3.0 AFFECTED ENVIRONMENT

This chapter describes the existing environmental conditions in the vicinity of the Proposed Action and alternatives. During the EIS preparation, current and accurate information was used to describe the existing environment. The information in this chapter serves as a baseline from which to identify and evaluate environmental changes resulting from the Proposed Action or alternatives.

This chapter focuses on the human environment that has the potential to be impacted by the mineral material sales. The human environment is interpreted comprehensively to include natural and physical resources and the relationship of people with those resources (40 CFR 1508.14). The affected environment discussed in this chapter includes air, earth, biological, water, cultural, paleontological, Native American, and visual resources as well as land use, noise and vibration, transportation and traffic, socioeconomic conditions, environmental justice issues, special management areas, recreation, and hazardous materials.

3.1 AIR QUALITY

Air quality in a given location is described as the concentration of various pollutants in the atmosphere. Air quality is determined by several factors, including the types and amounts of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. This section describes existing air quality conditions. Topics discussed in this section are climatology, air pollutants, NAAQS, local air quality, odor, and Valley fever, and climate change.

3.1.1 Climatology

The Proposed Action area is located in the southwestern desert region of Nevada and the northeastern portion of the Mojave Desert. Southern Nevada's climate is dry throughout the year, with long, hot summers and short, mild winters. This region experiences typical low desert conditions; winters are mild, with temperatures ranging from freezing to 75 degrees Fahrenheit (°F), and summers are extremely hot with highs that usually exceed 100°F and may reach 120°F.

The number of days with inclement weather varies from year to year. This climate is controlled primarily by Nevada's rugged and varied topography. The prevailing westerly winds move warm, moist Pacific air over the western slopes of the Sierra Nevada Range where the air cools, condensation takes place, and most of the moisture falls as precipitation. As the air descends the eastern slopes, compression warming occurs and little precipitation falls. The result is that the lowlands of Nevada are largely desert landscapes.

Precipitation in and around the area is spread fairly uniformly throughout the year, with maximum precipitation occurring in January and March. The mean annual total precipitation in the vicinity of the project area is approximately 3.0 to 6.0 inches (Clark County Regional Flood Control District

[CCRFCD], 2009); however, annual precipitation can vary greatly from year to year, ranging from 0.0 to 10.0 inches.

During the winter, precipitation is primarily associated with storms moving eastward from the Pacific Ocean. Snow accumulation is rare in the lower desert region. Flurries are observed once or twice during most winters, but snowfall of 1 inch or more occurs only once every 4 to 5 years.

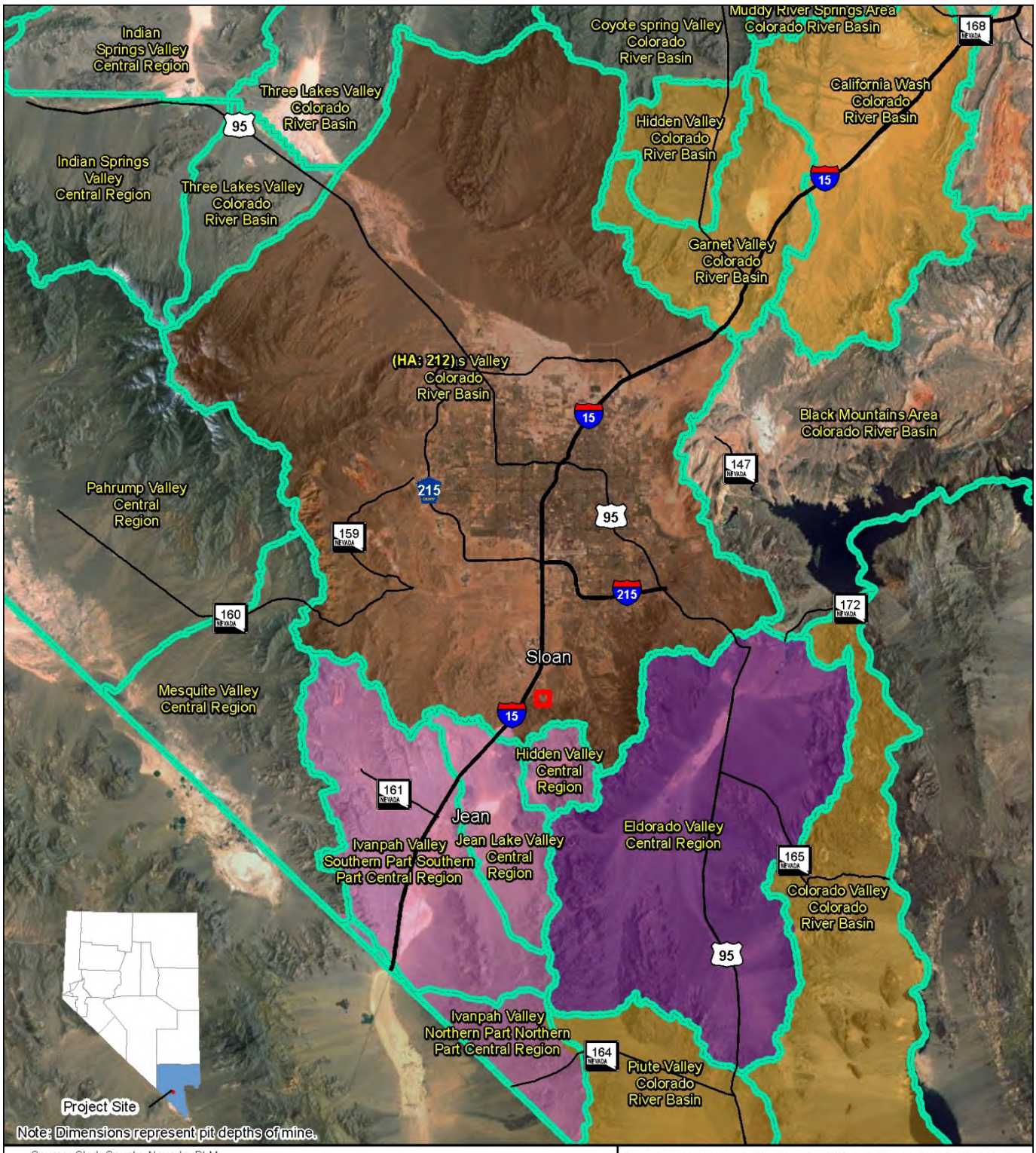
During the summer, precipitation is associated with storms that move south-southeast from the Pacific Ocean and north-northwest from the Gulf of Mexico. Over several weeks during the summer, warm, moist air predominates in the area and causes scattered, occasionally severe thunderstorms. The climate in the area is dry and hot in the summer and cool in the winter. The summer heat is accompanied by extremely low relative humidity.

Strong winds can occur during the spring and fall seasons. Winds stronger than 50 mph are infrequent but can occur with some of the more vigorous storms. Winter and spring wind events often generate widespread areas of blowing dust and sand. Strong wind episodes in the summer are usually connected with thunderstorms and are thus more isolated and localized. Surface winds are characterized by prevailing southwesterly winds with an average speed of approximately 10 mph.

3.1.2 Air Pollutants

Air pollutant emissions in the basin are generated from stationary, mobile, and natural sources. Stationary sources can be divided into two major subcategories: point and area sources. Point sources occur at an identified location and are usually associated with manufacturing and industry. Examples are boilers or combustion equipment that produce electricity or generate heat. Area sources are widely distributed and are characterized by many emission point sources. Examples of area sources include residential and commercial water heaters, painting operations, portable generators, lawn mowers, agricultural fields, landfills, and consumer products such as barbeque lighter fluid and hair spray. Construction activities that create fugitive dust, such as excavation and grading, also contribute to area source emissions. Mobile sources refer to emissions from on- and off-road motor vehicles, including tailpipe and evaporative emissions. On-road sources may be legally operated on roadways and highways. Off-road sources include aircraft, trains, and construction equipment. Mobile sources account for the majority of the air pollutant emissions in the air basin. Air pollutants can also be generated by the natural environment, such as when fine dust particles are pulled off the ground surface and suspended in the air during high winds.

The Proposed Action area is located in Hydrographic Basin 212 (the Las Vegas Valley airshed) (Figure 3.1-1).


Indian Springs Valley Central Region
Three Lakes Valley Colorado River Basin
Coyote spring Valley Colorado River Basin
Muddy River Springs Area Colorado River Basin
California Wash Colorado River Basin
Hidden Valley Colorado River Basin
Garnet Valley Colorado River Basin
(HA: 212) s Valley Colorado River Basin
Black Mountains Area Colorado River Basin
Pahrump Valley Central Region
Sloan
Mesquite Valley Central Region
Hidden Valley Central Region
Jean
Ivanpah Valley Southern Part Southern Part Central Region
Jean Lake Valley Central Region
Eldorado Valley Central Region
Colorado Valley Colorado River Basin
Ivanpah Valley Northern Part Northern Part Central Region
Piute Valley Colorado River Basin
Project Site
Note: Dimensions represent pit depths of mine.
Source: Clark County, Nevada, BLM.
Proposed Action Area
Airsheds
8-hour Ozone Non-attainment Area /PM and CO Non-attainment Area /VOC and NO Management Area
8-hour Ozone Non-attainment Area
PM and CO Management Area
VOC and NO Management Area
1 inch = 10 miles
10 5 0 10 Miles
N W E S
Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement
Figure 3.1-1
Hydrographic Areas
NATIONAL SYSTEM OF PUBLIC LANDS
Prepared by: PBS&J

Under the CAA, the EPA has designated six "criteria pollutants" that are measured in airsheds to provide indicators of air quality: ground-level ozone, carbon monoxide, particulate matter, nitrogen oxides, sulfur oxides, and lead. The sections below describe each criteria air pollutant and its known health effects.

Ozone (O_3) is one of a number of substances called photochemical oxidants that are formed when reactive organic compounds (ROC) and nitrogen oxides (both of which are byproducts of the internal combustion engine) react with sunlight. Ozone is present in relatively high concentrations in the basin, and the damaging effects of photochemical smog are generally related to the concentrations of ozone. Ozone may pose a health threat not only to those who already suffer from respiratory diseases but also to healthy individuals. Additionally, ozone has been tied to crop damage, typically in the form of stunted growth and premature death. Ozone can also act as a corrosive, resulting in property damage such as the embitterment of rubber products.

Carbon monoxide (CO) is a colorless, odorless gas produced by the incomplete combustion of fuels. Carbon monoxide concentrations tend to be the highest during winter mornings when there is little to no wind, and surface-based inversions trap the pollutant at ground levels. Because carbon monoxide is emitted directly from internal combustion engines motor vehicles operating at slow speeds are the primary source of carbon monoxide in the basin.

The highest ambient carbon monoxide concentrations are therefore generally found near congested transportation corridors and intersections. The primary adverse health effect associated with carbon monoxide is the interference of normal oxygen transfer to the blood, which may result in tissue oxygen deprivation. The major sources of carbon monoxide in the Las Vegas Valley airshed are on-road vehicles, aircraft, and off-road vehicles and equipment.

Respirable particulate matter (PM_{10}) and **fine particulate matter ($PM_{2.5}$)** consist of extremely small, suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter, respectively. Some sources of particulate matter (such as pollen and windstorms) occur naturally. However, in populated areas, most particulate matter is caused by road dust, diesel soot, combustion products, abrasion of tires and brakes, and construction activities. Both PM_{10} and $PM_{2.5}$ may adversely affect the human respiratory system, especially in people who are naturally sensitive or susceptible to breathing problems.

Nitrogen dioxide (NO_2) is a byproduct of fuel combustion. The principal form of nitrogen dioxide produced by combustion is nitrogen oxide. Nitrogen oxide reacts with oxygen in the air to form nitrogen dioxide, creating the mixture of nitrogen oxide and nitrogen dioxide commonly called nitrogen oxides (South Coast Air Quality Management District, 1993). Other oxides of nitrogen including nitrous acid and nitric acid are part of the nitrogen oxide family. While EPA's NAAQS covers this entire family, nitrogen dioxide is the component of greatest interest and is the indicator for the larger group of nitrogen oxides (EPA, 2010a).

Sulfur dioxide (SO_2) is a colorless, pungent gas. At levels greater than 0.5 parts per million (ppm), the gas has a strong odor, similar to rotten eggs. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries. Sulfuric acid is formed from sulfur dioxide, which is an aerosol particle component that may lead to acid deposition. Acid rain deposition into water, vegetation, soil, or other materials can harm natural resources and materials. Sulfur oxides include sulfur dioxide and sulfur trioxide. Although sulfur dioxide concentrations have been reduced to levels well below state and national standards, further reductions are desirable because sulfur dioxide is a precursor to sulfates. Sulfates are a particulate formed through the photochemical oxidation of sulfur dioxide. Long-term exposure to high levels of sulfur dioxide can cause irritation of existing cardiovascular disease, respiratory illness, and changes in the defenses in the lungs. When people with asthma are exposed to high levels of sulfur dioxide for short periods of time during moderate activity, effects may include wheezing, chest tightness, or shortness of breath.

Lead (Pb) occurs in the atmosphere as particulate matter. The combustion of leaded gasoline is the primary source of airborne lead in the basin. The use of leaded gasoline is no longer permitted for on-road motor vehicles; therefore, most lead combustion emissions are associated with off-road vehicles, such as race cars. Other sources of lead include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters. Lead accumulates in bones, soft tissue, and blood, and can affect the kidneys, liver, and nervous system. The more serious effects of lead poisoning include behavior disorders, mental retardation, and neurological impairment. Low levels of lead in fetuses and young children can result in nervous system damage, which can cause learning deficiencies and low intelligence quotients. Lead may also contribute to high blood pressure and heart disease. The Proposed Action would not emit lead; therefore, lead was eliminated from further review in this analysis.

3.1.3 National and State Ambient Air Quality Standards

The EPA Office of Air Quality Planning and Standards has set NAAQS for six principal criteria pollutants. Units of measure for the standards are ppm by volume, milligrams per cubic meter of air (mg/m^3), and micrograms per cubic meter of air ($\mu g/m^3$) (Table 3.1-1). The NAAQS were adopted by the State of Nevada and Clark County. National standards are established for carbon monoxide, PM_{10}, sulfur dioxide, nitrogen dioxide, ground-level ozone, and lead.

3.1.4 Local Air Quality

The Clark County DAQEM has the authority to implement and enforce an air pollution control program in Clark County. The DAQEM applies and enforces the Air Quality Regulations, which establish requirements for sources that emit or release air contaminants into the atmosphere. The DAQEM maintains approximately 20 monitoring stations throughout Clark County.

Table 3.1-1
National Ambient Air Quality Standards

	Primary Standards		Secondary Standards	
Pollutant	**Level**	**Averaging Time**	**Level**	**Averaging Time**
Carbon monoxide	9 ppm (10 mg/m^3)	8-hour[1]	None	
	35 ppm (40 mg/m^3)	1-hour[1]		
Lead	0.15 µg/m^3 [2]	Rolling 3-month average	Same as primary	
	1.5 µg/m^3	Quarterly average	Same as primary	
Nitrogen dioxide	100 parts per billion	1-hour[3] N	one	
	0.053 ppm (100 µg/m^3)	Annual (Arithmetic mean)	Same as primary	
PM_{10} 150	µg/m^3 24-h	our[4]	Same as primary	
$PM_{2.5}$	15.0 µg/m^3	Annual[5] (Arithmetic mean)	Same as primary	
	35 µg/m^3 24-h	our[6]	Same as primary	
Ozone	0.075 ppm (2008 standard)	8-hour[7]	Same as primary	
	0.08 ppm (1997 standard)	8-hour[8]	Same as primary	
	0.12 ppm	1-hour[9]	Same as primary	
Sulfur dioxide	0.03 ppm	Annual (Arithmetic mean)	0.5 ppm (1300 µg/m^3)	3-hour[1]
	0.14 ppm	24-hour[1]		

Source: EPA, 2009a

1 Not to be exceeded more than once per year.
2 Final rule signed October 15, 2008.
3 The 1-hour nitrogen dioxide standard went into effect April 12, 2010.
4 Not to be exceeded more than once per year on average over 3 years.
5 To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.
6 To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor in an area must not exceed 35 µg/m^3 (effective December 17, 2006).
7 To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average ozone concentrations measured at each monitor in an area over each year must not exceed 0.075 ppm (effective May 27, 2008). The EPA has proposed to further reduce this standard to between 60 and 70 ppb in August 2010.
8 a. To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average ozone concentrations measured at each monitor in an area over each year must not exceed 0.08 ppm.
b. The 1997 standard (and the implementation rules for that standard) will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 ozone standard to the 2008 ozone standard.
9 a. The standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above 0.12 ppm is less than 1.
b. As of June 15, 2005, EPA has revoked the 1-hour ozone standard for most areas, including the Las Vegas Valley..

Clark County has adopted the NAAQS. The State of Nevada has augmented the federal standards to include total suspended particulates, hydrogen sulfide, and visibility (Table 3.1-2). Where differences in national and local standards exist, the more stringent standard applies.

Table 3.1-2
Clark County, Nevada, Ambient Air Quality Standards

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Total suspended particulates	75 µg/m^3 Annual	mean	Same as primary	
	260 µg/m^3	24-hour concentration for Las Vegas Valley		
	150 µg/m^3	24-hour concentration elsewhere in Clark County	Same as primary	
Hydrogen sulfide	0.08 ppm	1-hour concentration	Same as primary	
Visibility	Maintain the prevailing visibility of greater than 30 miles			

Source: Clark County DAQEM, October 2009

Total suspended particulates are airborne particles or aerosols that are less than 100 micrometers. These particles constantly enter the atmosphere from many sources. Human sources include motor vehicle use, combustion products from space heating, industrial processes, and power generation. Natural sources include soil, bacteria and viruses, fungi, molds and yeast, and pollen.

Hydrogen sulfide is a colorless, flammable, extremely hazardous gas with a "rotten egg" smell. It occurs naturally in crude petroleum and natural gas and can be produced by the breakdown of organic matter and human/animal wastes (e.g., sewage). It is heavier than air and can collect in low-lying and enclosed, poorly ventilated areas, such as basements, manholes, sewer lines, and underground telephone/electrical vaults. Exposure to lower concentrations can result in eye irritation, sore throat and cough, nausea, shortness of breath, and fluid in the lungs. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness.

Visibility is affected by both particulates and gases. Haze is classified as intense if the visual range for 1 hour is less than 4.8 miles. Typically, the highest haze levels occur in the late fall and winter during low inversion, stagnant conditions.

Areas that meet the ambient air quality standards are classified as "attainment" areas, while areas that do not meet these standards are classified as "non-attainment" areas. The severity of the classifications for non-attainment range in magnitude from marginal to moderate, serious, severe, and extreme. An area that

can show two consecutive years of no more than one exceedance per year of the standard can, upon submittal of a plan to demonstrate how the area plans to remain in attainment, petition for redesignation as an attainment area. An area that has been reclassified from non-attainment to attainment is designated as a maintenance area until it demonstrates that it has maintained the standards for at least 10 years. The state and federal attainment status for the Clark County DAQEM is summarized in Table 3.1-3. The EPA Green Book reports that the Las Vegas Valley is currently in attainment for all criteria pollutants with the exception of PM_{10} and ozone. Although the EPA has issued a finding of attainment for carbon monoxide, the maintenance plan and redesignation is still awaiting approval and therefore remains in serious non-attainment for the 8-hour carbon monoxide standard. PM_{10} currently exceeds standards and Las Vegas Valley was classified as a serious non-attainment area for PM_{10} and a non-attainment area for ozone.

Table 3.1-3
Attainment Status for Clark County (Hydrographic Area 212)

Pollutant	Federal
Carbon monoxide	Serious non-attainment
Lead Attainment	
Nitrogen dioxide	Attainment
PM_{10} Seriou	s non-attainment
$PM_{2.5}$ Attainment	
Ozone*	Non-attainment
Sulfur dioxide	Attainment

Source: EPA, 2009a

* In 2007, the non-attainment status was revoked by court action; however, based on existing standards, it is anticipated that a designation of non-attainment will be designated for ground-level ozone in 2010.

The project area is located in the Las Vegas Valley Hydrographic Basin 212, which is classified as serious non-attainment for PM_{10}. The remaining portion of Clark County is designated as unclassifiable/ attainment for these pollutants (40 CFR 81.329). The project area is located closest to the Green Valley monitoring station located northeast of the project site within the boundaries of the Las Vegas Valley area. Emission data were obtained from the Green Valley station when available or from the Orr and JD Smith stations for 2007 through 2009. These ambient concentrations are shown in Table 3.1-4 for comparison with NDEP standards and NAAQS, which have been adopted by Clark County.

The primary contributor of PM_{10} throughout the project area is fugitive dust, both human-caused and naturally occurring in the desert environment. The major sources of PM_{10} emissions in the valley are paved and unpaved roads, construction activities, industrial/commercial facilities, motor vehicle exhaust, and disturbed vacant land. Carbon monoxide is produced primarily by incomplete fuel combustion in motor vehicles, with the highest concentrations occurring near the source points (busy streets and

freeways). The highest carbon monoxide measurements usually occur in the winter when winds are light and temperature inversions trap air near the ground surface from early evening through mid-morning, preventing pollutant dispersal.

As human population increases, resulting in future development, it is expected that air emissions will increase in the project area. However, regulations and methods to prevent, reduce, or control air pollution have been implemented to achieve and maintain levels of air quality that will protect human health and safety, prevent injury to plant and animal life, prevent damage to property, and preserve visibility and scenic, esthetic, and historic values of the project area by the Nevada Bureau of Air Quality Planning and Clark County.

3.1.5 Odor

Odor is a human perception that is experienced when one or more chemicals come into contact with the receptors of the olfactory nerves. Odor intensity measures the dimension of human olfactory perception. Because perception is subjective, odor intensity is difficult to measure. Some people have more acute olfactory senses than others, which causes them to be more sensitive to odors. The odor index value relates analytical concentrations of odorants in the air to referenced physiological responses. This measurement can be used as a relative measurement of odor intensity.

Monitoring for odorous compounds has not been performed in the vicinity of the Proposed Action. Baseline conditions are expected to be that of faint natural odors from the native creosote scrub. The DAQEM documents odor complaints in Clark County; however, no odor complaints have been filed in the vicinity of the Proposed Action.

3.1.6 Valley Fever (*Coccidioidomycosis*)

Valley fever, a fungal disease caused by the *Coccidioides* species, is found in the soils of semiarid areas such as the southwestern U.S. and parts of Mexico and South America. The disease is endemic in parts of California, New Mexico, Arizona, and Nevada, including a suspected endemic area in the Las Vegas Valley. Of the people living in endemic areas, 10 to 50 percent will show evidence of exposure (Center for Disease Control, 2010). Infection results from the inhalation of fungal spores that become airborne during the disturbance of contaminated soils from either human-related or natural activities such as construction-related earthmoving activities, dust storms, and earthquakes, and is not spread from person to person.

