanata)*, alkali seepweed (*Suaeda torreyana*), spiny hop sage (*Grayia spinosa),* black greasewood (*Sarcobatus vermiculatus),* rabbitbrush (*Chrusothamnus nauseosus),* Mormon tea (*Ephedra nevadensis*), snakeweed (*Guiterrezia sarothrae*), halogeton (*Halogeton glomeratus*), Russian thistle (*Salsola tragus*), and four-wing saltbush (*Atriplex canescens*). The greasewood community around the project sites contains sparse understory vegetation. Understory species observed in this community were primarily grasses, such as Indian ricegrass (*Achnatherum hymenoides*), inland saltgrass (*Distichlis spicata* var. *stricta)*, and cheatgrass (*Bromus tectorum*).

The only vegetation observed at Pad 10 on the playa was greasewood (*Sarcobatus vermiculatus*) (WBS 2008). Vegetation typical of salt and alkali flat communities dominates one site on the northwestern portion of Vulcan Power's leased land. This site is located one mile east of the Bunejug Mountains, and two miles south of Highway 50. While salt and alkali flats tend to be devoid of vegetation, iodine bush (*Allenrolfea occidentalis*), rush (*juncus sp.*), common wheat grass (*Elymus sp.*), and inland saltgrass may establish there. This portion of the project area is located at the transition between the greasewood community and the barren salt flat. As a result, there are several areas where saltgrass vegetation is well established. The extent of wetland vegetation south of Pad 15 fluctuates based on annual precipitation and runoff, but surveys identified approximately 6.6 acres of wetland vegetation with low to tall graminoids associated with the springs and seeps on Eight Mile Flat.

3.P VISUAL RESOURCES

The Salt Wells geothermal leasing area is characteristic of the Great Basin environment; desolate, sunny, and brush-strewn valley floors are interspersed with barren and bleached alkali playas, bordered by often barren, but frequently colorful, elongated and steep mountain ranges (BLM 1974).

Higher elevations support sagebrush, juniper, and pinyon pine providing visual diversity and contrasting darker color along ridgelines in the distant background. Vegetation on the valley floor grows low and evenly and primarily consists of monochromatic desert brush (US Navy 2000). Although these areas are sparsely populated, fences, utility lines, roads (paved and dirt), historic trails, trailer houses on private lands, mines, and road signs are present (BLM 1974).

The form, line, color, and texture of the Great Basin landscape are influenced by the arid climate. The hills are gold and brown, and the blue sky can be dotted with white clouds and thunder-clouds at times. Sunlight is a dominating element in the area, and whirling winds create dust funnels (US Navy 2000; BLM 1974).

The proposed project would occur in an area of Salt Wells administered by the BLM. No BLM visual resource management classes have been established for this area. Although no BLM visual resource management classes have been established yet for this area, projects of this nature are generally required to meet Visual Resource Management Class III objectives in such a situation. The Visual Resource Management Class III objective is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Sensitive receptors in the project area include drivers looking south from Highway 50 and people recreating in the area. Recreational activities in the area include people visiting the historic trails and off-highway vehicle drivers.

3.Q WILDLIFE RESOURCES

Wildlife

Two Tetra Tech biologists conducted a reconnaissance level survey on October 16-17, 2006, and an EMPS biologist surveyed on November 29, 2006, to identify wildlife species and potential sensitive habitat at the proposed drilling and freshwater well sites. Baseline surveys were conducted in 1987-1988 near the project location (WESTEC 1988); habitat conditions have not changed significantly since these surveys were conducted. Consequently, wildlife presence within the ROI observed in 1987-1988 is likely to be similar to current conditions and are summarized below.

In general, the ROI supports wildlife species typical of the Great Basin arid desert habitats, including reptiles, rodents, lagomorphs, medium-sized carnivores, passerine birds, and raptors.