Table 3.1-4
Clark County and Nevada Air Quality Standards[1]

Pollutant	Averaging Time	2009[2] Data	2008 Data	2007 Data	Clark County Standard	NDEP Standard
Carbon monoxide[3]	1-hour	3 ppm	3 ppm	4 ppm	40,000 µg/m^3 (35.0 ppm)	40,000 µg/m^3 (35.0 ppm)
	8-hour	2.1 ppm	2.1 ppm	2.8 ppm	10,000 µg/m^3 (9.0 ppm)	10,000 µg/m^3 (9.0 ppm)
Nitrogen dioxide[4]	1-hour 67		64	63 ppb	No current standard	100 ppb
	Annual Arithmetic mean	15 parts per billion (.015 ppm)	17 parts per billion (.017 ppm)	19 parts per billion (.019 ppm)	100 µg/m^3 (0.053 ppm)	100 µg/m^3 (0.053 ppm)
Ozone[3] 1-ho	ur	82 parts per billion (0.082 ppm)	87 parts per billion (0.087 ppm)	92 parts per billion (0.092 ppm)	157 µg/m^3 (0.08 ppm)	157 µg/m^3 (0.08 ppm)
PM_{10} [5]	24-hour 667(	330)[5] µg/m^3 137	3(1159)[5] µg/m^3 100	9(907)[5] µg/m^3 150	µg/m^3 150	µg/m^3
	Annual Arithmetic mean	20µg/m^3 20	µg/m^3 22	µg/m^3 50	µg/m^3 50	µg/m^3
$PM_{2.5}$ [5]	24-hour 94(5	8)[(5)] µg/m^3 188	(169)[5] µg/m^3 618(	479)[5] µg/m^3	No current standard	65 µg/m^3
	Annual Arithmetic mean	7 µg/m^3 7	µg/m^3 8	µg/m^3	No current standard	15 µg/m^3

Sources: Clark County DAQEM, 2009a; State of Nevada, 2009

1 The data do not exclude exceptional events.
2 2009 data inclusive through 8 a.m. December 16, 2009.
3 Carbon monoxide and ozone data obtained from the Orr monitoring station.
4 Nitrogen oxides data obtained from the JD Smith monitoring station.
5 PM $_{10}$ and $PM_{2.5}$ data obtained from the Green Valley monitoring station (closest station to the project site).
6 Second highest value.

Symptoms of exposure typically appear between one to three weeks after exposure and include a flu-like illness with fever, cough, headache, rash, and muscle aches. Typically, only 40 percent of those infected actually show/display/exhibit symptoms. Most people make a full recovery in a few weeks to a month from the onset of symptoms. In a small percentage of people, pulmonary infection or a widespread disseminated infection may occur, which presents typically in skin lesions, central nervous system infections such as meningitis, and bone and joint infection. People of African-American, Asian, or Filipino descent, women during their third trimester of pregnancy, and immunocompromised individuals seem to be at most risk of disseminated infections.

3.1.7 Climate Change

3.1.7.1 Overview of Climate Change

Global climate change refers to changes in the typical weather of the earth measured by alterations in wind patterns, storms, precipitation, and temperature relative to historical averages. Such changes vary considerably by geographic location. Over time, the earth's climate has undergone periodic ice ages and warming periods, as observed in fossil isotopes, ice core samples, and through other measurement techniques. Recent climate change studies use the historical record to predict future climate variations and the level of fluctuation that might be considered statistically normal given historical trends.

Temperature records from the Industrial Age (ranging from the late eighteenth century to the present) deviate from normal predictions in both rate and magnitude. Most modern climatologists predict an unprecedented warming period during the next century and beyond, a trend that is increasingly attributed to human-generated greenhouse gas emissions resulting from the industrial processes, transportation, solid waste generation, and land use patterns of the twentieth and twenty-first centuries. Increased greenhouse gas emissions are largely the result of increasing fuel consumption, particularly the incineration of fossil fuels. According to the United Nations Intergovernmental Panel on Climate Change (IPCC), greenhouse gas emissions associated with human activities have grown since pre-industrial times, increasing by 70 percent between 1970 and 2004; the IPCC further predicts that the range of global mean temperature change from year 1990 to 2100 could be anywhere from 1.1°C to 6.4°C (IPCC, 2007a).

Greenhouse gas emissions from an individual project, even a very large development project, would not individually generate sufficient greenhouse gas emissions to measurably influence global climate change (Association of Environmental Professionals, 2007). Climate change is, however, an irreversible, significant, cumulative impact on a global scale. Consideration of a project's impact to climate change is therefore essentially an analysis of a project's contribution to a cumulatively significant global impact through its emission of greenhouse gases.

3.1.7.2 Greenhouse Gases

Gases that trap heat in the atmosphere are called greenhouse gases because they transform the light of the sun into heat, similar to the glass walls of a greenhouse. Common greenhouse gases include water vapor,

carbon dioxide, methane, nitrous oxides, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, ozone, and aerosols. Without the natural heat-trapping effect of greenhouse gas, the earth's surface would be about 34°C cooler (California Environmental Protection Agency, Air Resources Board, 2007).

Water vapor is the most abundant, important, and variable greenhouse gas. While not considered a pollutant, it contributes to the enhanced greenhouse effect because the warming influence of greenhouse gases increases the amount of water vapor in the atmosphere. In addition to its role as a natural greenhouse gas, water vapor in the atmosphere helps to maintain a climate necessary for life. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include evaporation from other waterbodies, sublimation (change from solid to gas) from ice and snow, and transpiration from plant leaves. Water vapor is not considered further in this analysis because it is generally accepted that anthropogenic activities have not directly increased the amount of water vapor in the atmosphere (EPA, 2009b).

Carbon dioxide is an odorless, colorless gas that has both natural and anthropogenic sources. Natural sources include decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources of carbon dioxide are from burning coal, oil, natural gas, and wood. Carbon dioxide emissions are mainly associated with in-state fossil fuel combustion and fossil fuel combustion in out-of-state power plants supplying electricity to California. Other activities that produce carbon dioxide emissions include mineral production, waste combustion, and deforestation.

Methane is a flammable gas and is the main component of natural gas. A natural source of methane is the anaerobic decay of organic matter. Geological deposits, known as natural gas fields, also contain methane, which is extracted for fuel. Other sources include the exhaust from the combustion of fossil fuels, landfills, fermentation of manure, and cattle.

Nitrous oxide, also known as laughing gas, is produced naturally by microbial processes in soil and water. Anthropogenic sources of nitrous oxide include agricultural sources, industrial processing, fossil fuel-fired power plants, and vehicle emissions. Nitrous oxide is also used as an aerosol spray propellant and has medical applications.

Other gases that contribute to the greenhouse effect include ozone, chlorofluorocarbons, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and aerosols. Ozone is a greenhouse gas; however, unlike other greenhouse gases, ozone in the troposphere is relatively short-lived. It is difficult to make an accurate determination of the contribution of ozone precursors (nitrogen oxides and volatile organic compounds) to global climate change (California Environmental Protection Agency, 2004). This analysis focuses on the major sources of greenhouse gases, including carbon dioxide, nitrous oxide, and methane, because these are the gases currently regulated.

3.1.7.3 Predicted Effects of Climate Change

Climate change could have a number of adverse effects. Although these effects would have global consequences, in most cases they would not disproportionately affect any one site or activity. In other words, many of the effects of climate change are not site-specific. Emission of greenhouse gases would contribute to the changes in the global climate, which would in turn have a number of physical and environmental effects. A number of general effects that may occur are discussed below.

Water Supply. Most of the scientific models addressing climate change show that the primary effect on Nevada's climate would be a reduced snowpack and a shift in stream-flow seasonality. A higher percentage of the winter precipitation in the mountains would likely fall as rain rather than as snow in some locations, reducing the overall snowpack. As temperatures rise, snowmelt is expected to occur earlier in the year. As a result, peak runoff would likely come a month or so earlier. The end result of this would be that the state may not have sufficient surface storage to capture the resulting early runoff; therefore, absent construction of additional water storage projects, a portion of the current supplies would be lost to the oceans rather than be available for use in the state's water delivery systems.

Water Quality (IPCC, 2007b)**.** Climate change could have adverse effects on water quality, which would in turn affect the beneficial uses (such as habitat and water supply) of surface waterbodies and groundwater. The changes in precipitation discussed above could result in increased sedimentation, higher concentration of pollutants, higher dissolved oxygen levels, increased temperatures, and an increase in the amount of runoff constituents reaching surface waterbodies.

Ecosystems and Biodiversity (EPA, 2008a)**.** Climate change is expected to have effects on diverse types of ecosystems, from alpine to deep sea habitat. As temperatures and precipitation change, seasonal shifts in vegetation will occur. This could affect the distribution of associated flora and fauna species. As the range of species shifts, habitat fragmentation could occur, with acute impacts on the distribution of certain sensitive species. The IPCC states that "20 percent to 30 percent of species assessed may be at risk of extinction from climate change impacts in this century if global mean temperatures exceed 2 to 3°C (3.6 to 5.4°F) relative to pre-industrial levels" (IPCC, 2007b). Shifts in existing biomes could also make ecosystems vulnerable to invasive species encroachment. Wildfires, which are an important control mechanism in many ecosystems, may become more severe and more frequent, making it difficult for native plant species to repeatedly regerminate. In general terms, climate change is expected to put a number of stressors on ecosystems, with potentially catastrophic effects on biodiversity.

Human Health Impacts (EPA, 2008b)**.** Climate change may increase the risk of vector-borne infectious diseases, particularly those found in tropical areas and spread by insects—malaria, dengue fever, yellow fever, and encephalitis. While these health impacts would largely affect tropical areas in other parts of the world, effects would also be felt in Nevada. Warming of the atmosphere would be expected to increase smog and particulate pollution, which could adversely affect individuals with heart and respiratory problems, such as asthma. Extreme heat events would also be expected to occur with more frequency and

could adversely affect the elderly, children, and the homeless. Finally, the water supply impacts and seasonal temperature variations expected as a result of climate change could affect the viability of existing agricultural operations, making the food supply more vulnerable.

3.2 EARTH RESOURCES

This section describes the topography, geology, and soil conditions in the vicinity of the Proposed Action. The physical surface and subsurface features of the Proposed Action area, including geology, topography, stratigraphy, geologic hazards, mining resources, and soils, are described.

3.2.1 Geology

Geology is collectively defined as the topography, stratigraphy, and geologic hazards in the project area. Hazards can occur from seismic activity, subsidence, and ground fissures.

3.2.1.1 Topography

The Proposed Action area is located in the physiographic feature known as the Las Vegas Valley, which is located in the southern part of the Basin and Range physiographic province. The Las Vegas Valley is bordered on the north by the Las Vegas Range, on the east by the Frenchman, Sunrise, and River mountains, on the west by the Spring Mountains, and on the southeast by the McCullough Range. The mountain ranges of Clark County are typical of those found throughout the Basin and Range region. They are north-trending thrust and faulted mountain ranges separated by wide valleys filled with deep layers of sediments. These sediments have developed and accumulated from thousands of years of erosion of the surrounding ranges (BLM, 2004b).

The Proposed Action area is located on the northwest corner of the McCullough Range (Figure 3.2-1). The existing topography in the Proposed Action area consists of moderately low, northwest-trending hills. Elevation ranges from 2,680 feet on the valley floor to 3,375 feet at the highest point, with some slopes reaching angles of 45 degrees, and numerous vertical cliffs in bedrock areas (BLM, 2004b).

3.2.1.2 Stratigraphy

Bedrock and valley fill sediments are the geologic units that characterize the Las Vegas Valley. The mountain ranges to the west, east, and north consist primarily of Paleozoic and Mesozoic sedimentary rocks, including sandstone, limestone, siltstone, and conglomerates. The mountain ranges to the south and southeast primarily consist of Tertiary volcanic rocks, including basalts, andesites, rhyolites, and associated intrusive rocks that overlie Precambrian metamorphic and granitic rocks. The valley fill sediments predominantly consist of Miocene to Holocene age fine to coarse-grained deposits (Longwell et al., 1965).

The McCullough Range is predominantly Tertiary volcanic rock. These rocks are not usable for construction aggregate; however, the Proposed Action area is unique to this range. The Proposed Action

area is the only area east of I-15 in the Las Vegas area that contains construction aggregate. Onsite rock suitable for aggregate consists of mixed limestones and dolomites of the Mississippian Monte Cristo Formation and the Devonian Sultan Formation. The Monte Cristo Formation contains four members. From top to bottom (younger to older) these are: the Bullion member, a tan dolomite; the Anchor member, a dark dolomite with chert stringers; the Dawn member, a tan dolomite; and the Crystal Pass member, a light gray limestone. The Crystal Pass member overlies the older Sultan Formation. These formations generally trend northwest-southeast, dip to the east 5 to 45 degrees, and are dissected by a series of northwest-trending faults with varying amounts of displacement.

In Sloan, the carbonate units have a regional thickness of over 100 feet, except for the chert-bearing Anchor member that is 30 to 40 feet thick. This unit acts as a cap over the Proposed Action area and would have to be removed as waste before mining could occur. There is a section of Tertiary volcanic rock on the south 1/2 of the north 1/2 of Section 32; these rocks are not suitable for construction aggregate.

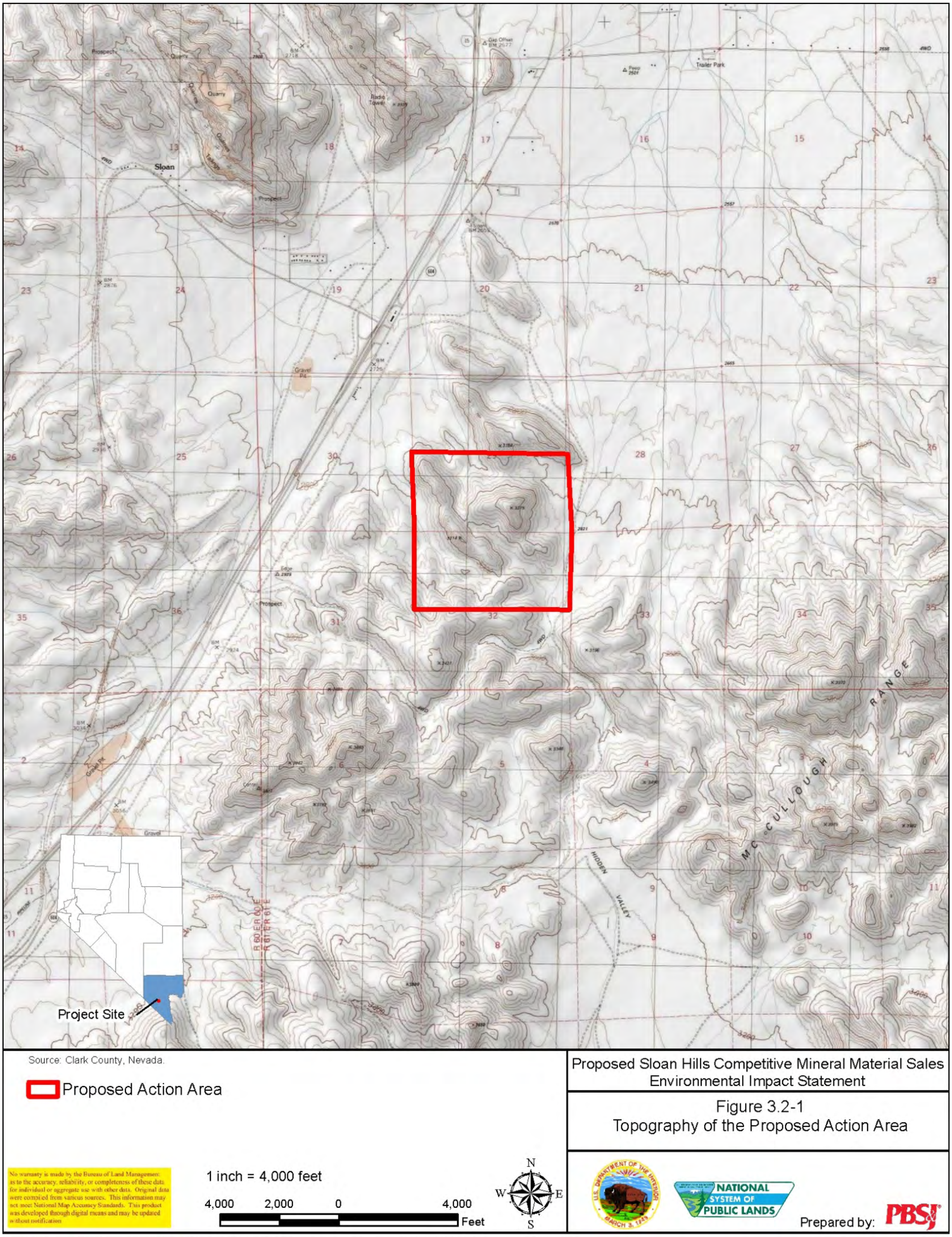
The primary units that produce product are the Dawn and Bullion members of the Monte Cristo Formation, both of which are dolomites. They are superficial to the Devonian units and cover large portions of the Proposed Action area. It is estimated that 5 to 10 percent of the rock mined in the Proposed Action area would be unusable for construction aggregate.

3.2.1.3 Geologic Hazards

Geologic hazards include subsidence and seismic activity. The Proposed Action area is located in the Las Vegas Valley Groundwater Basin.

Subsidence is the sinking of the earth's surface. It generally occurs as a result of a decrease in hydraulic pressure in the subsurface due to withdrawal of groundwater in regions with confined aquifers. In confined aquifers, the hydraulic pressure is greater than hydrostatic pressure, and relief of the excess pressure through pumping allows compaction of the aquifer materials. This process is partially reversible, meaning that if water pressures are allowed to recover, some reversal of subsidence will occur.

The Las Vegas Valley is a fault-bounded structural and hydrologic basin containing hundreds of meters of late Tertiary and Quaternary lacustrine, paludal, and alluvial deposits. These sediments consist of poorly compressible, coarse-grained alluvial fan deposits around the valley margins and of highly compressible, fine-grained sediment in the middle of the valley. Subsidence in the Las Vegas Valley Groundwater Basin is generally confined to four bowls that are bounded by Quaternary faults: the Northwest, North Las Vegas, Central, and Southern bowls. All of the bowls have decreased subsidence, the Central bowl being the most notable with an 80 percent decrease due to an artificial recharge program that is refilling the aquifer. However, none of these bowls occur in the area of the Proposed Action, and subsidence effects do not extend to the Proposed Action site, which is located in the valley margins (Bell, 2003).



Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.2-1
Topography of the Proposed Action Area

11/25/2009 | TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.2-1_topographic.mxd

No active faults are in the Proposed Action site or vicinity (Nevada Bureau of Mines and Geology, 2008). The current level of seismicity in southern Nevada is relatively low compared to more active parts of the Basin and Range Province. Most earthquakes in Nevada occur in the northern or western parts of the state. The Las Vegas Valley is located in Seismic Zone 2B, which is defined as an area with moderate damage potential (International Conference of Building Officials, 1997). Since 1898 only two earthquakes with a magnitude of 5.0 have occurred in the vicinity of the Las Vegas Valley, and none have had a magnitude greater than 5.0 (University of Nevada Reno, 2006). The Las Vegas Valley is ranked by the U.S. Geological Survey (USGS) as having a 50 percent chance of an earthquake with magnitude 5.0 to 5.9 occurring within 50 years and 50 kilometers of the city.

Two significant faults are on the site, both trending northwest-southeast. These faults indicate where rock units of different ages are adjacent to each other and reportedly would not affect the mining process (CEMEX/SRP, 2008).

3.2.2 Mining Resources

In 2009 Nevada ranked second, with more than 9 percent of total production in the U.S., in terms of the value of non-fuel mineral production. Nevada's principal minerals include gold, silver, copper, sand and gravel, and lime (USGS, 2009). In Clark County, the major industrial minerals include gypsum, silica products, and lime (Nevada Bureau of Mines and Geology, 2008).

Federally owned minerals in the public domain fall into one of the following categories, as defined by the BLM: locatable, leasable, or saleable. Locatable minerals are those that can be located and claimed under the General Mining Law of 1872. Locatable minerals are "uncommon varieties of sand, gravel, stone, pumice, pumicite, cinders, and exceptional clay." All "valuable mineral deposits" are locatable under the General Mining Law of 1872 except those that are leasable or saleable. Examples of locatable minerals include metallic minerals (such as gold and silver) and non-metallic minerals (such as gemstones and mica). Mining for these minerals requires an approved Plan of Operation and bonding. Leasable minerals include fluid minerals and solid minerals. Fluid leasable minerals, such as oil and gas, coal and geothermal resources, and solid non-energy leasable minerals (sodium and potassium), are leased under the Mineral Leasing Act of 1920 and its amendments of 1987. Saleable minerals are those materials, such as sand, gravel, and construction material, that are sold or permitted for extraction under the Materials Act of 1947 (43 CFR 3600; 30 USC 601, et seq.), as amended. This category includes all minerals not defined as locatable or leasable.

Locatable Minerals

Nevada produced 5.698 million ounces of gold, 7.965 million ounces of silver, 175.5 million pounds of copper, and 0.28 million pounds of molybdenum in 2008. Gold production was down 338,826 ounces, a 5.6 percent decrease from 2007. The decrease marked the eighth consecutive year of declining production. Exploration in Nevada continued at a great pace in 2008, but slowed considerably in the fall

due to the economic recession. Nevada county recorders registered 221,858 claim filings (new claims and annual maintenance of existing claims) in 2008, a 4 percent increase from 2007. While claim filings increased in 2008, the number of new claims decreased. The BLM listed more than 20,000 new claims that were located in 2008, which was a 51 percent decrease from 2007 (Nevada Bureau of Mines and Geology, 2009).

In the early 1990s, both the Crescent Property (Crescent District) and Keystone (Goodsprings District) produced gold; however, both sites are currently inactive (Nevada Bureau of Mines and Geology, 2009). Approximately 56 miles west of Las Vegas, Boxxer Gold Corporation is conducting exploration drilling for gold and other metals. Samples collected were found to contain copper, gold, platinum, silver, and palladium (Boxxer, 2008). No evidence exists of the occurrence of gold in the vicinity of the Proposed Action (BLM, 2004b).

Leasable Minerals

Leasable minerals include oil, gas, phosphate, sodium, potassium, sulfur, gilsonite, and hardrock minerals. In 2008 Nevada ranked 26th out of 31 oil-producing states (Nevada Bureau of Mines and Geology, 2009). Commercial oil and gas accumulations have not been discovered in the Las Vegas Valley or nearby areas. At least one test well was drilled in the Sloan Valley in search of oil, but no oil or gases were produced (Longwell, et al., 1965).

Saleable Minerals

According to the USGS, in 2008 Nevada produced an estimated 31.3 million tons of construction sand and gravel and 8.67 million tons of crushed stone. Production from sand and gravel deposits accounted for about 78 percent of aggregate production statewide, with crushed stone and lightweight aggregate making up the balance. The total production value of almost $225 million makes construction aggregate the third most valuable commodity produced in the state in 2008. Aggregate production, which in recent years had been increasing as a result of Nevada's expanding population and need for construction materials for homes, schools, streets, highways, airports, resort hotels, and other businesses, experienced a decline from 2007 to 2008 due to the economic recession. The production of construction sand and gravel and crushed stone decreased from 2007 levels by 17 percent and 22 percent, respectively.

Construction aggregate produced in the Las Vegas Valley in 2008, estimated at about 28 million tons, was about 35 percent lower than in 2007. Sand and gravel operations accounted for about 75 percent of the aggregate used in the Las Vegas metropolitan area in 2007. As in past years, the Lone Mountain area in northwest Las Vegas remained the most important source of sand and gravel aggregate. The Lone Mountain area produced more than 10 million tons in 2005 and 2006, but is estimated to have fallen below that in 2007 and 2008. Significant production also came from sand and gravel pits and stone quarries south and northeast of Las Vegas, and in the El Dorado Valley area west of Boulder City.

Portable crushers at construction sites were also important producers of sand and gravel in Las Vegas (Nevada Bureau of Mines and Geology, 2009).

As noted in Chapter 1, the Las Vegas metropolitan area is one of the fastest-growing urban areas in the country. Clark County is expected to increase in population from 1.99 million in 2008 to 3.02 million in 2028. This projected increase in population will result in an increasing demand for construction materials throughout the valley for residential, commercial, and infrastructure projects. The proposed project site contains geologic formations of calcium and magnesium carbonates (limestone and dolomite, respectively) that have been identified as suitable for the production of construction aggregate. The site was selected by the mining applicants because of the large volume of high-quality materials and its proximity to the area where construction materials would be needed most (i.e., high growth area).

The Materials Act of 1947, as amended, establishes procedures for the exploration, development, and disposal of mineral material resources on public lands, and for the protection of the resources and the environment. This Act authorizes the sale of common varieties of minerals, including sand and gravel, clay, petrified wood, stone, and pumicite. Additionally, the Act authorizes the BLM to sell mineral material at fair market value and to grant free use permits for mineral material to government agencies. Regulations set forth in 43 CFR 3602.31 limit the volume of mineral material that BLM may sell in an individual sale without advertising or calling for bids. This limitation is set at 200,000 cubic yards, which is approximately 409,000 to 489,000 tons of aggregate. The sale requests from CEMEX and SRP exceed the volume limitations for non-competitive sales found at 43 CFR 3602.31, and any sale, if made, would have to be on a competitive basis (through oral bid or auction). The Proposed Action analyzed in this EIS is the BLM sale of mineral material in the Sloan Hills site by competitive bid. The Proposed Action would not result in the disposal of public lands; the lands proposed for mineral extraction would remain under the administration of the BLM.

3.2.3 Soils

The Natural Resources Conservation Service (NRCS) has mapped three soil types at the 640-acre Proposed Action site: Nipton-Hiddensun-Haleburu association; Cave very stony sandy loam; and Cave gravelly fine sandy loam. The Nipton-Hiddensun-Haleburu association comprises more than 82 percent of the site. The Cave very stony sandy loam covers approximately 17 percent of the site, occurring in the northeastern and eastern part of the site. The Cave gravelly fine sandy loam, covering less than 1 percent of the site, occurs only as small isolated areas in the northwest and southeast portions of the site (Soil Conservation Service, 1985; NRCS, 2009).

The Nipton-Hiddensun-Haleburu association is formed on mountains and has a low available water capacity. The surface area is covered with cobbles, stones, or boulders. The Nipton surface layer is stony sandy loam to a depth of 2 inches. The subsoil is very gravelly sandy loam from 2 to12 inches, and from 12 to 22 inches is bedrock. Slope gradients range from 15 to 50 percent. The Hiddensun surface layer is very gravelly fine sandy loam to a depth of 3 inches, underlain by very cobbly fine sandy loam at a depth

of 3 to 5 inches and bedrock at a depth of 15 to 25 inches. Slope gradients for Hiddensun are 8 to 30 percent. The Haleburu surface layer is extremely gravelly sandy loam to a depth of 2 inches. The subsurface (from 2 to 11 inches) is very gravelly sandy loam, and from 11 to 21 inches is bedrock. Slope gradients generally range from 15 to 50 percent (Soil Conservation Service, 1985; NRCS, 2009).

The Cave very stony sandy loam soil is formed in alluvium derived from various kinds of rock on erosional fan remnants. The soil is shallow and well drained with low available water capacity. The surface layer is pale brown very sandy loam about 3 inches thick, underlain by a very pale brown gravelly sandy loam to a depth of 6 inches. Slope gradients generally range from 0 to 4 percent (Soil Conservation Service, 1985; NRCS, 2009).

The Cave gravelly fine sandy loam is derived from various kinds of rock derived in alluvium. The available water capacity is very low. The surface layer is covered with a desert pavement of pebbles, cobbles, and pale brown gravelly sandy loam to a depth of 12 inches thick. The subsoil is to a depth of 36 inches and is an indurated, lime-cemented hardpan. Slope gradients range from 0 to 4 percent (Soil Conservation Service, 1985; NRCS, 2009).

There is little topsoil on the site (Shumway, 2008).

3.3 BIOLOGICAL RESOURCES

The Proposed Action area lies within the Mojave Desert. The Mojave is the smallest of the four North American deserts, lying primarily in California, but also including the southern quarter of Nevada and two small extensions into western Arizona. This region is marked by extreme conditions as the climate is arid, accompanied by temperatures ranging from 20°F to more than 100°F. Overall precipitation is very low, averaging 4 to 6 inches per year, with erratic rainfall patterns that tend to be localized. Most precipitation in the eastern Mojave Desert occurs during October through April (accounting for approximately 66 percent of the annual total), with May and June being the driest months (Hereford et al., 2004). The Mojave Desert is bordered by the southern Sierra Nevada Mountains to the west, the Great Basin Desert to the north, the Colorado River to the east, and the San Bernardino Mountains and the Sonoran Desert to the south.

In the Mojave Desert, the Proposed Action area is situated in the eastern Mojave subdivision (Webb et al., 2009). The eastern Mojave subdivision is distinguished from other Mojave subdivisions by its relatively high amount of summer rainfall and generally uniform growing conditions throughout the region despite wide variations in local elevation (Webb et al., 2009).

The Proposed Action area encompasses a portion of the Sloan Hills, just south of the Las Vegas Valley, and is bounded by the McCullough Range to the east, the Las Vegas Valley to the north, Hidden Valley to the south, and I-15 to the west. The Proposed Action area is located in the Mojave Desert Biome of the

Basin and Range physiographic province. This physiographic province is characterized by a varied topography that consists of small, generally north-south trending mountain ranges.

The methodology used to develop the biological resources baseline in the Proposed Action area included agency coordination, literature review, and field investigations. One hundred percent ground cover surveys were conducted for special-status species in the Proposed Action area using linear transects spaced approximately 30 feet apart. Surveys were conducted from December 3, 2007, to January 29, 2008.

3.3.1 Vegetation

3.3.1.1 Plant Communities

Vegetation communities in the Mojave Desert biome that are present in the Proposed Action area include Mojave Desert Scrub and Mojave Desert Wash Scrub. The Mojave Desert Scrub ecosystem typically occurs on slopes, hillsides, and washes with alluvial soils at elevations of about sea level to 4,000 feet, but may occur 1,000 feet higher on south-facing slopes (Turner, 1982). The vegetation is dominated by creosote bush (*Larrea tridentata*) and a diverse mixture of other shrubs, cacti, and yucca (*Yucca* species). Other common vegetative species that typically occur in this ecosystem include indigo bush (*Psorothamnus fremontii*), desert thorn (*Lycium* species), shadscale (*Atriplex confertifolia*), hopsage (*Grayia spinosa*), ratany (*Krameria erecta*), and Mormon tea (*Ephedra* species). The predominant vegetation in the Proposed Action area consists of creosote bush, white bursage (*Ambrosia dumosa*), and multiple species of cacti.

The Mojave Desert Wash Scrub community is located in the project area in the large washes along the southern portion of the Proposed Action area. Desert Wash Scrub communities are typically nested within Mojave Desert Scrub biogeographically and are either dominated by mesquite (*Prosopis* species) or catclaw (*Acacia* species) plants. The ephemeral washes in the Proposed Action area are catclaw-dominated communities. Catclaw-dominated communities grow in soils that tend to be sandy or gravelly, such as those found in washes and alluvial fans in both the Mojave and Sonoran deserts. Common vegetative species that occur in this ecosystem include burro bush (*Hymenoclea salsola*), sweetbush (*Bebbia juncea*), and sandpaper plant (*Petalonyx nitidus*).

Vegetation surveys of the Proposed Action area were performed by biologists walking transects that were spaced approximately 30 feet apart. During the field surveys, a total of 625 acres were surveyed for vegetation, and a total of 51 plant taxa representing 21 families were identified. A list of all plant species observed during the field surveys is in Table 3.3-1.

Table 3.3-1
Vegetative Species Observed in the Proposed Action Area

Scientific Name	Common Name	Family
Yucca schidigera	Mojave yucca	Agavaceae
Tidestromia oblongifolia	Honey-sweet	Amaranthaceae
Adenophyllum species	Dyssodia	Asteraceae
Ambrosia dumosa	White bursage	
Encelia actoni	Acton encelia	
Encelia virginensis	Green encelia	
Gutierrezia microcephala	Snakeweed	
Hymenoclea salsola	Cheesebush	
Peucephyllum schottii	Desert fir	
Porophyllum gracile	Slender poreleaf	
Stephanomeria pauciflora	Wire lettuce	
Xylorhiza tortifolia	Mojave aster	
Amsinckia tessellata	Checker fiddleneck	Boraginaceae
Echinocactus polycephalus	Cottontop cactus	Cactaceae
Echinomastus johnsonii	Pygmy barrel cactus	
Ferocactus cylindraceus	Barrel cactus	
Mammillaria tetrancistra	Fishhook cactus	
Opuntia basilaris	Beavertail cactus	
Opuntia echinocarpa	Silver cholla	
Opuntia ramosissima	Pencil cholla	
Mortonia utahensis	Utah mortonia	Celastraceae
Grayia spinosa	Hopsage	Chenopodiaceae
Krascheninnikovia lanata	Winterfat	
Salsola kali ssp. t*ragus*	Russian thistle	
Ephedra torreyana	Brigham tea	Ephedraceae
Chamaesyce albomarginata	Rattlesnake weed	Euphorbiaceae
Acacia greggii	Cat-claw acacia	Fabaceae
Dalea mollissima	Silk dalea	
Psorothamnus arborescens	Mojave indigobush	
Krameria erecta	Littleleaf ratany	Krameriaceae
Salazaria mexicana	Paper bag bush	Lamiaceae
Sphaeralcea ambigua	Apricot globemallow	Malvaceae
Allionia incarnata	Trailing four-o'clock	Nyctaginaceae
Menodora spinescens	Spiny menodora	Oleaceae
Camissonia brevipes	Suncup Onag	raceae
Achnatherum hymenoides	Indian ricegrass	Poaceae
Bromus rubens	Red brome	
Erioneuron pulchellum	Fluffgrass	
Muhlenbergia porteri	Bush muhly	
Pleuraphis rigida	Galleta grass	
Chorizanthe rigida	Spiny chorizanthe	Polygonaceae
Eriogonum deflexum	Skeletonweed	
Eriogonum fasciculatum	Mojave buckwheat	
Eriogonum inflatum	Desert trumpets	

Table 3.3-1
Vegetative Species Observed in the Proposed Action Area

Scientific Name	Common Name	Family
Cheilanthes parryi	Parry's lipfern	Pteridaceae
Coleogyne ramosissima	Blackbrush	Rosaceae
Lycium species	Boxthorn	Solanaceae
Nicotiana trigonophylla	Coyote tobacco	
Physalis crassifolia	Thick-leaved ground cherry	
Larrea tridentata	Creosote bush	Zygophyllaceae

3.3.1.2 Cacti, Yucca, and Evergreen Trees

All native cacti, yuccas, and evergreen trees are protected and regulated by the State of Nevada under NRS 527.060-.120. This provision prohibits the removal or destruction of the listed plant species on Nevada state lands, county lands, reserved or unreserved lands owned by the federal government, and from privately owned lands without written permission from the legal owner or the legal owner's duly authorized agent, specifying locality by legal land description and number of plants to be removed or possessed. The BLM coordinates all plant salvages on public lands with the State. The BLM is authorized to salvage vegetation on public lands under 43 CFR 5400 and BLM Manual 5000-1 (BLM, 1991).

Surveys of cacti and yuccas conducted in the Proposed Action area showed that they to occur at a density of approximately 18 plants per acre. Species observed included beavertail cactus (*Opuntia basilaris*), barrel cactus (*Ferocactus cylindraceus*), silver cholla (*Opuntia echinocarpa*), cottontop cactus (*Echinocactus polycephalus*), pencil cholla (*Opuntia ramosissima*), pygmy barrel cactus (*Echinomastus johnsonii*), and fishhook cactus (*Mammillaria tetrancistra*). A complete count of the cactus species observed in the Proposed Action area is in Table 3.3-2. No evergreen trees were observed during surveys.

Table 3.3-2
Number of Cacti Plants Observed in the Survey Area

Scientific Name	Common Name	Number Observed
Echinomastus johnsonii	Pygmy barrel cactus	2,904
Echinocactus polycephalus	Cottontop cactus	1,726
Ferocactus cylindraceus	Barrel cactus	1,611
Mammillaria tetrancistra	Fishhook cactus	19
Opuntia basilaris	Beavertail cactus	1,932
Opuntia echinocarpa	Silver cholla	438
Opuntia ramosissima	Pencil cholla	87
Yucca schidigera	Mojave yucca	2,330

3.3.1.3 Noxious Weeds

Noxious weeds are those weeds designated as a pest by state or federal law or regulation. The Nevada Department of Agriculture recommends plants for listing as noxious weeds "after consultation with outside experts and a panel composed of Nevada Weed Action Committee members." If a plant is found to be "detrimental or destructive and difficult to control or eradicate," the Department, with approval of the Board of Agriculture, will designate the plant as a noxious weed (NRS 555.005).

Invasive weeds are alien species whose introduction does or is likely to cause economic or environmental harm (National Invasive Species Council, 2006). Invasive weeds include but are not limited to designated noxious weeds. Noxious weeds and invasive species are a concern in most parts of the U.S. and in southern Nevada because they are opportunistic and can exclude native plants from an area if left unchecked. Weed management is an integral part of maintaining ecosystem health.

Federal agencies are directed by Executive Order 13112, Invasive Species Federal Laws and Regulations (February 3, 1999), to expand and coordinate efforts to prevent the introduction and spread of invasive plant species, including noxious weeds, and to minimize the economic, ecological, and human health impacts that invasive species may cause. No plants on the State of Nevada Noxious Weeds list were observed during surveys of the Proposed Action area. Two plant species identified during surveys are classified by the USDA as non-native invasive species—Russian thistle (*Salsola kali* ssp. t*ragus*) and red brome (*Bromus rubens*) (USDA, 2007). Both of these species are widespread in Nevada and the southwestern U.S. State or federally regulated noxious weeds were not observed in the Proposed Action area or vicinity during surveys.

3.3.1.4 Threatened, Endangered, and Other Sensitive Plant Species

Endangered, threatened, and other special status plant species that potentially occur in the Proposed Action area were identified through coordination with the Nevada Natural Heritage Program (NNHP) and USFWS (Table 3.3-3). Copies of the responses received from NNHP and USFWS are in Appendix C. No federally endangered or threatened plant species were identified as potentially occurring in the Proposed Action area. However, two species designated as federal species of concern (USFWS, 2009) potentially occur in the Proposed Action area: the Las Vegas bearpoppy (*Arctomecon californica*) and rosy two-tone beardtongue (*Penstemon bicolor* ssp. *roseus*). The Las Vegas bearpoppy is listed by the State of Nevada as "critically endangered" and by the BLM as Special Status Species, while the rosy two-tone beardtongue is listed by the BLM as Sensitive in the State of Nevada. These federal species of concern are shown in Table 3.3-3. Brief habitat descriptions for the species are in the paragraphs below.

Table 3.3-3
Threatened, Endangered, and Other Sensitive Plants Evaluated for Occurrence in the Proposed Action Area

Species		Protection Status			Suitable Habitat Present?
Scientific Name	Common Name	Federal[1]	State of Nevada[2]	BLM[3]	
Arctomecon californica	Las Vegas bearpoppy	SOC	Yes	SSS	No
Penstemon bicolor ssp. *roseus*	Rosy two-tone beardtongue	SOC	—	S	Yes

1 Federal (USFWS) status for listing under the ESA: SOC (Species of Concern).
2 State of Nevada special status species protected under NRS 527.
3 BLM Special Status Species (SSS); BLM Sensitive Species in Nevada (S).

Las Vegas Bearpoppy

The Las Vegas bearpoppy is a federal species of concern, is listed by the State of Nevada as critically endangered, and is listed by the BLM as a Special Status Species. Las Vegas bearpoppy occur in Clark County, Nevada, and in Mohave County, Arizona (primarily near Lake Mead) within the Gypsum Barren Communities of the Mojave Desert at elevations between 1,060 feet and 3,150 feet. This species is restricted to soils with high gypsum content, between 36 and 69 percent. These gypsum soils are most commonly found in relatively barren, low-competition sites within Mojave Desert Scrub, Saltbush Scrub, and occasionally Blackbrush Scrub ecosystems (The Nature Conservancy, 2007). In Clark County, Las Vegas bearpoppy can be found on barren, gravelly, desert flats, hummocks, and slopes that are otherwise sparsely vegetated (Mistretta et al., 1996) primarily north of Lake Mead and west of the Virgin River and Overton Arm of Lake Mead (The Nature Conservancy, 2007), although a few are scattered populations documented in the western portion of the Las Vegas Valley. In Clark County, 91 populations at 78 sites have been documented and are presumed to still exist (Mistretta et al., 1996).

The known population range of Las Vegas bearpoppy in the Las Vegas Valley was mapped as part of the 2008 Las Vegas Valley Flood Control Master Plan Update (CCRFCD, 2008). Populations in the vicinity of the Proposed Action area are shown in Figure 3.3-1. There are no known populations in the area that would be impacted by the proposed alternatives, and no Las Vegas bearpoppy plants were observed during project surveys. Additionally, suitable habitat for this species (high gypsum soils) does not occur in the Proposed Action area.

Rosy Two-tone Beardtongue

The rosy two-tone beardtongue, a federal species of concern (USFWS, 2009), is listed by the BLM as Sensitive in the State of Nevada. This perennial species is typically associated with creosote bush habitats in Clark County and portions of Arizona. Preferred substrate includes gravel washes and disturbed roadsides to outwash fans and plains at elevations ranging from 1,970 feet to 5,480 feet above mean sea level. In Nevada, this plant is found on rocky calcareous, granitic, or volcanic soils in washes, roadsides,

scree at rock outcrop bases, rock crevices, or similar places receiving enhanced runoff, in the creosote-bursage, blackbrush, and mixed-shrub zones (Arizona Game and Fish Department, 2003). This species responds favorably to disturbance, which tends to increase the number of individuals in a population.

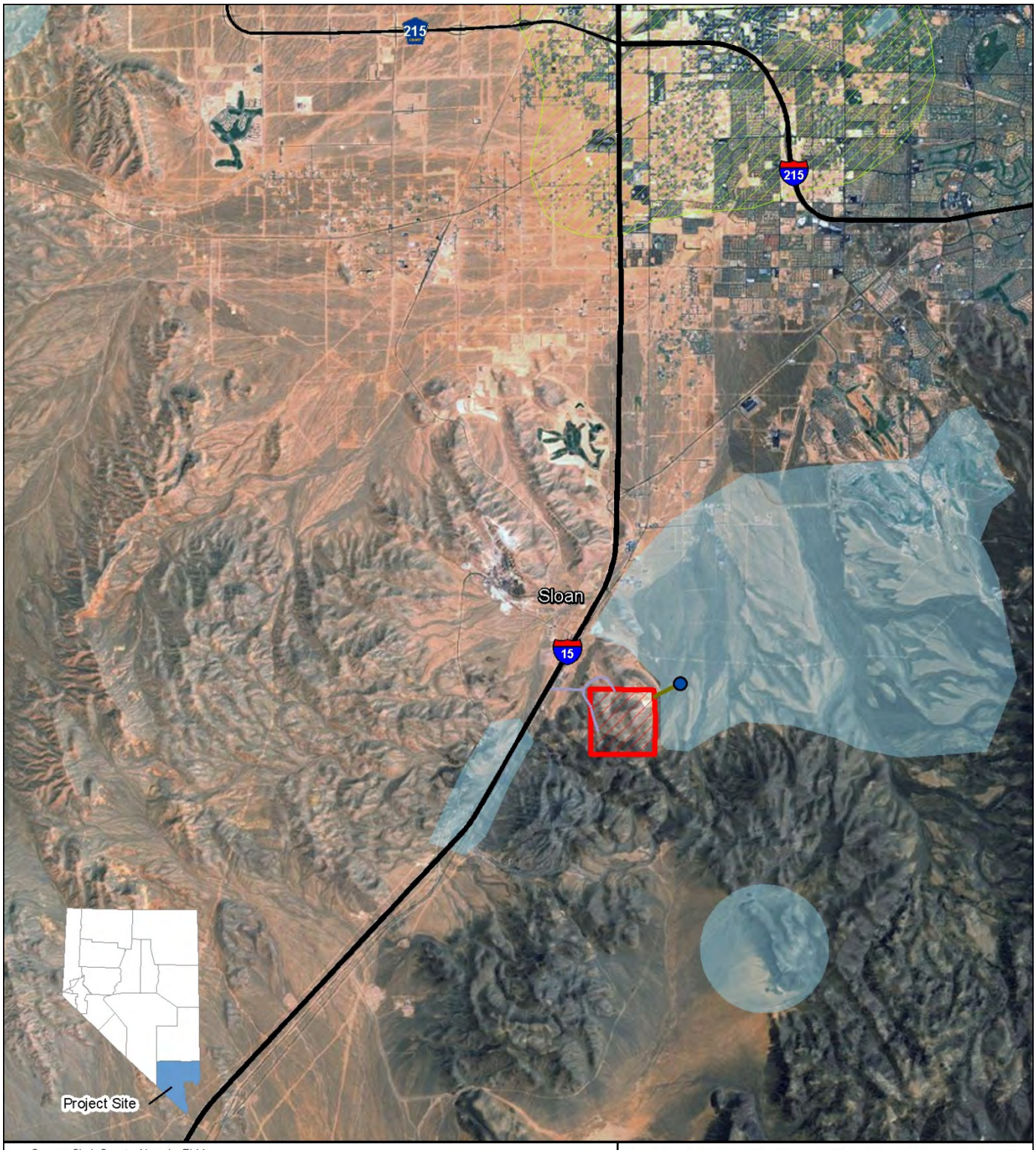
The known population range of the rosy two-tone beardtongue in the Las Vegas Valley was mapped as part of the 2008 Las Vegas Valley Flood Control Master Plan Update (CCRFCD, 2008). Populations in the vicinity of the Proposed Action area are shown in Figure 3.3-1. Ephemeral washes and roadsides in the Proposed Action area provide potentially suitable habitat for the rosy two-tone beardtongue. While biological surveys were conducted during the winter of 2007/2008 and no individuals of this subspecies were observed, it is feasible that rosy two-tone beardtongue may occupy portions of the Proposed Action area.

3.3.2 Wildlife

Wildlife observations were noted while conducting protocol surveys for desert tortoise (*Gopherus agassizii*). The Proposed Action area supports numerous species of animals, including mammals, birds, reptiles, and various invertebrates. It also serves as a travel corridor for many animals. Wildlife species discussed in this section commonly occur in the Mojave Desert and have adapted to desert scrub habitats with little cover and dry, desert-like conditions. All wildlife species observed in the Proposed Action area or identified by indirect evidence, such as tracks, burrows, carcasses, or scat, are shown in Table 3.3-4.