Mammals

Three species of medium-sized mammals were observed during the baseline surveys, including black-tailed jackrabbit (*Lepus californicus),* coyote (*Canis latrans),* and kit fox (*Vulpes macrotis)* (WESTEC 1988). Jackrabbits were also observed during the 2006 reconnaissance survey. Four species of small mammals were captured during the baseline studies and include deer mouse (*Peromyscus maniculatus),* Merriam's kangaroo rat (*Dipodomys merriami),* Ord's kangaroo rat (*Dipodomys ordii),* and Great Basin pocket mouse (*Perognathus parvus)* (WESTEC 1988). Mice burrows were observed during the November 2006 survey. No key game habitats occur on or near the site.

Birds

Bird use of the area is fairly low compared to some other habitat types in the Great Basin. Typical bird species include horned lark (*Eremophilia alpestris),* black-throated sparrow (*Amphispiza bilineata),* and sage sparrow (*Amphispiza bellii).* Several raptor species were observed during the baseline surveys. These include golden eagle (*Aquila chrysaetos),* which was only observed during the winter and is not expected to nest onsite. Also observed were northern harrier (*Circus cyaneus),* prairie falcon (*Falco mexicanus),* American kestrel (*Falco sparverius),* and burrowing owl (*Athene cunicularia)* (WESTEC 1988). Several small birds were observed but unidentified during the 2006 survey. There are no sage grouse use areas on or near the project site.

Reptiles

A variety of lizards and snakes are expected to occur within the ROI. Typical lizard species present may include western whiptail (*Cnemidophorus tigris tigris),* desert horned lizard (*Phrynosoma platyrhinos platyrhinos),* spiny lizard (*Sceloporus magister uniformis),* and side blotched lizard (*Uta stansburiana)* (WESTEC 1988). Snake species likely to occur in the area include gopher snake (*Pituophis melanoleucus)* and Great Basin rattlesnake (*Crotalus viridis).*

Wildlife Habitats

Four wildlife habitats occur in the vicinity of the proposed project: Intermountain Cold Desert Scrub, Desert Playa, Sand Dunes, and Springs (Nevada Wildlife Action Plan 2006).

Intermountain Cold Desert Scrub

The Intermountain Cold Desert Scrub habitat is the most extensive type and most important type in the state of Nevada. Community composition is largely influenced by salinity and drainage. Shadscale and greasewood often dominate this habitat. This habitat is important to loggerhead shrike and kit fox and serves as support habitat for sagebrush breeders such as sage sparrow and Brewer's sparrow (Nevada Wildlife Action Plan 2006). Greasewood dominates the Intermountain Cold Desert Scrub habitat in the project area.

Desert Playa

This habitat is composed of mostly barren or sparsely vegetated playas typically found on the valley bottoms in the intermountain region. Dry playas are often barren of vegetation from their center out to their outer margins, where saltgrass, iodine bush, or greasewood maintain a foothold on the fresher soils. Most playas in Nevada do not have permanent sources of water; therefore, the value of playas to wildlife is largely ephemeral in nature. When playas are watered, they produce vegetation, aquatic insects and attract waterfowl, shorebirds, and small water birds (Nevada Wildlife Action Plan 2006). Saltgrass and greasewood dominate the fringe of the playa in the vicinity of the project .

Sand Dunes

The sand dunes in the project vicinity are vegetated and stable. Nevada's sand dunes were formed during the Holocene Epoch. Sand dune habitats consist of stabilized to partially stabilized sand dunes dominated by desert sand-verbena, greasewood, dalea, saltgrass, and fourwing saltbush. Kangaroo rats and kangaroo mice feed on the available seed sources (Nevada Wildlife Action Plan 2006).

Springs

In Nevada, the characteristics of individual spring systems vary tremendously in terms of flow, water chemistry, and habitats for terrestrial and aquatic wildlife species (Nevada Wildlife Action Plan 2006). The springs in the vicinity of the proposed wells sites have low flow and vary between non-vegetated to sparsely vegetated. The University of Nevada, Reno has identified seven springs within the Vulcan leases on the western side of Eight Mile Flat (UNR 2008).

3.6 ALTERNATIVES

The description of the affected environment for the No Action Alternative would be the same as that for the Proposed Action.