Table 3.3-4
Wildlife Species or Their Sign Identified During Surveys

Scientific Name	Common Name
Athene cunicularia hypugea	Western burrowing owl
Corvus corax	Common raven
Buteo jamaicensis	Red-tailed hawk
Falco peregrinus	Peregrine falcon
Lepus californicus	Black-tailed jackrabbit
Gopherus agassizii	Desert tortoise (Mojave population)
Masticophis flagellum	Coachwhip snake
Dipodomys species	Kangaroo rat
Neotoma lepida	Desert woodrat
Ovis canadensis nelsoni	Desert bighorn sheep
Sauromalus obesus	Chuckwalla
Uta stansburiana	Side-blotched lizard
Canis latrans	Coyote
Vulpes macrotis	Kit fox



Source: Clark County, Nevada, BLM.

Proposed Action Area
Las Vegas Bearpoppy
Rosy_Twotone_Beardtongue
Existing Groundwater Well
Proposed Access Roads
Proposed Pipeline

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

1 inch = 2 miles

2 1 0 2 Miles

N W E S

Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.3-1
Distribution of Las Vegas Bearpoppy and Rosy Two-tone Beardtongue

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS&J

06/08/2010 | TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.3-1_Vegetation.mxd

Reptiles typically found in Mojave Desert Scrub and Mojave Desert Wash Scrub vegetation include the western whiptail (*Cnemidophorous tigris*), side-blotched lizard (*Uta stansburiana*), common chuckwalla (*Sauromalus obesus*), long-nosed leopard lizard (*Gambelia wislizenii*), Great Basin collared lizard (*Crotaphytus bicinctores*), desert spiny lizard (*Sceloporus magister*), desert horned lizard (*Phrynosoma platyrhinos*), banded Gila monster (*Heloderma suspectum cinctum*), western patch-nosed snake (*Salvadora hexalepis mojavensis*), red coachwhip (*Masticophis flagellum piceus*), gopher snake (*Pituophis catenifer*), speckled rattlesnake (*Crotalus mitchelli*), and desert tortoise (Mojave population).

Avian species that commonly occur in Mojave Desert Scrub and Mojave Desert Wash Scrub vegetation include the common raven (*Corvus corax*), red-tailed hawk (*Buteo jamaciensis*), Cooper's hawk (*Accipiter cooperii*), American kestrel (*Falco sparverius*), turkey vulture (*Cathartes aura*), western burrowing owl, mourning dove (*Zenaida macroura*), white-throated swift (*Aeronautes saxatalis*), cactus wren (*Campylorhynchus brunneicapillus*), loggerhead shrike (*Lanius ludovicianus*), ash-throated flycatcher (*Myiarchus cinerascens*), black-throated sparrow (*Amphispiza bilineata*), Anna's hummingbird (*Calypte anna*), horned lark (*Eremophila alpestris*), and Say's phoebe (*Sayornis saya*).

Mammalian species that are commonly found in Mojave Desert Scrub and Mojave Desert Wash Scrub vegetation include the black-tailed jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus audubonii*), desert woodrat (*Neotoma lepida*), grasshopper mouse (*Onychomys torridus*), deer mouse (*Peromyscus maniculatus*), antelope ground squirrel (*Ammospermophilus leucurus*), kangaroo rat (*Dipodomys* spp.), desert bighorn sheep, kit fox (*Vulpes macrotis*), bobcat (*Lynx rufus*), and coyote (*Canis latrans*).

3.3.2.1 Migratory Birds

All migratory bird species that may occur in the Proposed Action area, with the exception of rock pigeons (*Columba livia*), house sparrows (*Passer domesticus*), and European starlings (*Sturnus vulgaris*), are protected under the Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712). This Act states that it is unlawful to take, kill, or possess migratory birds, their parts, nests, and eggs (16 USC 703-711). For migratory game species, the treaty order is carried out cooperatively with the state agencies (e.g., NDOW), which set and enforce legal harvest laws and regulations. Any impacts on migratory birds are primarily a concern during the breeding season when most species protected under the Act are expected to be rearing young. Several migratory bird species are considered special status species in the region. In addition, the mountainous terrain of the Proposed Action area provides suitable nesting habitat for several species of raptors.

3.3.2.2 Bald and Golden Eagles

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668c). This Act prohibits anyone without a permit issued by the Secretary of the Interior from

"taking" bald or golden eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

Bald eagles (*Haliaeetus leucocephalus*) are further protected under the Migratory Bird Treaty Act of 1918 and were previously protected as a threatened species under the ESA of 1973. On August 9, 2007, the bald eagle was removed from the federal list of threatened and endangered species. This species requires open water habitats that support an adequate food base and provide appropriate roosting and nesting sites, such as cliffs and tall trees. Food base for the eagle primarily includes fish, small mammals, and waterfowl. Bald eagles are winter residents of southern Nevada with roost sites primarily located along Lake Mead and Lake Mohave (Floyd et al., 2007). Annual surveys for this species are conducted in the Lake Mead National Recreation Area by the National Park Service, who has reported that overwintering birds have been increasing in number over the last few years. Winter home range size for bald eagles can be very large and averages approximately 99,000 acres (155 square miles) in the southwestern part of their range (NatureServe, 2010a). Bald eagles are not known to nest in southern Nevada (Floyd et al., 2007). The Proposed Action area does not contain suitable wintering roost habitat, and it does not contain suitable nesting habitat. However, the Proposed Action area may serve as suitable foraging habitat. No bald eagles were observed during 2007/2008 biological surveys.

Golden eagles (*Aquila chrysaetos*) are further protected under the Migratory Bird Treaty Act of 1918 and are designated by the BLM as a Sensitive Species in the State of Nevada. Golden eagles are year-round residents in southern Nevada, ranging across open and semi-open habitats from alpine mountains to grasslands, to desert scrub (NatureServe, 2010b). Breeding habitat consists primarily of mountainous canyon land, rimrock terrain of open desert, and grassland areas of the western U.S. Golden eagles will also occasionally nest in riparian habitats, but generally avoid densely vegetated areas (Kochert et al., 2002). Preferred foraging territories are also sparsely vegetated and may be as large as 38,400 acres (60 square miles). The Proposed Action area does not contain suitable nesting habitat for this species, but suitable foraging habitat is present. No golden eagles were observed during the 2007/2008 biological surveys.

3.3.2.3 Threatened, Endangered, and Other Sensitive Wildlife Species

This section summarizes information on the species listing status, habitat, and range for federally listed, State listed, and BLM sensitive wildlife species. This information was compiled from existing scientific literature, technical reports, and survey data collected for the Proposed Action. A list of the federally and State listed wildlife species that could potentially occur in the Proposed Action area was derived from literature review, correspondence with the USFWS (USFWS, 2007a), NDOW (NDOW, 2007), and the NNHP (NNHP, 2007). This correspondence is in Appendix C.

Table 3.3-5 summarizes the sensitive wildlife species that occur and could potentially occur in or near the Proposed Action area. In addition to these species, migratory birds and raptors have the potential to occur in the Proposed Action area.

Table 3.3-5
Threatened, Endangered, and Other Sensitive Wildlife Species Evaluated for Potential Occurrence in the Proposed Action Area

Species		Protection Status			Suitable Habitat Present?
Scientific Name	Common Name	Federal[1]	State of Nevada[2]	BLM[3]	
Gopherus agassizii (Mojave population)	Desert tortoise	LT	Yes	SSS	Yes
Athene cunicularia hypugea	Western burrowing owl	SOC	Yes	S	Yes
Falco peregrinus anatum	American peregrine falcon	SOC	Yes	S	Yes
Heloderma suspectum cinctum	Banded Gila monster	SOC	Yes	S	Yes
Sauromalus obesus	Chuckwalla	SOC	—	S	Yes
Ovis canadensis nelsoni	Desert bighorn sheep	—	Yes	S	Yes

1 Federal (USFWS) status for listing under the ESA: LT (Listed Threatened); SOC (Species of Concern).
2 Wildlife protected under NAC 503.
3 BLM Special Status Species (SSS); BLM Sensitive Species in Nevada (S).

Desert Tortoise Mojave Population

Declines in desert tortoise populations became a major concern in the 1970s because of direct take from humans; habitat degradation, loss, and fragmentation; droughts; and diseases (USFWS, 1994). The Mojave population of the desert tortoise was listed as threatened in 1990 in the northern and western parts of its range, and six distinctive population segments were identified for critical habitat protection in 1994 following the guidelines set by the recovery plan released the same year (USGS, 1997).

The Mojave population of the desert tortoise occurs north and west of the Colorado River in the Mojave Desert ecoregion in California, Nevada, Arizona, and Utah. The desert tortoise is a large herbivorous reptile found at elevations ranging from below mean sea level to 5,000 feet above mean sea level. Desert tortoises primarily forage on annual wildflowers and native desert grasses, especially galleta (*Hilaria* species) and Indian rice grass (*Achnatherum hymenoides*). Ideal conditions for excavating burrows include gently sloping terrain with soils ranging from sand to sandy-gravel; however, desert tortoises also may utilize terrain with steep slopes and rocky soils. Soils must be friable enough for tortoises to excavate burrows but firm enough so that burrows do not collapse. Desert tortoises also may utilize caves that naturally form on the banks of washes in caliche soils and on the slopes of mountainous terrain. The species is generally most active during the spring, early summer, and autumn when annual plants are most abundant and mating occurs. Desert tortoises usually spend the remainder of the year in burrows protected from the extreme conditions of the desert.

Desert tortoise home ranges vary with respect to location and year. Long-term home ranges for male tortoises range from 25 to 200 acres, while ranges for females are approximately half that of the male (Berry, 1986). Over its lifetime, a desert tortoise may require more than 1.5 square miles of habitat and travel more than 7 miles at a time (Berry, 1986). In drought years, the ability of tortoises to drink surface

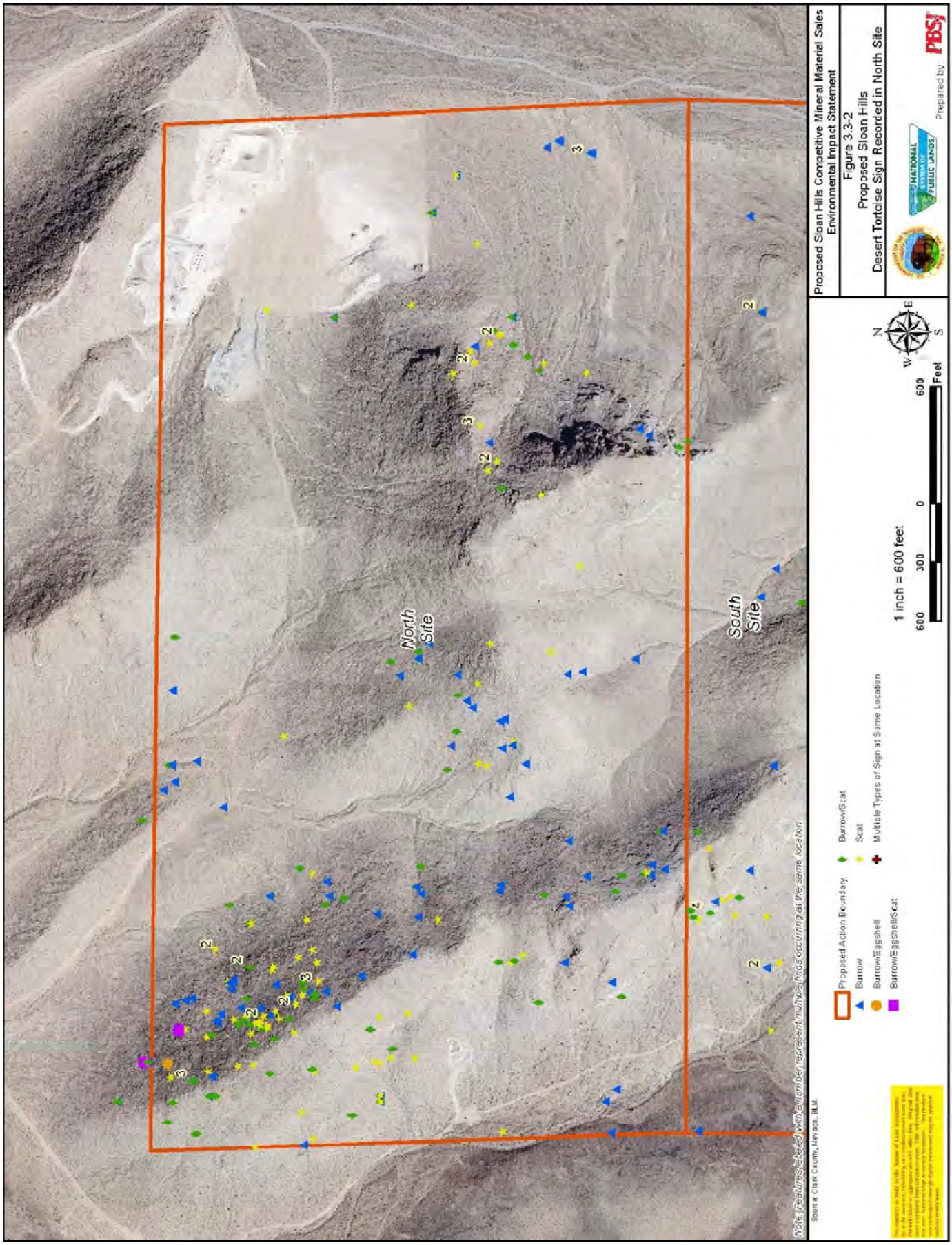
water while it is available following rains may be crucial for survival. Tortoises forage over larger areas during droughts, increasing the likelihood of encounters with humans and other predators that are sources of injury or mortality. Tortoises may require 20 years to reach sexual maturity and may live between 80 and 100 years (Turner et al., 1984; Bury, 1987).

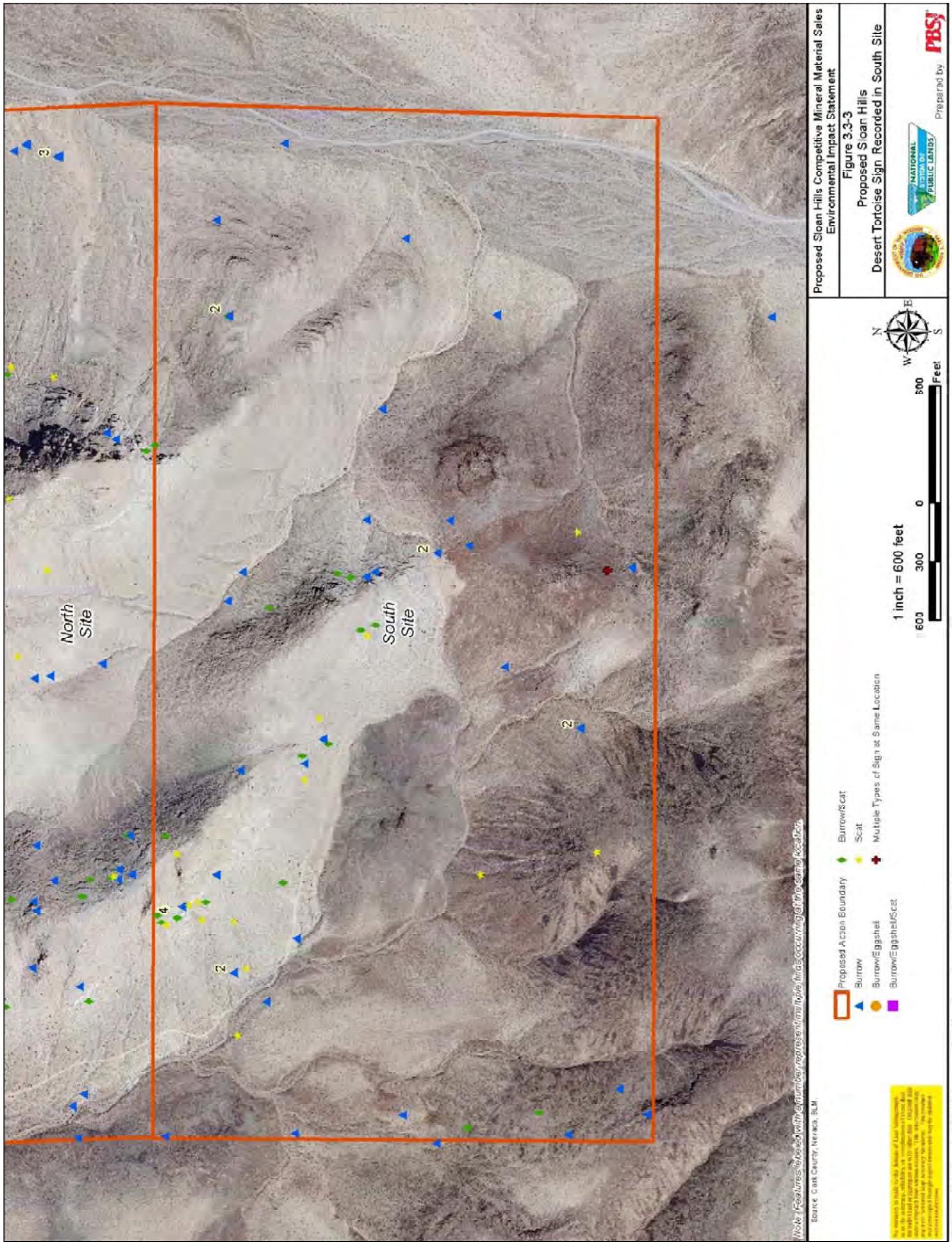
The Las Vegas Valley and the Proposed Action area are in the desert tortoise Northeastern Mojave Recovery Unit. Approximately 1.2 million acres in Nevada are designated as critical habitat for the desert tortoise. Critical habitat has not been designated in the Proposed Action area. Habitat to support this species occurs in the Proposed Action area.

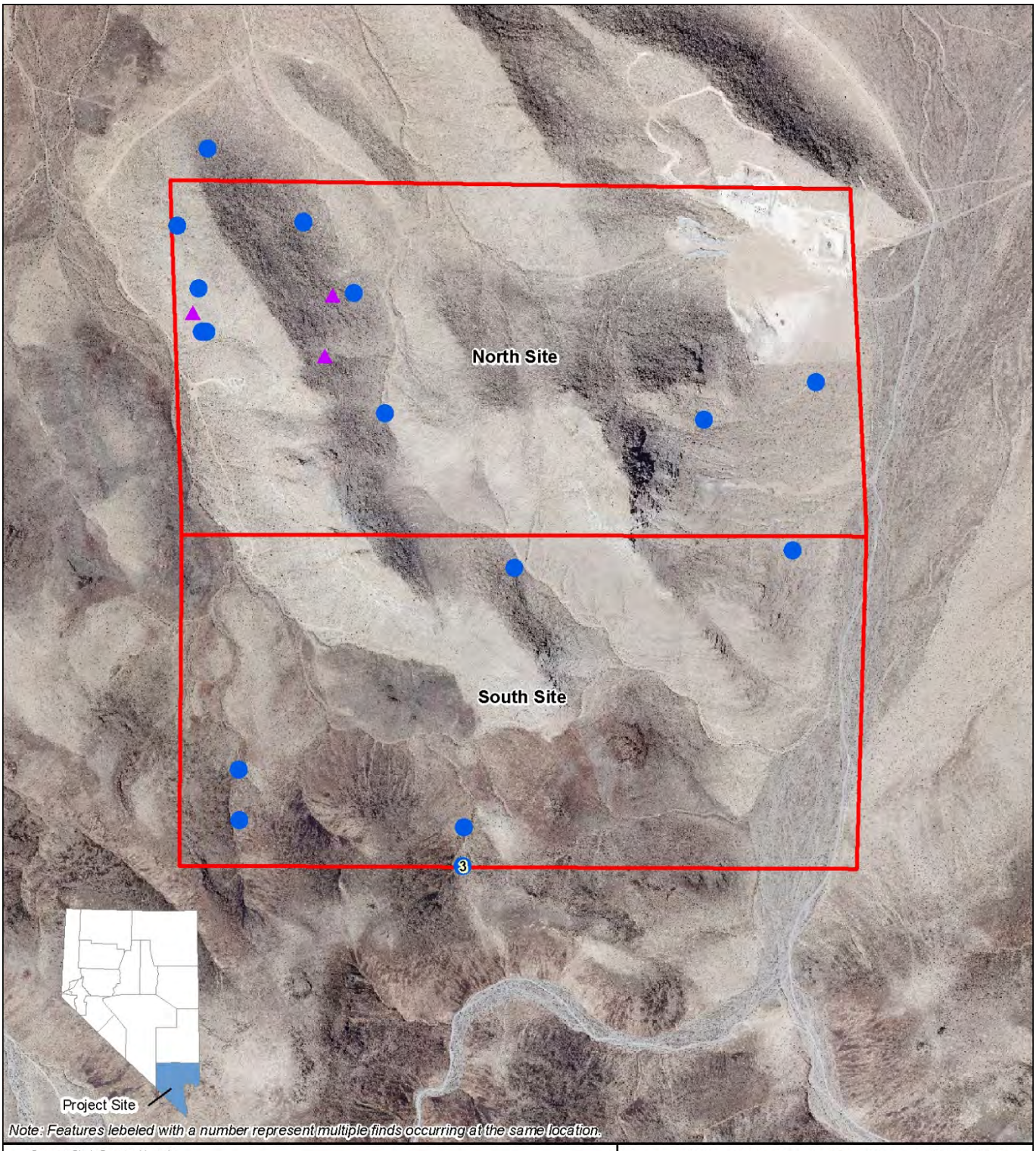
The Proposed Action area was surveyed during December 2007 and January 2008. Tortoise sign recorded during surveys included live tortoises, scat, burrows, and carcasses. The field surveys were conducted using a 100 percent coverage presence-or-absence survey methodology as prescribed in the Field Survey Protocol for Any Federal Action That May Occur Within the Range of the Desert Tortoise (USFWS, 1992).

A total of 247 burrows were found during field surveys. Of these, 99 contained pieces of scat and three contained eggshell fragments. In addition to the burrows, there were 117 pieces of scat, 19 carcasses, and three live tortoises found during the surveys. The locations of these sign are shown on Figure 3.3-2 and Figure 3.3-3. The three live tortoises encountered during the surveys were found in shallow rock burrows (less than 3 feet deep) in the northwestern quadrant of the Proposed Action area. Figure 3.3-4 shows the locations of live tortoises and carcasses encountered during surveys.

Zone of influence surveys were not conducted during the 2007/2008 presence/absence survey. However, the area in the zone of influence was previously surveyed by BLM biological consultants in support of the 2004 Las Vegas Valley Disposal Boundary Environmental Impact Statement (BLM, 2004a). Data from these surveys were used to infer presence within the zone of influence. Tortoise sign recorded in the Sloan Hills zone of influence during the Las Vegas Valley Disposal Boundary EIS surveys is shown in Figure 3.3-5.


Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement
Figure 3.3-2
Proposed Sloan Hills
Desert Tortoise Sign Recorded in North Site
Prepared by
PBS
North Site
South Site
Proposed Action Boundary
Burrow
Burrow/Eggshell
Burrow/Eggshell/Scat
Burrow/Scat
Scat
Multiple Types of Sign at Same Location
1 inch = 600 feet
600 300 0 600
Feet
N
S
E
W
Source: Clark County, Nevada, BLM.
Note: Features labeled with a number represent multiple birds occurring at the same location.


Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement
Figure 3.3-3
Proposed Sloan Hills
Desert Tortoise Sign Recorded in South Site
Prepared by
North Site
South Site
Proposed Action Boundary
Burrow
Burrow/Eggshel
Burrow/Eggshell/Scat
Burrow/Scat
Scat
Multiple Types of Sign at Same Location
1 inch = 600 feet
600 300 0 600 Feet
N
W
E
S
Source: Clark County, Nevada, BLM
Note: Features labeled with a number represent multiple birds occurring at the same location.


North Site
South Site
3
Project Site
Note: Features lebeled with a number represent multiple finds occurring at the same location.
Source: Clark County, Nevada.
Live Tortoises
Tortoise Carcasses
Proposed Action Area
1 inch = 1,000 feet
1,000 500 0 1,000
Feet
N
W
E
S
Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement
Figure 3.3-4
Carcasses and Live Tortoises Rocorded in the Proposed Action Area
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Prepared by: PBS&J

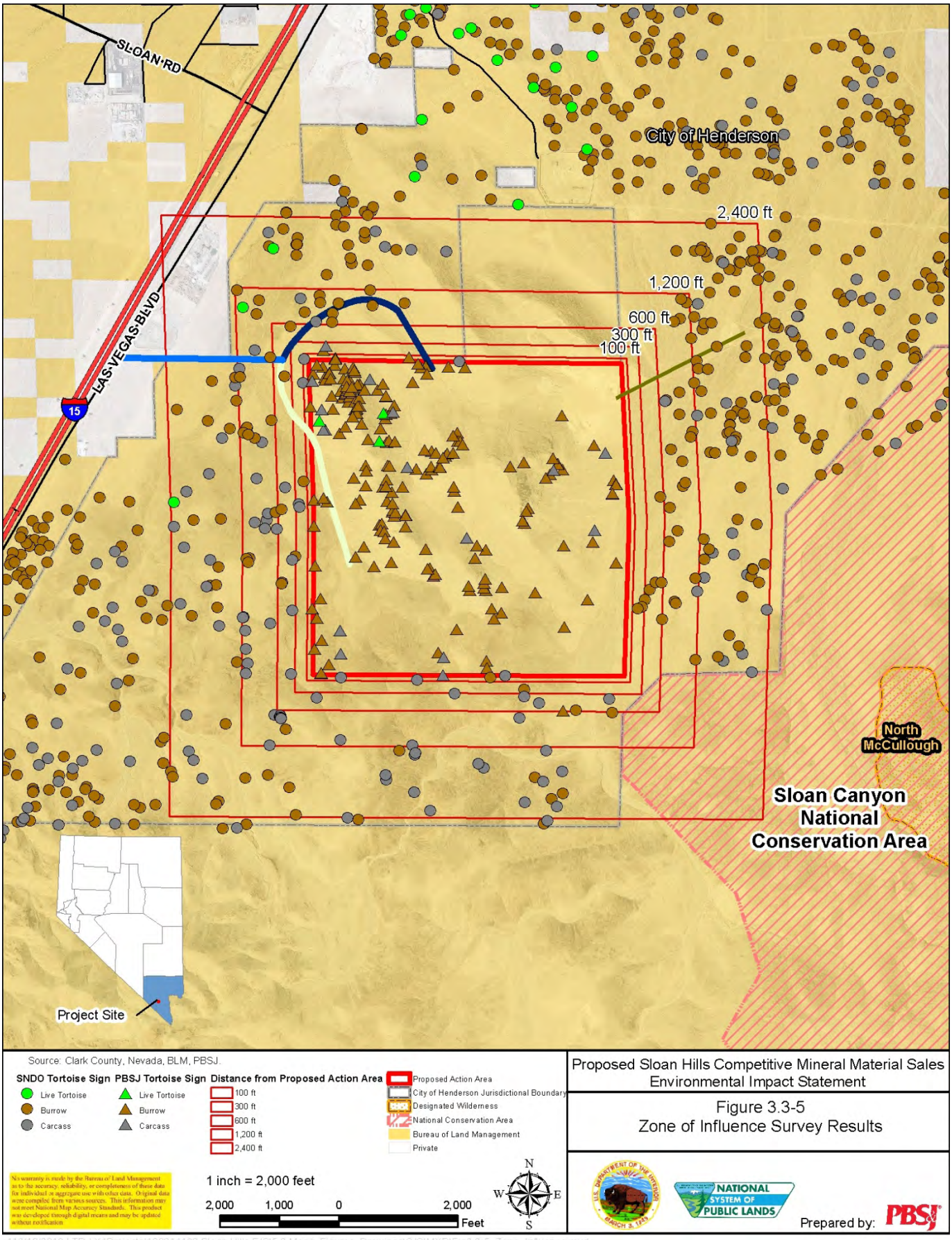

SLOAN RD
LAS VEGAS BLVD
15
City of Henderson
2,400 ft
1,200 ft
600 ft
300 ft
100 ft
North McCullough
Sloan Canyon National Conservation Area
Project Site
Source: Clark County, Nevada, BLM, PBSJ.
SNDO Tortoise Sign
Live Tortoise
Burrow
Carcass
PBSJ Tortoise Sign
Live Tortoise
Burrow
Carcass
Distance from Proposed Action Area
100 ft
300 ft
600 ft
1,200 ft
2,400 ft
Proposed Action Area
City of Henderson Jurisdictional Boundary
Designated Wilderness
National Conservation Area
Bureau of Land Management
Private
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
1 inch = 2,000 feet
2,000 1,000 0 2,000
Feet
N
W
E
S
Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement
Figure 3.3-5
Zone of Influence Survey Results
NATIONAL SYSTEM OF PUBLIC LANDS
Prepared by: PBSJ
3/16/2010 | TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.3-5_Zone_Influence.mxd

Table 3.3-6 shows the desert tortoise sign recorded and its classification.

Table 3.3-6
Desert Tortoise Sign Observed During Surveys

Class	Definition	Number of Signs
Live Tortoise		
1	Adult	2
2	Juvenile	1
	Total Live Tortoises	*3*
Carcass		
2	Normal color; scutes adhere to bone	2
3	Scutes peeling off bone	3
5	Disarticulated and scattered	14
	Total Carcasses	*19*
Burrows		
1	Currently active with tortoise or recent tortoise signs	3
2	Good condition; definitely tortoise; no evidence of recent use*	109
3	Deteriorated condition; definitely tortoise	55
4	Deteriorated condition; possibly tortoise	36
5	Good condition; possibly tortoise	44
	Total Burrows	*247*
Scat		
1	Wet (not from rain or dew) or freshly dried; obvious odor	1
2	Dried with glaze; some odor; dark brown	38
3	Dried; no glaze or odor; signs of bleaching (light brown); tightly packed material	80
4	Dried; light brown to pale yellow, loose material; scaly appearance	53
5	Bleached or consisting only of plant fiber	44
	Total Scat	*216*
Other		
2	Eggshell fragments	3

* For the purposes of this survey, recent use was defined as the presence of Class 1 scat or tortoise tracks.

Western Burrowing Owl

The western burrowing owl is designated as a federal species of concern and as a BLM Sensitive Species in Nevada. The burrowing owl also is protected under the Migratory Bird Treaty Act of 1918 and is included as a priority species in seven of the Bird Conservation Regions, including the Sonoran and

Mojave deserts region, in the most recent National Birds of Conservation Concern List (USFWS, 2008). Killing or possessing burrowing owls or destroying their nests with eggs or young is prohibited (USFWS, 2007b).

Burrowing owls generally prefer open, arid, and treeless landscapes. They are not known to construct their own burrows, so this species tends to be most common in habitats where suitable burrows already exist (Floyd et al., 2007). In the northern end of their range, they are largely dependent on prairie dog colonies for burrow sites, while in the southern portion of their range, they may use a variety of mammal burrows (ground squirrel, skunk, fox, or coyote) and will use desert tortoise burrows throughout the Mojave and Sonoran deserts (Klute et al., 2003; McDonald et al., 2004).

The western burrowing owl is a breeding resident in southern Nevada and produces young from mid-March through August. Some individuals may reside year-round; however, most will migrate south to the extreme southern U.S. and Mexico during the winter months (Haug et al., 1993). This subspecies is found in intermountain cold desert scrub, sagebrush, grasslands and meadows, and developed landscapes throughout Clark County (Wildlife Action Plan Team, 2006). In southern Nevada, burrow sites most commonly used by burrowing owls are desert tortoise burrows. For this reason, the distribution of burrowing owls in Clark County largely overlaps that of the desert tortoise. This species also has been known to breed in isolated desert patches in urban landscapes and thus will often respond positively to habitat enhancement, such as the installation of artificial nest sites (Klute et al., 2003). Burrowing owls are fairly tolerant of human disturbance and often will breed around the fringes of agricultural lands and use crop and pasture lands for foraging through the breeding season (Neel, 1999).

Habitat to support this species does exist in the Proposed Action area. Three burrows with burrowing owl sign were observed during the 2007/2008 biological surveys. Burrowing owl sign recorded during surveys included scat, cough pellets, and burrows.

American Peregrine Falcon

The peregrine falcon is a federal species of concern (USFWS, 2010) and is protected as an endangered bird species in the State of Nevada under NAC 503.050 and NAC 503.093. Additionally, this species is designated by the BLM as sensitive in Nevada. The peregrine falcon is a wide-ranging species whose current distribution is nearly worldwide. However, this species was nearly extirpated from most of its range largely due to the use of DDT-based pesticides in the 1950s through 1970s. As a result, this species was listed as an endangered species protected under the ESA in 1970. The ban of DDT-based pesticides throughout much of the modern world, in conjunction with relocation efforts, led to strong recovery of the species and its subsequent delisting in 1999 (USFWS, 2010).

In the desert southwest, peregrine falcons breed in a variety of habitats from wetlands and riparian areas, Mojave desert scrub, up to mountainous forests. Peregrine falcon breeding has been recorded frequently along the Colorado River and its tributaries in southern Nevada. In general, nesting locales in southern

Nevada contain high cliff walls and are near rivers and lakes (Floyd et al., 2007). Peregrine falcons also occasionally nest atop tall buildings, including one occurrence of nesting on a high-rise casino on the Las Vegas Strip (Floyd et al., 2007). Foraging may occur in a variety of habitats and is largely dependent on prey density. Primary prey species are birds, but peregrine falcons will also prey on small mammals, lizards, and fish. Foraging home ranges are generally large, and in the desert southwest can range between 0.2 mile to 18.5 miles (NatureServe, 2010c).

The Proposed Action area does not contain suitable nesting habitat for this species. However, peregrine falcons may utilize the site for foraging. One peregrine falcon was observed in the Proposed Action area during the 2007/2008 biological surveys.

Banded Gila Monster

The banded Gila monster is a federal species of concern (USFWS, 2009) and is protected by the State of Nevada (NAC 503.080, NAC 503.093). The Gila monster also is designated as a BLM Sensitive Species in Nevada.

The Gila monster is a large desert species and one of only two species of venomous lizards in the world. The species ranges throughout southwestern Utah, the southern tip of Nevada, southwestern New Mexico, Arizona, and the Sonoran Desert. Gila monsters can be found in many habitats below 5,000 feet, but most commonly frequent the lower slopes of mountains and adjoining canyon bottoms and arroyos. Common habitat for the Gila monster is characterized by complex rocky landscapes of upland desert scrub (NDOW, 2007). Most localities are also associated with desert wash, spring, and riparian areas, including those along the lower Colorado River drainage (Nafis, 2009; NDOW, 2007). The presence of potential denning sites is an important habitat requirement. Denning sites include spaces under rock, dense shrubs, burrows, or woodrat nests (NatureServe, 2007). Significant differences exist between winter and summer homesites (Jennings and Hayes, 1994). Banded Gila monsters winter at more elevated locations (i.e., on rocky slopes, in rocky outcrops, or below cliffs), often with other reptiles such as rattlesnakes and desert tortoises. However, summer ranges are located in adjacent lower valleys or alluvial fans (Jennings and Hayes, 1994). Breeding typically occurs in May and June, with egg laying in July and August of the following year. The eggs then incubate in burrows and develop from fall to the early spring, with young appearing in April and June.

Banded Gila monsters are rarely observed in nature, which makes them difficult to detect during surveys. No individuals of this species were observed during surveys; however, potential habitat does exist in the Proposed Action area.

Chuckwalla (*Sauromalus ater*)

The chuckwalla is a federal species of concern (USFWS, 2009) and a BLM Sensitive Species in Nevada. The chuckwalla is a large, flat-bodied lizard commonly distributed throughout the Mojave and Colorado

deserts, primarily in creosote scrub habitats (Stebbins, 2003). This species inhabits rocky flats and hillsides, lava flows, and large outcrops. Chuckwallas also have been observed inhabiting atypical places, such as burrows in dirt, piles of railroad ties, and artificial riprap. When disturbed, the chuckwalla will retreat into a rock crevice and inflate with air, which makes extraction difficult. Chuckwalla populations are locally threatened by excessive collecting and habitat degradation (NatureServe, 2008).

The Proposed Action area contains habitat suitable for the chuckwalla. Chuckwalla sign recorded during surveys included scat and a carcass.

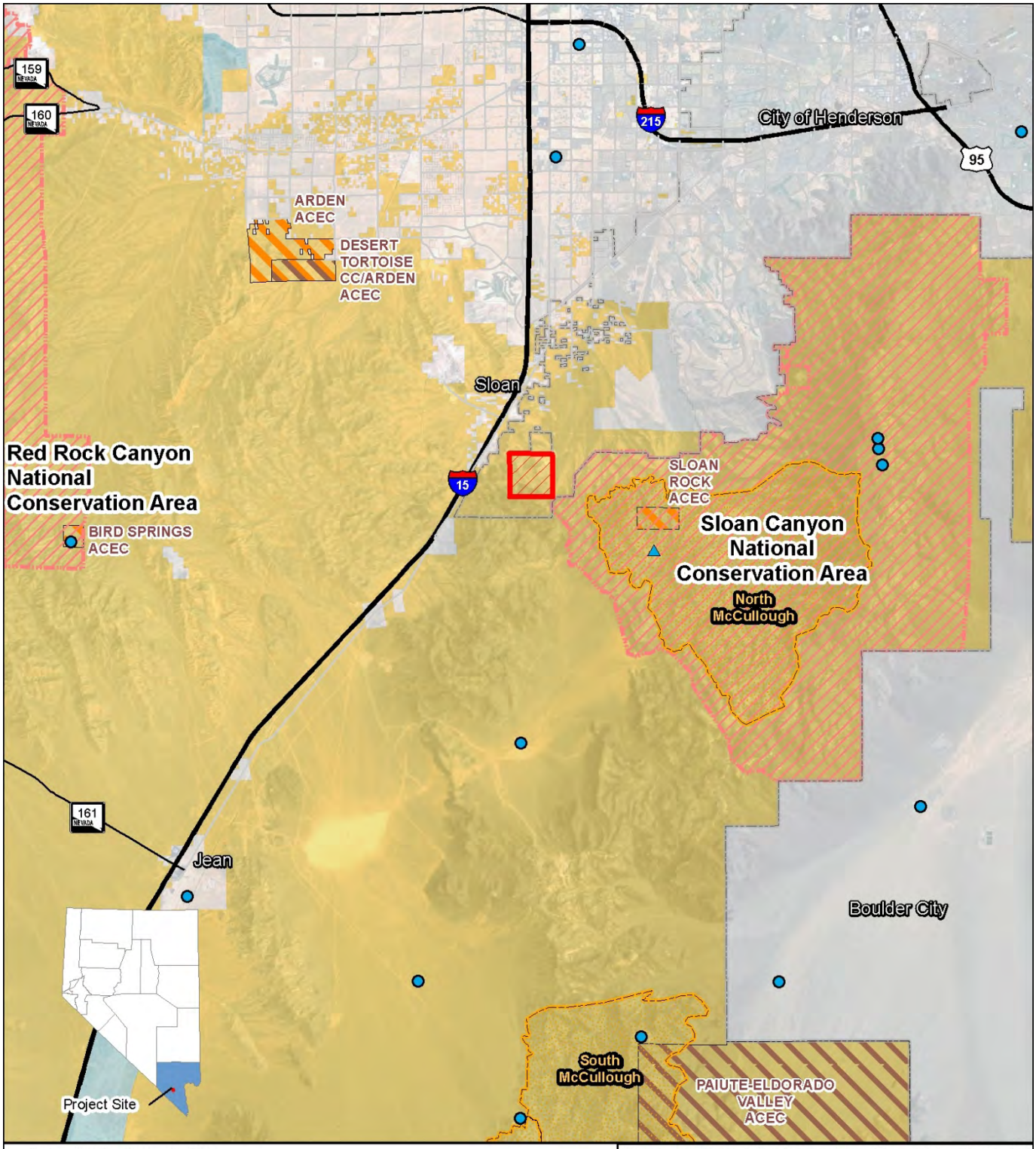
Desert Bighorn Sheep

The desert bighorn sheep is designated a BLM Sensitive Species in Nevada and is regulated by the State of Nevada as a big game mammal (NAC 503.020).

Bighorn sheep are known to inhabit rugged terrain at elevations from near mean sea level to higher than 7,000 feet above mean sea level, venturing to lower elevations for food and water when necessary. Bighorn sheep are a gregarious species that exhibit "seasonal drift" or a gradual seasonal movement of some, but not all, members of each band between seasonal ranges (Monson and Sumner, 1981). They typically use larger upland habitats in the summer and concentrate in sheltered valleys during the winter. While lack of water is the single most limiting factor for bighorn herds in the desert (Monson and Sumner, 1981), certain basic resources are required for bighorn survival; these are food, water, escape terrain, and space, or a lack of crowding (Monson and Sumner, 1981). Bighorn sheep have a preference for grasses and shrubs over forbs (Ginnett, 1982).

Desert bighorn sheep require steep, rugged terrain to support escape from predators. Their cloven front hooves and the heavy musculature of their front shoulders make bighorn sheep more suited for climbing steep surfaces than for running at high speeds on open terrain to escape danger (McQuivey, 1978). Rutting season is generally in the autumn and early winter, with births occurring in late winter and early spring. Traditional lambing areas are chosen on the basis of isolation, shelter, and an unobstructed view.

Habitat in the Proposed Action area is rough, rocky, and bisected by washes and canyons. No permanent water sources are in the Proposed Action area. However, water sources located in the vicinity include the McCullough #2 (Poppy) wildlife water development approximately 2.5 miles to the west of the Proposed Action area in the Sloan Canyon NCA, and a natural spring approximately 5.5 miles to the south in Hidden Valley (Figure 3.3-6).


159
NEVADA
160
NEVADA
215
City of Henderson
95
ARDEN
ACEC
DESERT
TORTOISE
CC/ARDEN
ACEC
Sloan
Red Rock Canyon
National
Conservation Area
BIRD SPRINGS
ACEC
15
SLOAN
ROCK
ACEC
Sloan Canyon
National
Conservation Area
North
McCullough
161
NEVADA
Jean
Boulder City
South
McCullough
PAIUTE-ELDORADO
VALLEY
ACEC
Project Site
Source: Clark County, Nevada, BLM.
Poppy McCullough Guzzler
Springs
Proposed Action Area
City of Henderson Jurisdictional Boundary
National Conservation Area
Designated Wilderness
Biological ACEC
Cultural ACEC
Cultural/Biological ACEC
Desert Tortoise ACEC
Desert Tortoise/Cultural ACEC
Bureau of Land Management
Clark County, Nevada
Private
1 inch = 3 miles
3 1.5 0 3
Miles
N
W
E
S
Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement
Figure 3.3-6
Spring and Guzzler Locations
NATIONAL SYSTEM OF PUBLIC LANDS
Prepared by:
PBS&J
11/13/2009 | TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.3-6_Springs.mxd

The Proposed Action area is located in the historically important winter movement area bridging the McCullough Range with the Bird Spring Range and Spring Mountains Range (NDOW, 2007). However, since 2007, several observations by NDOW, including those concerning activity at wildlife water developments in the McCullough Range, show that spatial use of the Proposed Action area has shifted. Now bighorn usage of the Poppy McCullough guzzler indicates year-round usage in proximity to and likely on the Proposed Action area (Hardenbrook, 2010). Desert bighorn sheep sign, including pellets, urine spots, and tracks, were observed throughout the steeper portions of the Proposed Action area during the 2007/2008 biological surveys.

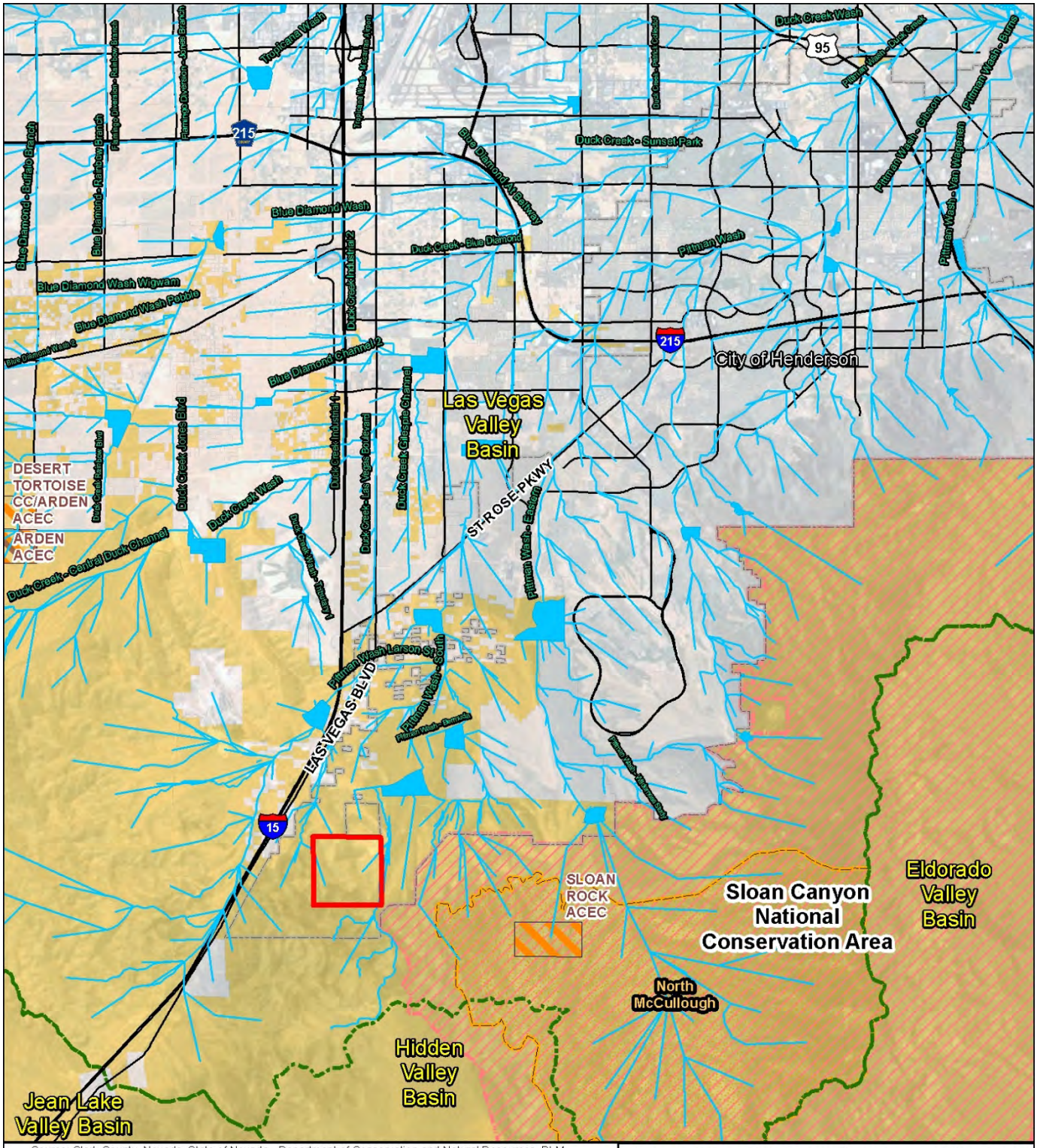
3.4 WATER RESOURCES

This section describes water resources and identifies existing water features in the proposed project site that could potentially be affected by construction and maintenance of the Proposed Action. Surface water and drainage, groundwater, and other sensitive water features encountered in the Proposed Action area are described in this section.

3.4.1 Surface Water and Drainage

Surface water is water in a lake, river, or fresh water wetland. Surface water is replenished naturally by precipitation and lost naturally through discharge to the oceans, evaporation, and subsurface seepage. The natural input to any surface water system is precipitation within its watershed; however, the total quantity of water in that system at any given time is also dependent on many other factors, including storage capacity in lakes, wetlands, and artificial reservoirs; the permeability of the soil beneath these storage bodies; the runoff characteristics of the land in the watershed; the timing of the precipitation; and local evaporation rates.

The Proposed Action area is located in the Colorado River Basin Hydrographic Region. Specifically, it is located in the Las Vegas Valley Hydrographic Area (Area Number 212). This hydrographic area covers approximately 1,000,000 acres (Division of Water Resources, 2009). Surface water in the Proposed Action area eventually flows into Lake Mead and ultimately the Colorado River via the Las Vegas Wash (Figure 3.4-1). The Las Vegas Wash is the primary conveyance corridor of surface water runoff for the Las Vegas Valley, which includes Las Vegas, North Las Vegas, Henderson, and portions of unincorporated Clark County. The major tributaries to the Las Vegas Wash include Range Wash, Northern Las Vegas Wash, Flamingo/Tropicana Wash, Duck Creek/Blue Diamond Wash, Pittman Wash, and the C-1 channel. These tributaries are ephemeral, and intermittent water that flows through them is the result of infrequent storm events and urban runoff draining from adjacent developments.



Source: Clark County, Nevada, State of Nevada - Department of Conservation and Natural Resources, BLM.

- Proposed Action Area
- Storm Water Basins
- Surface Waters
- Groundwater Basin
- City of Henderson Jurisdictional Boundary
- Designated Wilderness
- Biological ACEC
- Cultural ACEC
- Cultural/Biological ACEC
- Desert Tortoise ACEC
- Desert Tortoise/Cultural ACEC
- National Conservation Area
- Bureau of Land Management
- Private

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

1 inch = 10,000 feet

10,000 5,000 0 10,000 Feet

N W E S

Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.4-1
Water Resources

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS

11/13/2008 | TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.4-1_water_resources.mxd

The 2008 Las Vegas Valley Flood Control Master Plan Update (CCRFCD, 2008) divides the Las Vegas Valley into 10 hydrographic planning areas, or watersheds, to facilitate implementation of the flood control plan. The Master Plan Update designates the area encompassing the Proposed Action area as the Pittman Watershed. This watershed is a major tributary to the Pittman and Duck Creek washes. The Pittman Watershed covers an area of approximately 160 square miles, and drainage facilities in this watershed consist primarily of detention basins connected by conveyance facilities with drainage patterns that are generally from southwest to northeast (CCRFCD, 2008). Washes draining through the Pittman Watershed begin in the mountains to the southeast of the Las Vegas Valley and flow out into alluvial fans. Drainage in developed areas is collected into storm drains and ultimately conveyed to the Pittman Wash. Pittman Wash then flows into Duck Creek Wash, which then flows into the Las Vegas Wash (CCRFCD, 2008).

The Proposed Action area is located at the extreme southern boundary of the Las Vegas Valley. Steep mountain ridges trending southwest to northeast and shallow alluvial fans draining to the valley floor characterize the site. The drainage network is highly dynamic, with the flow patterns often changing significantly during major flood events. The numerous surface water channels that cross the Proposed Action area are subject to periodic flooding during major rainfall/runoff events. The surface water channels in the Proposed Action area have not been heavily disturbed by urban development and human activity and still exist in their natural condition.

The principal surface water features in the Proposed Action area are unnamed ephemeral washes with a high runoff potential (Figure 3.4-1). The major ephemeral wash conveying surface water flows from the Proposed Action area is identified in the Master Plan Update as Pittman Natural Wash 2. An unlined levee is proposed to be constructed immediately to the east of the wash, but this has been designated as a Category B priority facility by CCRFCD. Category B facilities are "either located in undeveloped areas and primarily protect undeveloped land (that is planned to be developed in the future), or they will eventually replace an existing facility that provides a high level of flood protection but cannot convey the 100-year peak flow." Additionally, one 737-acre detention basin is proposed approximately 3 miles east of the North Site; this facility has also been designated as a Category B priority by CCRFCD (CCRFCD, 2008). Category A facilities are given priority funding by CCRFCD over Category B facilities.

3.4.1.1 Surface Water Quality

Under Section 303(d) of the CWA, states, territories, and authorized tribes are required to develop lists of impaired waters. These are waters that are too polluted or otherwise degraded to meet the water quality standards set by states, territories, or authorized tribes. The law requires that each jurisdiction establish priority rankings for waters on the lists and develop total maximum daily loads (TMDL) for these waters. The TMDL is the maximum amount of a pollutant that a waterbody can receive and still safely meet water quality standards.

The State of Nevada is required by the CWA to develop TMDLs for those waterbodies on the 303(d) List. The Bureau of Water Quality Planning within the NDEP is the primary agency responsible for the TMDL program. As required by the CWA, Nevada has set beneficial uses and water quality criteria for waterbodies throughout the state. While some waters have been listed based upon other evidence of use impairment, most of the waterbodies on the 303(d) List have been identified as impaired due to exceedances of these numeric criteria. The Bureau of Water Quality Planning through its Non-point Source (NPS) program manages activities and implements projects that prevent and reduce NPS loading in the surface and groundwaters of Nevada. Nevada's NPS program is voluntary, relying on public education/outreach, agency collaboration, technology transfer, implementation of best management practices (BMP), and demonstration projects as mechanisms for reducing NPS loads. Although the NPS program is voluntary, the Proposed Action must comply with CWA Section 402 NPDES requirements for managing stormwater runoff. The NPDES requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that identifies, among other items, specific minimum BMPs to protect stormwater runoff. The Proposed Action must also comply with Clark County Code Chapter 24.40 (Stormwater Pollution) requirements.

The surface waters in the Proposed Action area are not on the 303(d) List. The nearest impaired waters are in Duck Creek, approximately 3.5 miles from the Proposed Action area. Duck Creek is designated as impaired water from its origin to its confluence with the Las Vegas Wash due to high levels of dissolved solids and selenium (NDEP, 2009).

3.4.1.2 Wetlands and Waters of the U.S.

Section 404 of the CWA of 1972 (33 USC 1344, et seq.) requires that a permit be obtained from the USACE prior to beginning construction activities involving the placement of dredged or fill material in waters of the U.S., including adjacent wetlands and tributaries. The term waters of the U.S. refers to the jurisdictional limits of the USACE that extend to the ordinary high water mark of Traditional Navigable Waters (TNW), Relatively Permanent Waters (RPW), wetlands adjacent to TNWs and RPWs, and some non-permanent tributaries, such as ephemeral desert washes (USACE, 2007).

Wetland and riparian habitats in Nevada cover a very small percentage of the total area of the state. However, because of the high resource levels in these areas, they have comparatively high species diversity and provide essential habitat for wildlife. Wetlands are areas that are saturated by water for a sufficient amount of time to support vegetation that is adapted to saturated soil conditions. The presence of vegetation, such as cottonwood (*Populus* spp.), willow (*Salix* spp.), mesquite (*Prosopis* spp.), desert willow (*Chilopsis linearis*), or catclaw (*Acacia* spp.), serves as a good indication that sufficient water is available throughout the year for these riparian species.

TNWs are all waters that are currently used, were previously used, or could potentially be used for interstate or foreign commerce, including all waters that are subject to the ebb and flow of the tide. RPWs

are non-navigable and flow into a TNW either directly or indirectly through other tributaries. They either have flow year-round or at least have continuous flow seasonally.

Wetlands and other jurisdictional/navigable waters are regulated by the USACE through Section 404 of the CWA. The jurisdiction of the USACE extends to the ordinary high water mark of TNWs, RPWs, and non-permanent tributaries with a significant nexus to a TNW. The ordinary high water mark for non-tidal streams is defined as:

> [the] line on the shore established by the fluctuations of water and is indicated by physical characteristics, such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding area (33 CFR Part 328.3).

Activities in jurisdictional waters require permits from the USACE prior to any ground-breaking activities within the ordinary high water mark. Section 404 Permit types include Nationwide, Regional General, Letter of Permission, and Individual (USACE, 2009). A Nationwide Permit is a form of general permit that authorizes a category of activities throughout the nation. These permits are valid only if the conditions applicable to the permits are met. If the conditions cannot be met, then one of the other permits would be required. Most Nationwide Permits require that the area of impact to waters of the U.S. be less than 0.5 acre. Regional Permits are issued by the USACE for a general category of activities when the activities are similar in nature and cause minimal environmental impact (both individually and cumulatively), and the Regional Permit reduces duplication of regulatory control by state and federal agencies. No Regional General Permits are applicable to the Proposed Action. The District Engineer may determine that more than minimal impacts may occur as a result of the Proposed Action, or the Proposed Action exceeds the maximum acreage of disturbance and therefore does not qualify for a Nationwide Permit or a Regional General Permit. In such cases, either a Letter of Permission or an Individual Permit would be required. A Letter of Permission may be required if it is determined that the impacts would be minor. The Letter of Permission is an expedited process for a standard permit wherein a public notice is not issued. However, a notice is issued to surrounding landowners and their comments are evaluated. An Individual Permit is a type of standard permit in which public notice is issued and an evaluation of comments received is conducted.

The Proposed Action area was reviewed for the potential presence of jurisdictional wetlands and waters of the U.S. No wetlands, as defined by the USACE, are in the Proposed Action area. No TNWs, RPWs, or adjacent wetlands are present in the Proposed Action area. There are two unnamed washes to the east and west of the Project Site (Pittman Natural Wash 1 and Pittman Natural Wash 2). The Pittman Natural Wash 1 does not exhibit connectivity with a TNW and would therefore not be considered jurisdictional. The Pittman Natural Wash 2 is a potentially jurisdictional waters of the U.S. in the Proposed Action area

because it is a tributary to a RPW (the Las Vegas Wash) that is a tributary to a TNW (the Colorado River). However, a jurisdictional determination has not been conducted.

3.4.1.3 Floodplains

FEMA is charged with floodplain mapping, management, and safety. According to the FEMA Flood Insurance Rate Maps for the area, the proposed project site is located in Zone X. Zone X includes areas "outside the 1 percent annual chance floodplain, areas of 1 percent annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1 percent annual chance stream flooding where the contributing drainage area is less than one square mile, or areas protected from the 1 percent annual chance flood by levees." FEMA is also charged with mapping Base Flood Elevations. The Base Flood Elevation is defined as "the computed elevation to which floodwater is anticipated to rise during the base flood." No Base Flood Elevations or depths are shown in this zone. Insurance purchase is not required in these zones (FEMA, 2009).

3.4.2 Groundwater Resources

The Proposed Action area is in the Las Vegas Valley Basin, which lies within the Basin and Range Physiographic Province (Figure 3.4-1). This province is characterized by mountain ranges separated by alluvium-filled valleys and basins. The project site is near the southern boundary of the basin. The sections below describe the groundwater resources in the Proposed Action area.

3.4.2.1 Groundwater Aquifers

Groundwater in the Las Vegas Valley occurs in two dominant aquifer systems: Basin and Range sediments that have filled the valley to its current elevation, and underlying carbonate sedimentary rocks.

Basin-Fill Aquifers occur in unconsolidated to semi-consolidated deposits of clay, silt, sand, and gravel. The sand and gravel deposits are generally younger and more hydraulically conductive than the clay and silt sediments. Older deposits, often of silts and clays, are more uniformly fine-grained and have lower hydraulic conductivities. Some of these aquifers are localized and relatively shallow. In these aquifers, groundwater flow generally follows topography from high to low elevation.

Carbonate-Rock Aquifers consist of consolidated limestones, dolomites, and lesser amounts of clastic rocks that either comprise or underlie most of the mountain ranges and many of the intervening basins in the Basin and Range Province. The carbonate rocks commonly exhibit low hydraulic conductivity where they are unbroken and are commonly dense and brittle. However, carbonate rocks are subject to dissolution under the correct geochemical conditions. Dissolution leads to the formation of karsts, which can form sinkholes at the surface and cavities and caves below the surface. Additionally, in most areas the carbonate rocks have been fractured and deformed. Karst development and fracturing allows this aquifer to store and transmit groundwater (Dettinger et al., 1995).

In the Las Vegas Valley, these two aquifer types are present as three aquiformations: the Las Vegas Wash Aquitard, the Las Vegas Springs Aquifer, and the Duck Creek Aquifer. The Las Vegas Wash Aquitard extends from land surface to a depth of between 150 and 500 feet. The underlying Las Vegas Springs Aquifer has variable thickness averaging 500 feet. Most groundwater used in the Las Vegas Valley is obtained from this aquiformation, and its most productive areas are in the west-central and northwest portions of the valley. Some municipal wells also tap the upper portions of the subjacent Duck Creek Aquifer, which (locally) may exceed 900 feet in thickness (Donovan, 1996).

Each of these aquiformations contains interbedded boulder to pebble conglomerate, sandstone, siltstone, and claystone of variable thickness. The proportion of finer-grained sediment increases away from the flanking mountains toward the valley center and is higher near some faults (Donovan, 1996).

3.4.2.2 Groundwater Recharge

The Las Vegas Valley has three main sources of groundwater recharge. The first is natural recharge from snowmelt, runoff, and precipitation falling directly on the northern parts of the Spring Mountains and Sheep Range. The second, especially to the shallow aquifer and near surface reservoir, includes infiltration of treated effluent as well as industrial and irrigation water. The third source includes irrigation water and a minor component of effluent discharge that enters the shallow groundwater system.

Interaction between the shallow groundwater system (which is in the Las Vegas Wash Aquitard) and underlying aquifers is slight. Before urbanization, the shallow groundwater system was recharged by slow, upward artesian flow from the Las Vegas Springs Aquifer. This flow has diminished in the area due to extraction of groundwater. However, increased irrigation has caused the shallow system to integrate and expand in some areas (Leising, 2004).

Natural recharge from the valley floor is not a significant source of recharge because natural recharge occurs primarily along the valley margins, where ephemeral streams flow onto the valley floor and a large component of flow infiltrates into the subsurface. Approximately 10 percent of precipitation in the valley floor contributes to recharge, and the average annual recharge rate for undeveloped land is approximately 0.4 inch per year.

3.4.2.3 Groundwater Flow

Groundwater flow in the Las Vegas basin is characterized by:

- Artesian interbasin flow consisting of recharge in the mountains
- Horizontal movement within the basin margins
- Discharge to the central basin floor through water supply pumping
- Evapotranspiration

Groundwater in the shallow aquifer generally flows to the southeast across most of the valley, discharging to the Las Vegas Wash. Shallow groundwater flows northeast in the southeastern part of the valley and also discharges to the Las Vegas Wash (Converse Consultants, 1985). Channels, washes, or mounding related to irrigation may cause local variations in the direction of groundwater flow (Zikmund, 2002). Water levels in the near-surface reservoir generally slope eastward toward the base of Frenchman Mountain, the lowest point in the valley. Groundwater flow in the near-surface reservoir is primarily toward the east; however, the amount of water moving through the near-surface unit is believed to be small due to its low permeability (Malmberg, 1961).

Groundwater levels in the Proposed Action area are greater than 100 feet below the ground surface (CCRFCD, 2004). In 2001 the static water level was measured for a well in the Proposed Action area. The static water level was 596 feet below land surface (BLM, 2003a).

3.4.2.4 Groundwater Quality

In 2001, during a step-drawdown test conducted at a groundwater well in the Proposed Action area, a groundwater sample was collected and a profile one analysis conducted. Major cations and anions found in the sample are shown in Table 3.4-1. No other current data were available for groundwater in the Proposed Action area.

All measurements are lower than the drinking water quality standard (maximum contaminant level), where applicable, set by the EPA.

Table 3.4-1
Results of Groundwater Quality Analysis

Parameter	Results (mg/L)
Arsenic	0.0098
Barium 0.0250	
Boron 0.4900	
Calcium 69.000	0
Sodium 150.00	00
Iron 0.0700	
Chromium 0.0081	
Total alkalinity	110.0000
Chloride 230.00	00
Fluoride 0.9900	
Sulfate	160.0000
Total dissolved solids	752.0000
pH	7.8600

mg/L = milligrams per liter

3.4.3 Water Supply

The SNWA operates the Southern Nevada Water System, which works to secure water resources for the Las Vegas Valley. Southern Nevada gets about 90 percent of its water from the Colorado River (Lake Mead), and the other 10 percent comes from groundwater that is pumped out through wells (SNWA, 2009). The LVVWD provides water for residents in Las Vegas and the unincorporated areas of the valley, whereas North Las Vegas, Henderson, and Boulder City provide for their own residents. The LVVWD and the cities are members of the SNWA. The State Engineer of the Nevada Department of Conservation and Natural Resources, Division of Water Resources is the state entity that regulates groundwater and surface water resources within Nevada (other than the Colorado River). In 1992 the State Engineer implemented Amended Order number 1054, which began the moratorium on issuance of new permits (with very few exceptions) to appropriate groundwater from the Las Vegas Valley groundwater basin.

Nevada is allocated 300,000 acre-feet of Colorado River water for consumptive use each year. Southern Nevada regional water planning also assumes the development of 134,000 AFY of in-state groundwater based on current permits and outstanding applications. Development of wastewater treatment facilities since the mid-1990s has resulted in an overall treatment and delivery capacity for the southern Nevada region of approximately 1 million AFY (SNWA, 2009).

Due to ongoing drought conditions since 1999, the primary water reservoir for the Colorado River basin (Lake Mead) is down to 52 percent of total capacity (SNWA, 2009). Projected water supply demand for southern Nevada in 2010 is 553,000 acre-feet. This is predicted to increase to 739,000 by 2035 (SNWA, 2009). As a result of the potential deficit of water supply versus water demand, the SNWA has developed their most recent Water Resources Plan to address projected growth and water needs through 2060 (SNWA, 2009).

3.5 CULTURAL RESOURCES

Cultural resources are prehistoric and historic archeological sites, districts, structures, or locations considered important to a culture, a subculture, or a community for scientific, traditional, religious, or other reasons. Prehistoric archaeological resources may include rock shelters, lithic scatters, flaked stone scatters, rock rings or alignments, tool procurement sites, thermal features/roasting pits with artifact scatters, and rock art locations. Historic sites may include buildings, structures, features such as mine shafts or adits, transportation routes, and refuse deposits.

To be eligible for the NRHP, an archaeological site or other property must satisfy at least one of the National Register criteria as set forth at 36 CFR 60.4. The site or property must:

a. Be associated with events that have made a significant contribution to the broad patterns of our history; or

b. Be associated with the lives of persons significant in our past; or

c. Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d. Have yielded, or is likely to yield, information important in prehistory or history.

3.5.1 Cultural Overview

The Proposed Action area is located in southern Nevada 2 miles southeast of Sloan and approximately 16 miles south of Las Vegas at the northwestern extent of the McCullough Mountain Range in Clark County. Archaeological resources suggest that many different cultural groups have exploited and occupied the area for at least the last 11,000 years (Fowler and Madsen, 1986; RECON, 2000). Archeological sites have been located northwest of the project area around Duck Creek, northeast along the Lower Las Vegas Wash, east within Sloan Canyon NCA, and in the adjacent North McCullough Wilderness. Archeological sites and features found in those locations include rock shelters, petroglyphs, rock rings, and both prehistoric and historic-era adobe structural remains. Many of these sites show evidence of repeated use through all periods discussed below, including the historic period.

3.5.1.1 Prehistoric Period

Three inclusive prehistoric cultural periods are usually applied to the project area: the Paleo-Archaic Period, the Archaic Period, and the Ceramic Period.

The Paleo-Archaic (10,000 Before the Common Era [BCE] to 6,500 BCE)

During the Paleo-Archaic Period, the climate was cooler and moister than at present. Extensive marshlands, shallow lakes, and woodlands were present at lower elevations. Temporally diagnostic artifacts include various lanceolate and fluted projectile point forms such as Clovis, Folsom, and Lake Mojave points. Groups during this time are thought to be highly mobile. Lack of ground stone artifacts from sites dating to this period has led most researchers to believe that hunting was the focus of subsistence activities. Evidence of human occupation before 6,500 BCE is present in southern Nevada; however, most of the evidence exists as isolated finds and lacks conclusive radiocarbon or stratigraphic relationships.

The Archaic Period (ca. 6,500 BCE to 500 Anno Domini [AD])

The Archaic Period in southern Nevada spans the majority of the Holocene. Archaic people appear to have practiced a generalized hunter and gatherer lifestyle, moving seasonally from area to area in search of a wide array of plant and animal resources (Lyneis, 1982; Fowler and Madsen, 1986; Warren and Crabtree, 1986). Technological change appears to have been minimal and gradual, as observed in the variance in projectile points over time.

Some researchers split the Archaic Period into several sub-periods. Nomenclature commonly used for these sub-periods are the Early or Lake Mohave Period (10,000 BCE to 5,000 BCE); the Middle or Pinto Period (5,000 BCE to 2,000 BCE); and the Late, Armargosa or Gypsum Period (2,000 BCE to 500 BCE) (Lyneis, 1982; Fowler and Madsen, 1986). Regardless of sub-period, all Archaic Period projectile points reflect atlatl and spear usage. Long-lasting lithic tool types include a variety of scrapers and drills. Frequencies in milling equipment increase over time, suggesting a rise in the amounts and types of seeds and roots included in Archaic Period diets.

Subsistence resources during the Archaic Period included ungulates, lagomorphs, rodents, birds, and a wide variety of roots and seeds (Fowler and Madsen, 1986). Many basketry and textile items, such as nets and sandals, have been preserved in cave and rock shelter contexts that date to the Archaic Period. Open sites appear to have been located in areas along streams, lakeshores, and marshes (Fowler and Madsen, 1986; Warren and Crabtree, 1986).

Rock art was also practiced by Archaic peoples in southern Nevada; the majority of rock art dates to the late Archaic Period. Occurring on well patinated and weathered rock faces, rock art renderings from the late Archaic Period typically depict mountain sheep and atlatl hunting scenes (Lyneis, 1982). Sloan Canyon NCA, located east of the Proposed Action area, contains good examples of late Archaic Period rock art.

The most common Archaic Period site types encountered in southern Nevada are surface lithic scatters; however, a few Archaic Period sites with buried components have been recorded north of the project area in the Lower Las Vegas Wash and Duck Creek vicinity (Roberts and Ahlstom, 2007; DuBarton, 2009).

The Ceramic Period (ca. 500 AD to 1850 AD)

Ceramic Period people practiced a mixed farming and hunting-gathering lifeway in southern Nevada. In general, sites dating to this period are identified by the presence of ceramics, small arrow-sized projectile points, and the remains of cultigens, such as maize and squash (Lyneis, 1982; Fowler and Madsen, 1986; Warren and Crabtree, 1986; Roberts and Ahlstrom 2007).

In the past, this period has been attributed to Virgin Anasazi (Kayenta Puebloan) cultural traditions. More recently, studies have considered Southern Paiute and Patayan/Mohave influence in the region and have adjusted descriptions of sub-periods to reflect this (Roberts and Ahlstrom 2007). The older nomenclature is still in use, which makes characterization of sub-periods complex. Thus, to minimize confusion, this EIS splits the period into two regional sub-periods: the Virgin Anasazi Period (500 AD to 1200 AD) in eastern Clark County and the Shoshonean Period (1200 AD to 1850 AD) in central and southwestern Clark County. The project is situated at the interface of these two areas.

The Virgin Anasazi Period (500 AD to 1200 AD) is primarily associated with settlements located along the Muddy and Virgin rivers in the Moapa Valley. Sites dating to this period are characterized by Rose

Spring projectile points and grayware ceramics (Warren and Crabtree, 1986). Typical settlements consisted of small clusters of circular, semi-subterranean pit houses with prepared clay floors and fire basins located along mesa rims, and rock shelters located near permanent water courses needed for the irrigation of horticulture fields (Fowler and Madsen, 1986). As the period progressed, rectangular masonry rooms with slab-lined walls and fire basins became more common. Slab basin metates constituted the majority of milling equipment. Food resources included both cultigens, such as maize, cucurbits, and beans, and wild foodstuffs, such as agave, yucca, deer, antelope, mountain sheep, rabbits, and tortoise (Fowler and Madsen, 1986). Basketry, cordage, fur cloth, clay figurines, and bone tools were manufactured, and cotton was grown (Lyneis, 1982; Fowler and Madsen, 1986). Mineral mining occurred in the region, particularly for salt on the Virgin River, but magnesite, turquoise, and possibly selenite deposits were also exploited (Lyneis, 1982). These resources may have been used in an extensive trade network, which extended to the Pacific Coast and the Gulf of California (evidenced by large quantities of shell beads from the Pacific Ocean). Settlements in this area are located near the Old Mohave Trail, possibly placing them in a favorable position for trade (Lyneis, 1982; Fowler and Madsen, 1986).

Around 1200 AD, the Virgin Anasazi appear to have abandoned southern Nevada. Explanations for abandonment of the area presented by researchers include environmental and demographic factors, but are still a matter of debate and require further research to determine an answer.

Many Archaic Period sites continued to be inhabited by the Virgin Anasazi. Site 26CK1282 in the Lower Las Vegas Wash represents a transitional period from the Middle Archaic to the Ceramic Period. Located in Clark County Wetlands Park north of the project area, it consists of the remains of a pithouse. No pottery or evidence of cultigens was recovered, but two Rose Spring arrow points were found. The lack of cultigens or pottery suggests a pre-ceramic presence, though the arrow point indicates the inhabitants were likely Virgin Anasazi; evidence from this structure is consistent with other early Virgin Anasazi sites further to the east (DuBarton, 2009).

The cultural tradition that typified the Shoshonean Period became dominant in the area after 1200 AD, but was present in the southern Nevada area from 1000 AD and existed alongside the Virgin Anasazi for approximately 200 years. The Shoshonean were strongly influenced by the Patayan cultures to the south, and mainly concentrated in the Las Vegas Valley and along the Colorado River. The Shoshonean cultural tradition is characterized by brownware and buffware ceramics, twined and coiled basketry, and small Desert Side-notched or Cottonwood projectile points (Fowler and Madsen, 1986). Shoshonean cultural groups appear to have practiced a predominantly hunting and foraging subsistence strategy, with minimal horticulture (Fowler and Madsen, 1986). Many sites associated with this period consist of roasting pit features, some bearing agave and tortoise remains. Similar occupational residues are found in rock shelters and scattered open campsites, reflecting the less sedentary character of a foraging life-way (Warren and Crabtree, 1986). The presence of expedient, unshaped milling equipment at most of these sites also supports this characterization. Like the Virgin Anasazi Period, Shoshonean participation in a widespread trade network is evidenced by the presence of coastal shell beads. The Shoshonean Period in

southern Nevada has been associated with the ancestors of the historic Southern Paiute, possibly marking the expansion of the Numic speakers across the eastern Mohave (Warren and Crabtree, 1986).

Sites dating to the Shoshonean Period in Clark County often overprint Virgin Anasazi occupations along the interface of their ranges in the Las Vegas Valley. Sites located in the Corn Creek and Duck Creek area are good examples (DuBarton, 2009). Other southern Nevada Shoshonean sites are located in the Valley of Fire, such as Atlatl Rock Shelter, and in the Armargosa Valley, such as Shoshone Rock Shelter (Warren and Crabtree, 1986).

The Contact Period (1850 AD to 1905 AD)

The Southern Paiute and Chemehuevi Native American groups are traditionally associated with this region of southern Nevada. Both groups practiced a highly effective mobile hunter-gatherer subsistence strategy, employed limited horticulture, and were loosely organized into small family bands. Given their large cultural use areas, they often shared boundaries, languages, and natural resources with neighboring groups. No evidence of Chemehuevi occupation has been documented for the Las Vegas Valley, but it has been suggested they may have entered the valley for hunting and gathering forays (White, 2002). For this reason, only the Southern Paiute is described.

Southern Paiute

The Native American group associated with the Las Vegas Valley is the Southern Paiute. The ancestral territory of the Southern Paiute extends west from southern Nevada into southeastern California, and south into northwestern Arizona. The Southern Paiute spoke a Numic language of the Uto-Aztecan language family. Their ancestors are believed to have arrived in the area sometime around 1000 AD. The Southern Paiute have often been divided into several sub-groups, including the Las Vegas Paiute (Kelly and Fowler, 1986). The Las Vegas Paiute's territory extended from the western side of the Colorado River to below Eldorado Canyon, continued southward along the inland side of the Eldorado and Newberry mountains, westward into the Mojave Desert at Soda Lake and the Old Dad Mountains, and to the edge of Death Valley (White, 2002). The current project's area of potential effect (APE) is located approximately at the center of Las Vegas Paiute territory.

The Southern Paiute constructed various types of dwellings. The "winter" house was a conical or sub-conical structure, gabled, with a tree limb used as a ridgepole. To catch the morning sun, the doorway typically faced east, and most houses contained a smoke hole (Kelly and Fowler, 1986). Warm-weather dwellings were typically lean-to structures supplemented with shades and windbreaks, as many Southern Paiute chose this season to "live under the trees" (Kelly and Fowler, 1986). Caves were also used as dwellings in areas throughout the territory. Households were furnished primarily with baskets and pottery, but basketry comprised the more important class of the two; both were used for cooking. Meat was often roasted directly over a fire, and flat cakes made of mesquite flour were cooked on flat stones (Warren, 2007). Plants with tough, woody stems, such as agaves and yuccas, were roasted in earth ovens built near

collecting sites. Limestone rocks, such as those that are located in the Proposed Action area, were heated and placed in pits with raw foods and left to roast for 24 to 36 hours (Warren, 2007).

Diverse environmental zones located in their territory allowed the Southern Paiute to practice a mixed economy of horticulture supplemented by hunting and gathering. This seasonally based subsistence pattern allowed cultigens to be planted and tended in the spring and early summer and wild foods hunted and gathered from summer through fall (Kelly and Fowler, 1986). Through limited irrigation practices, the Southern Paiutes were able to grow squash, melons, corn, and winter wheat (Kelly and Fowler, 1986). In the summer, big game was hunted and seeds, fruits, and berries gathered. In the fall, pine nuts and agave were collected. Mesquite beans were also a favored food source, and researchers have suggested that the distribution of the mesquite groves in the Las Vegas Valley closely matches the distribution of Southern Paiute groups (Lyneis, 1982). Further, the spring and summer mesquite harvest coincides with the planting season, so a diet that includes both resources would not be subject to major scheduling conflicts.

During the nineteenth century, the way of life for the Las Vegas Paiute changed permanently with the arrival of outsiders in the Las Vegas Valley. Euroamerican settlers, miners, and railroad developers quickly displaced Paiute hegemony over land, water, and resources (Warren, 2007). In 1911 the Las Vegas Colony was created to contain the Las Vegas sub-group of the Southern Paiute. Most Paiutes who moved there, however, did not stay (Kelly and Fowler, 1986). Like other Native Americans in the western U.S., many Las Vegas Paiutes instead went to work for local ranchers (Warren, 2007). The Las Vegas Paiute were recognized as a sovereign nation in 1970 and today hold approximately 3,800 acres of their traditional territory as reservation land (Las Vegas Paiute Tribe, 2009).

3.5.1.2 Historic Period

Exploration (1776 AD to 1855 AD)

The deserts of southern Nevada presented a barrier to non-native exploration for centuries. One of the first documented explorations in what would become Clark County occurred in 1776 when Father Francisco Garcés led an expedition from Sonora to the pueblo of Los Angeles in an effort to establish a route from Santa Fe to the colonial capital of Monterey in Alta, California. He used Mojave guides and traced portions of the Old Mojave Trail, an ancient long-distance trading route located along the Colorado and Mojave river systems (McBride, 2002; Beck and Haase, 1974). In the 1820s, more expansive explorations began to occur when fur trappers exploited the river valleys of the west using routes established by early Spanish expeditions. Jebidiah Smith, one of the most famous trappers, established a trail between the Great Salt Lake and Los Angeles while working for the Rocky Mountain Fur Company in 1826 (Edwards, 1969; McBride, 2002). Following the Virgin River out of Utah, Smith and his party crossed into southern Nevada and reached the Colorado River. From there, the party crossed the Mojave Desert and into California via the route established by Garcés 50 years earlier. The trail they opened eventually combined with other early routes and became known as the Old Spanish Trail. During the

1830s and 1840s, this trail was used by Americans, Mexicans, and Native Americans as a conduit for the extensive caravan trade between Los Angeles and Santa Fe in goods and animals (Edwards, 1969; McBride, 2002).

As part of the growing spirit of Manifest Destiny, the U.S. government sponsored a series of surveys and expeditions to explore the geography and known trails of the western Great Basin (Edwards, 1969; McBride, 2002). One of these expeditions brought the "Great Pathfinder" John C. Fremont and famous scout Kit Carson through the Las Vegas Valley in 1844. Entering from Utah along the Virgin and Muddy rivers, this expedition mapped the springs of Las Vegas, identifying the location as the best watering place in southern Nevada (Edwards, 1969). The valley and springs at Las Vegas had been visited earlier by Antonio Armijo, a New Mexican trader, when he explored the valley in 1829 (McBride, 2002). Fremont's maps also identified the Old Spanish Trail as the only practical southwest passage to the Pacific Coast. The desert climate of the area allowed for year-round travel on the Old Spanish Trail, a factor that would have a significant role in the trail's development in the years that followed.

Mormon Settlement (1855 AD to 1880 AD)

After the conclusion of the Mexican War in 1848, most of southern Nevada under the 37th parallel, including Clark County, became part of the U.S. New Mexico Territory. Trade traffic on the Old Spanish Trail ceased and the segment established in southern Nevada became known as the Mormon Road. The Mormon Road was used as a supply and travel route between the Mormon settlements in San Bernardino, California, and Salt Lake City. A way-station and Mormon colony were established at Las Vegas in 1855, followed by construction of a fort and development of irrigation channels for agricultural endeavors. The new colony was instructed to search for mineral resources, resulting in the discovery and opening of the first lode mine in Nevada (Edwards, 1969). The "Lead Mine," later known as Potosi, was located approximately 25 miles southwest of Las Vegas (Edwards, 1969). The Las Vegas colony and its outlying areas were, however, abandoned in 1857 when the settlers were called back to Salt Lake City. The abandoned fort was briefly used during the Civil War when it was named Fort Baker. By the end of the 1860s, almost all business travel, especially during winter, between Salt Lake City and the west coast passed through Las Vegas via the Mormon Road (Edwards, 1969).

Mining, Railroads, and the City of Las Vegas (1880 AD to 1921 AD)

Despite hardships caused by flooding, heat, and isolation, a few Mormons and other pioneers remained in southern Nevada. Some of these residents participated in the mining boom that shaped what would become Clark County. Prospectors located many valuable minerals in southern Nevada. Gold, silver, lead, and copper were found in El Dorado Canyon and the Spring Mountains, as well as huge salt deposits along the Muddy and Colorado Rivers (Warren, 2007). Mining camps were established in remote areas, supported by isolated ranches built along the few permanent water sources found in the Mojave.

Instrumental in early mining development in southern Nevada were the routes and stations established along the Colorado and Virgin rivers by Mormon settlers. The steamboats that traversed the rivers were a key component in transporting supplies to and from mines until the completion of the San Pedro, Los Angeles, and Salt Lake (SPLA&SL) Railroad in January of 1905.

Success of the region's mining industry was facilitated by the development of railways, many of which ran from individual mines or districts to main lines such as the Santa Fe Railroad terminal in Needles, California, and the SPLA&SL terminals in Las Vegas and Jean, Nevada (Edwards, 1969; University of Nevada Las Vegas, 2009). The construction of the SPLA&SL, also known as the Salt Lake Route, and additional development to meet operational needs rapidly changed southern Nevada from a desert wilderness occupied by a few scattered ranches, mines, and farms into an area of industry and commerce focused on servicing mines and boom towns. Las Vegas became the hub of a new freight and transportation monopoly, prompting incorporation of the city on May 5, 1905, less than 4 months after completion of the SPLA&SL line.

Construction of more extensive yards and shops in Las Vegas in 1909 created an increased demand for housing and water; the Las Vegas Land and Water Company, a subsidiary of the SPLA&SL, was established to see to both needs (Edwards, 1969). At this time, Las Vegas was part of Lincoln County, but the 150-mile distance to the county seat in Pioche and the increasing importance of the growing community of Las Vegas created a need for a local bureaucracy. An appeal was made to the state legislature in 1909, and the county division act became effective on July 1, 1909 (Edwards, 1969). The new county was named Clark after William A. Clark, who had been instrumental in bringing the railroad into southern Nevada. Las Vegas was the natural site for the county seat, a decision that further stimulated the growth and development of the city.

Hoover Dam, World War II, and Beyond (1921 AD to Present Day)

During the first decade of the twentieth century, several devastating floods in the Moapa Valley and along the Colorado River inflicted great damage to the tracks, grades, and bridges of the SPLA&SL Railroad and to agricultural fields in the Imperial Valley of California. As a result, improved, higher grades and bridges were built for the railroad, and pressure was placed on the U.S. Congress for construction of a dam on the Colorado River. In 1921 a tri-state commission was formed, and in December 1928 Congress formally authorized the Boulder Dam project (Edwards, 1969). In 1930 the dam's name was changed to Hoover Dam to honor the president whose engineering and diplomacy skills contributed to its undertaking (Edwards, 1969). The dam was completed in 1936.

The surplus of power provided by Hoover Dam also led to the establishment of several military-oriented research and development projects in southern Nevada during World War II. These projects included a facility in Boulder City to study the utility of low-grade domestic ores, such as manganese, chromium, titanium, gypsum, and magnesium (Edwards, 1969). After the war, the Las Vegas area also became home

to the Atomic Energy Commission's experimental facilities (also known as the Nevada Test Site) and the Nuclear Rocket Development Station.

Another military operation that came to Clark County in the 1940s was the U.S. Air Force (at that time the Army Air Corps) gunnery school (Edwards, 1969). With clear, usually cloudless skies and extensive stretches of unoccupied desert wilderness, the region proved to be a perfect training ground for combat pilots. Originally called the Las Vegas Army Air Field, the base was renamed Nellis Air Force Base in 1950.

The 1940s also saw the establishment of the entertainment and resort hotel industries in Las Vegas. Location, resources, demographics, and the legalization of gambling in 1931 greatly contributed to the success of these endeavors. As a natural outgrowth of these attractions, Las Vegas also established a successful convention industry, beginning with the construction of a state-of-the-art convention center in 1959 (Edwards, 1969).

Business and employment opportunities offered by the military and entertainment industries continue to grow today. Accompanying this growth is an increased demand for housing and construction similar to the demands experienced in the first half of the twentieth century. The mineral resources of the surrounding area offer a way to help meet this need, reflecting the diverse potential of this desert environment for managed human use.

3.5.1.3 Previous Archeological Investigations

In December 2001 and April 2002, a cultural resource inventory was conducted for the Mojave Mineral Project (White, 2002). The area inventoried for that project totaled 1,500 acres and encompassed the current Proposed Action area and adjacent areas. Archeologists from the University of Nevada Las Vegas and Harry Reid Center for Environmental Studies conducted the cultural resource inventory. The inventory consisted of a Class I literature search, a Class II pedestrian sampling inventory of areas with slopes greater than 30 percent, and a Class III pedestrian inventory of areas with 30 percent slope or less (BLM, 2003a; White, 2002).

The Class I literature search consisted of reviewing information at Special Collections, Lied Library, University of Nevada Las Vegas, Harry Reid Center for Environmental Studies, and Southern Nevada Archeological Archives. The Class II sampling inventory consisted of using widely-spaced (greater than 30-meter intervals) transects up slopes greater than 30 percent and along ridgelines or spines. The Class III pedestrian inventory included areas that were less than 30 percent slope. In these areas the survey was conducted using linear transects spaced no greater than 30-meter intervals. When a cultural resource was identified, limited subsurface testing was conducted with a hand trowel.

It is suspected that the Armijo Branch of the Old Spanish Trail (a National Historic Trail) may have passed through the proposed Sloan Hills Mineral Material site. The Armijo Branch most likely utilized

the wash that runs through the southeast corner of the Proposed Action area to continue into Hidden Valley (Sprowl, 2010). The extensive use of the wash by off-highway vehicles (OHV) combined with floodwaters in the wash may have removed any physical evidence of the route in this portion. This branch is currently being investigated to determine if any physical traces of the trail are still evident and to determine the visual resource impacts along this trail segment.

3.5.2 Archeological Surveys and Results

The literature search identified 15 previous cultural resource investigations and 8 recorded cultural resources. Seven of the resources are directly associated with the existing main alignment of the historic SPLA&SL Railroad (ca. 1905). The eighth resource, a petroglyph site located southwest of the project area, is suspected of being modern in origin based on stylistic design manipulations uncommon to the region and obvious chisel marks (BLM, 2003a).

In December 2001 and again in April 2002, a pedestrian survey encompassing approximately 1,500 acres was conducted by William White and archaeologists from the Harry Reid Center for Environmental Studies, University of Nevada Las Vegas. They identified seven isolated cultural resources, four of which lie within the confines of the current project APE.

The survey conducted by White in 2002 for the Mojave Mineral Project consisted of a pedestrian survey of the area of direct impact and the surrounding proposed alternative areas, for a total of approximately 1,500 acres. Terrain with slopes greater than 30 percent were surveyed to Class II standards, while terrain with slopes less than 30 percent were surveyed to Class III standards. No cultural resources were identified during the Class II survey (White, 2002). The Class III pedestrian survey conducted by White identified one historic site (26CK6482) and seven isolated resources.

The seven isolated resources include six chert flakes and one mining claim cairn (White, 2002). All six chert flakes were primary percussion flakes with cortex reduced from various chert sources. The mining cairn is constructed of numerous medium-sized volcanic rocks (White, 2002). A pocket tobacco tin discovered in the cairn contained a folded pink paper inside of it. The pink paper read: “E[ast] end center/ Cinderella #2 claim.” No date was present.

Three of the chert flakes and Historic Site 26CK6482 identified during the 2002 survey are located outside of the current project APE, while four are found to be inside the current Proposed Action area. The four isolated finds located in the APE consist of three chert flakes and a mining claim cairn. Due to their isolated occurrence and lack of distinctive characteristics, none of these resources were considered eligible for inclusion in the NRHP under any criteria (White, 2002).

3.6 NATIVE AMERICAN RESOURCES

Native American resources include locations associated with the traditional beliefs and events of Native American groups regarding their origin, cultural history, religion, or nature of the world. As identified by

Native Americans, these areas include places that figure prominently in their religion or oral tradition, such as sacred mountains or springs where important events took place in the legendary past. The American Indian Religious Freedom Act states that the U.S. government will respect and preserve the rights of Indian tribes to freedom of traditional religions, including access to sacred sites (42 USC 1996). Further, Executive Order 13007, Indian Sacred Sites (May 29, 1996; 61 FR 26771), dictates that to the extent practicable, agencies should not damage or block Native American sacred sites found on federal land. The NRHP also provides protection for Traditional Cultural Property (TCP). A TCP is an area of traditional importance that has been determined eligible for listing or has been listed based on established definitions and criteria. When a project is proposed to occur on federal land, Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (November 9, 2000; 65 FR 67249), directs agencies to coordinate with Native American tribal leaders to determine whether the proposed project would have an effect on the Native American population or resources.

Two federally recognized tribes and one Indian organization have demonstrated cultural and historic ties to Southern Nevada; these are the federally recognized Las Vegas Indian Colony and the Moapa Paiute Indian Tribe, and the currently unrecognized Pahrump Paiute Tribe and the Las Vegas Indian Center. The Las Vegas Indian Center represents the urban Native American population of Las Vegas and Clark County. Traditionally, it is the Las Vegas Paiute sub-group who are more closely associated with the Las Vegas Valley where the project area is located. However, due to historical processes that caused the dispersal and relocation of many Native American groups during the late nineteenth century and early twentieth century, descendants of these original inhabitants can now be found spread out across the entire region.

Several previous cultural resource studies have been conducted in the proposed project area, including the Mojave Mineral Project (White, 2002). This study failed to identify the presence of Native American TCPs or scared lands in the Proposed Action area (BLM, 2003a).

Religious and meaningful places for southern Nevada groups are often marked by rock art. The Sloan Canyon Petroglyph Complex (26CK2240 and 26CK2621), located 2.3 miles southeast of the Proposed Action area, contains more than 300 rock art panels (BLM, 2009c). These sites were listed on the NRHP in December 1978. Today, the site's boundaries have been expanded to include additional rock art loci, and the nomination form has been updated by the State Historic Preservation Office (SHPO). Despite the proximity of the Sloan Canyon Petroglyph Complex, no rock art has been recorded in the Proposed Action area.

Resource locations are also given significance by many Native American groups. In the Las Vegas Valley, two such significant resources are water locations and tool stone sources, such as chert deposits. Native Americans have occupied the Las Vegas Valley area for more than 8,000 years, particularly in areas near springs. No springs or reliable sources of water are present in the Proposed Action area; the steep topography and lack of vegetation cause water to quickly drain from the area with no retention or

delay in downhill movement (White, 2002). The Sloan Hills vicinity also contains extensive surface exposures of weathered and eroded chert layers and nodules, as well as extensive limestone deposits. An exhaustive field examination of both types of deposits in the Proposed Action area was undertaken as part of the Mojave Mineral Project in 2001 (White, 2002). The investigation failed to reveal evidence of cultural exploitation in either the chert beds or limestone deposits (White, 2002). The chert nodules that would have been most attractive to Native Americans are of poor quality. Further, the lack of concentrated lithic debris, coupled with the scarcity of lithic reduction waste flakes (only six flakes were found in a 1,500-acre area), supports the conclusion that local chert was not an extensively exploited or preferred tool stone source for the area.

Based on these conclusions, it is unlikely that the proposed mining activities in the Sloan Hills would have direct impacts on local Native American resources. No sacred lands, TCPs, or areas associated with traditional usable resources are present in the Proposed Action area. Rock art, a cultural practice most often associated with meaningful places for Native Americans, is also lacking. Thus, Native American occupation and use of the project area appears to have been minimal due to its lack of exploitable resources (BLM, 2003a; White, 2002).

3.7 LAND USE

Land use includes land ownership, existing land use, land use plans, and zoning. Land use and land management practices have a major impact on natural resources, including water, soil, nutrients, plants, and animals. The Proposed Action and alternatives would be located on undeveloped public land in Clark County. This section describes land ownership, existing land use, and land use planning in the Proposed Action area and vicinity.

3.7.1 Land Ownership

Clark County covers 5.12 million acres of land, of which approximately 90 percent is under the administration and control of six federal agencies (Figure 3.7-1). The BLM administers about 57 percent of this federal land (BLM, 2004a). The Proposed Action area is located on 640 acres of lands administered by the Las Vegas Field Office of the BLM in southwest Clark County. Public lands in Clark County are administered by the Las Vegas Field Office, and all land uses are managed under the Las Vegas RMP (BLM, 1998), as mandated by the FLMPA of 1976 (43 CFR 1600). Lands in the vicinity of the Proposed Action area are also administered by the BLM. Surrounding lands, including the Proposed Action area, were identified for disposal with the enactment of the Clark County Act of 2002 (PL 107-282). These surrounding lands have been annexed by the City of Henderson, but currently remain under the administration of the BLM. The Proposed Action area is located in an area that is commonly referred to as the “donut hole” and is not in Henderson city limits. Proposed access routes, water wells, utility corridors, and water pipeline alignments would occur on public lands located in the jurisdictional boundaries of the City of Henderson and unincorporated Clark County.

3.7.2 Existing Land Use

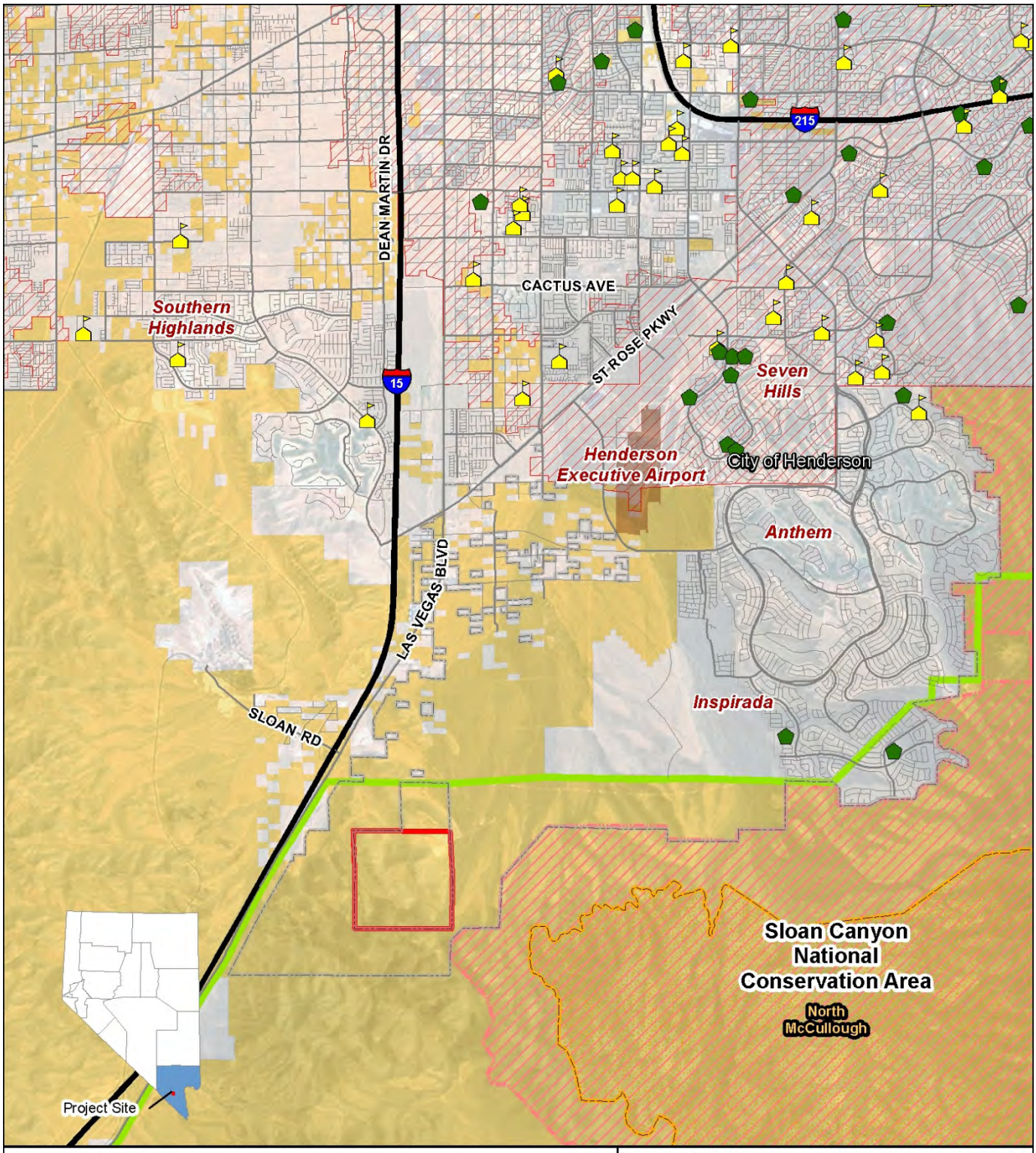
Current land uses in the vicinity of the proposed project area include the Sloan Canyon NCA, the North McCullough Wilderness, and the Hidden Valley Grazing Allotment. The boundary of the Sloan Canyon NCA is located approximately 650 feet to the southeast of the Proposed Action area. Located entirely within the Sloan Canyon NCA is the North McCullough Wilderness. The closest boundary of the North McCullough Wilderness is approximately 1 mile southeast of the project area. The Hidden Valley Grazing Allotment is approximately 64,192 acres, and portions of the Hidden Valley Grazing Allotment lie within the Sloan Canyon NCA (Figure 3.7-1).

Recreational uses in the Proposed Action area include camping, recreational target shooting, and auto touring. Bighorn sheep in the area may be of interest for wildlife watching. Recreational opportunities in the Sloan Canyon NCA include hiking and horseback riding, and destinations frequently include the Sutor and Hanna peaks, the North McCullough escarpment, and the Sloan Canyon Petroglyph Site.

Residential communities in the vicinity of the Proposed Action area include Southern Highlands, Anthem, Seven Hills, and Inspirada. Construction activities are still continuing at these residential communities. The locations of these residential communities in relation to the Proposed Action area are shown in Figure 3.7-1.

Public and private facilities in the vicinity of the Proposed Action area include the Revere at Anthem Golf Club, Anthem Country Club, Rio Secco Golf Club, Fire Station 99, Liberty High School, Wolff Elementary School, Coronado High School, Lamping Elementary School, Webb Middle School, Fire Station 98, Walker Upper School, Hillcrest Academy, and Henderson Executive Airport. All of the facilities are located to the northeast of the Proposed Action area.

Major transportation rights-of-way in the vicinity of the Proposed Action area include I-15, Las Vegas Boulevard, and St. Rose Parkway (Figure 3.7-1). Additional rights-of-way in the vicinity are shown in Table 3.7-1 and on Figure 3.7-2.



Source: Clark County, Nevada, BLM.

Anthem Community Name

Existing Park

Existing School

Proposed Action Area

City of Henderson Jurisdictional Boundary

Designated Wilderness

National Conservation Area

Bureau of Land Management

Private

Grazing Allotment

Open

Acquired/ Planned Closure

Acquired/ Closed

Closed

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification

1 inch = 7,000 feet

7,000 3,500 0 7,000 Feet

N W E S

Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.7-1
Landuse

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS&J

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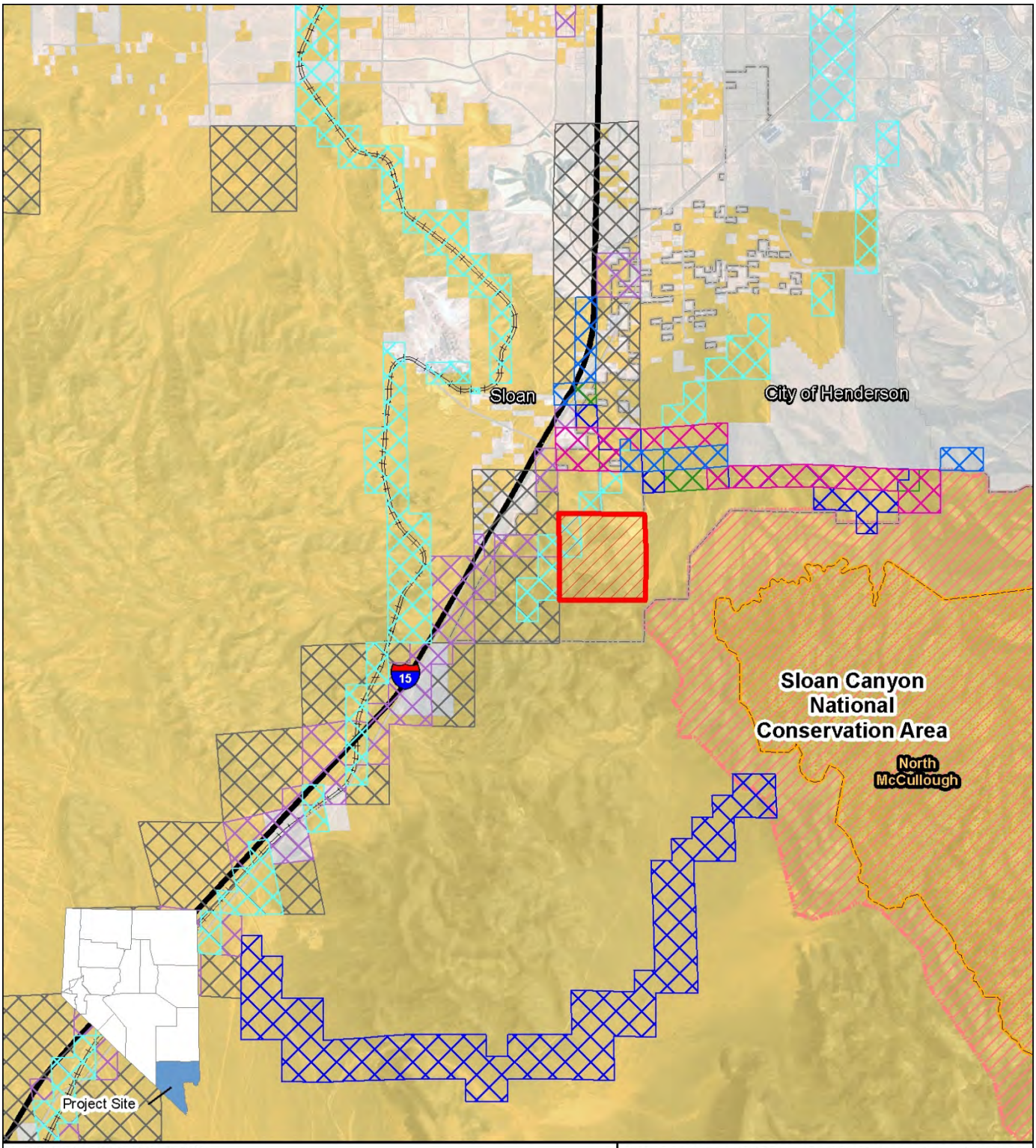

Source: Clark County, Nevada, BLM.

- Proposed Action Area
- NDOT Federal Aid Highway: Non-Energy Facility
- Cal-Nev Pipeline Co. Oil/Gas Pipeline
- Los Angeles and Salt Lake Railroad
- Nevada Power Co. Fiber Optic Facility
- BLM Sloan Canyon Access Road
- City of Henderson Road
- Nevada Power Co. Power Transmission
- Clark County Jurisdictional Boundary
- National Conservation Area
- Designated Wilderness
- Bureau of Land Management
- Private

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

1 inch = 1.5 miles

1.5 0.75 0 1.5 Miles

N W E S

Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.7-2
Proposed Sloan Hills
Additional Rights-of-Way

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS&J

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Table 3.7-1
Additional Rights-of-Way in the Project Vicinity

Group	Right-of-Way/Facility Type	Acreage
BLM	Sloan Canyon access road	43
Cal-Nev Pipeline Company	Oil/gas pipeline	96
City of Henderson	Road	184
NDOT	Federal Aid Highway: non-energy facility	3
NV Energy	Power transmission	98
NV Energy	Fiber optic facility	5
NV Energy	Other energy facility	2
NV Energy	Fiber optic facility	11
Los Angeles and Salt Lake Railroad	Railroad	6,623

3.7.3 Land Use Planning

Land use plans relevant to the proposed project are:

- **Clark County Comprehensive Master Plan.** This is a long-term general policy plan for the physical development of unincorporated Clark County (Clark County, 2008a). Planned land use immediately surrounding the Proposed Action area is designated as Residential Rural with up to two units per acre. Northwest of the Proposed Action area, near I-15, planned land uses include industrial, business and design research park, commercial tourist, and public facilities. To the west of I-15 and south of the Proposed Action area, planned land use is for open lands. To the southeast of the Proposed Action area, planned land use includes public facilities in the area of the Sloan Canyon NCA (Clark County, 2008b). The South County element of the Clark County Comprehensive Master Plan includes planned land uses for open lands to the south as well as public facilities for the recently approved Southern Nevada Regional Heliport site south of the Proposed Action area. The heliport site will cover approximately 230 acres just east of I-15, approximately 1 mile southwest of the Proposed Action area. The heliport site will provide commercial helicopter tour operators an alternative to McCarran International Airport and will also provide noise relief to Las Vegas Valley residents.

- **City of Henderson Comprehensive Plan.** The City of Henderson has been one of the fastest-growing cities in the nation, averaging nearly 12,000 new residents per year since 1990 (City of Henderson, 2006). The City of Henderson Comprehensive Plan covers 96 square miles of land in the southeast portion of the valley. Some master planned communities in Henderson located northeast of the project site are Seven Hills, Anthem, Inspirada, and Southern Highlands. Planned land use in the project vicinity in Henderson includes very low-density residential, medium-density residential, high-density residential, public/semi-public, industrial, commercial, and a planned community (City of Henderson, 2006) (Figure 3.7-1).

- **Bureau of Land Management Las Vegas Resource Management Plan and Final Environmental Impact Statement.** The RMP and EIS identifies future management directions for 2.6 million acres of public land in Clark County. The project site is designated as Not Available for Disposal (PL 107-282; BLM, 1998).

- **Sloan Canyon Resource Management Plan and Final Environmental Impact Statement.** Title VI of the Clark County Act requires the BLM to develop a plan for the appropriate use and management of the NCA and Wilderness within 3 years of enactment (BLM, 2005). This plan, once adopted, would amend the Las Vegas Resource Management Plan (BLM, 1998) and be a standalone land use plan for all plans within the NCA.

3.7.3.1 Zoning

Zoning classifications in the vicinity of the Proposed Action are designated by Clark County and the City of Henderson, depending on the jurisdiction. Zoning designations are intended to implement the policies of a land use plan in a specific planning area, such as those discussed in Section 3.7.3. Zoning classifications define the use or development standards of a parcel of land to be compatible with the surrounding and planned land use.

City of Henderson zoning designations northeast of the Proposed Action area are public/semi-public use, designated holding, planned community, general industrial, tourist commercial, and multifamily (16 units per gross acre). Northeast of the planned community is Anthem, which is designated as public/semi-public interspersed with single-family residential (six units per gross acre). The zoning designations just south of the planned community are designated holding and public/semi-public use (City of Henderson, 2006).

3.8 VISUAL RESOURCES

Visual resources include the physical (natural and artificial) and biological features of the landscape that contribute to the scenic quality of an area. Scenic quality is a measure of the visual appeal of the landscape, perhaps best described as the overall impression retained after passing through an area. Although relative values can be used to evaluate scenic quality, visual appeal is subjective and can vary among observers (BLM, 1986a). The appropriate level of management for visual values and resources is determined through a systematic inventory process. The process identifies affected landscapes and assigns them values. These visual resource values are obtained by considering the scenic quality of the landscape, sensitivity of the viewers of that landscape, and distance of that landscape to the viewers. Lands are then placed into one of four classes based on relative value of the resource as determined from the inventory.

3.8.1 Visual Resource Inventory

The visual resources evaluation for this project has been conducted in accordance with the objectives and methods described in the BLM Visual Resource Management (VRM) Guidelines (BLM, 1986a) and the

BLM Visual Resource Contrast Rating (BLM, 1986b). The objective of the VRM Guidelines is to manage federal lands in a manner that would protect the quality of the scenic or visual values of those lands.

The first step of the VRM process is to identify affected landscapes and assign them values. These visual resource values are obtained by considering the quality of the landscape, the sensitivity of the viewers of that landscape, and the distance of that landscape to the viewers. A contrast rating system is then used as a systematic means to evaluate proposed projects and to determine the level of impact the project would have on visual resources.

Assigning values to visual resources is a subjective process, yet researchers have found consistent levels of agreement among individuals asked to evaluate visual quality. Modifications in a landscape that repeat the landscape's basic elements are said to be in harmony with their surroundings. Modifications that do not harmonize often appear out of place and are said to contrast or stand out unpleasantly. These basic design elements and concepts were incorporated into the VRM system to lend objectivity, integrity, and consistency to the process. The VRM system is designed to separate the existing landscape and a proposed project into their features and elements and to compare each part against the other to identify those parts that are not in harmony.

The baseline visual resource inventory consists of the evaluation of the scenic quality, sensitivity levels, and distance zones.

3.8.1.1 Scenic Quality Evaluation

Scenic value is one of the resources for which public lands are managed. Scenic quality includes man-made modifications that represent changes to the land, water, or vegetation, or the addition of a structure that creates visual contrast to the natural character of the landscape. The scenic quality of an area is determined by completing a visual resource inventory process based on seven key factors: landform, vegetation, water, color, adjacent scenery, scarcity, and cultural modifications.

3.8.1.2 Sensitivity Level Analysis

Sensitivity levels are a measure of public concern for scenic quality. Visual sensitivity is dependent upon user (or viewer) attitudes, the amount of use, and the types of activities in which people are engaged when viewing an object. Overall, higher degrees of visual sensitivity are correlated with areas where people live and with people who are engaged in recreational outdoor pursuits or participate in scenic or pleasure-driving. Conversely, areas of industrial or commercial use are considered to have low to moderate visual sensitivity because the activities conducted in these areas are not significantly affected by the quality of the environment.

3.8.1.3 Delineation of Distance Zones

Landscapes are subdivided into three distance zones based on relative visibility from travel routes or observation points: foreground-middleground, background, and seldom seen. The foreground-middleground zone includes areas seen from highways, rivers, or other viewing locations that are less than 3 to 5 miles away. The background zone includes areas that are visible beyond 5 miles but are less than 15 miles away. Other areas are in the seldom seen zone.

3.8.1.4 Proposed Action Area Setting

The Proposed Action area is generally characterized by low, steep-sided hills ranging in elevation from approximately 2,800 feet to approximately 3,200 feet. The plant communities represented in the project area include Mojave Desert Scrub and Mojave Desert Wash Scrub. The vegetation is dominated by creosote bush, white bursage, Mojave yucca, and cacti species. I-15, Las Vegas Boulevard, and the communities of Inspirada, Anthem, and Seven Hills can be seen from the hilltops in the Proposed Action area. I-15 and Las Vegas Boulevard lie approximately 3,400 feet to the west of the Proposed Action area. The communities lie approximately 2 miles north of the Proposed Action area and can be seen as an assemblage of brown, gray, and beige low-rise structural shapes and sizes. Further in the distance, views of the Las Vegas Valley can be seen from the area and are viewed as a collection of low- and high-rise structural shapes and sizes ranging in color from subtle desert hues to the bright neon of casinos and other commercial development lights.

3.8.2 Visual Resource Management

Lands are placed into one of four classes based on relative value of the visual resource as determined from the inventory:

- **Class I.** The objective of this class is to preserve the existing character of the landscape. This class provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention.

- **Class II.** The objective of this class is to retain the existing character of the landscape. The level of change to the characteristic landscape should be low. Management activities may be seen but should not attract the attention of the casual observer. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the characteristic landscape.

- **Class III.** The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape 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.

- **Class IV.** The objective of this class is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the characteristic landscape can be high. These management activities may dominate the view and be the major focus of viewer attention; however, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements

The Proposed Action area is designated as Class III in the RMP (Figure 3.8-1). Management direction for this classification is to manage for partial retention of the existing character of the landscape. These landscapes are allowed to be altered, but not to the extent that actions would dominate the views of the casual observer.

3.8.3 Sensitive Receptors

Sensitive receptors include residents of four master-planned communities (Inspirada, Seven Hills, Anthem, and Southern Highlands), recreational users of the Sloan Canyon NCA, and commuters driving to and from Las Vegas on I-15 and Las Vegas Boulevard. Drivers on the highways are not considered as sensitive as residents and recreational users.

Under the contrast rating system, the contrast rating is conducted from the most critical viewpoints, or key observation points (KOP). For the purpose of this visual resource analysis, seven KOPs were selected for initial analysis. These points were selected based on the location of sensitive receptors and their proximity to the Proposed Action area (Figure 3.8-2). Factors that were considered in selecting KOPs are angle of observation, number of viewers, length of time the project is in view, relative project size, season of use, and light conditions. The KOPs selected for the Proposed Action are the community of Seven Hills (KOP 1), Las Vegas Boulevard at the intersection of Sloan Road (KOP 2), the North McCullough Wilderness (KOP 3), a rural housing area in unincorporated Clark County (KOP 4), the town of Sloan (KOP 5), the community of Inspirada (KOP 6), and the Sloan Canyon NCA (KOP 7) (Figure 3.8-2).

KOP 1 is located in the master planned community of Seven Hills in Henderson. This KOP is located approximately 3.4 miles northeast of the Proposed Action area. The location of Seven Hills was selected over other nearby residential communities (i.e., Inspirada) because it is generally located at a higher elevation and contains some unobstructed views to the Proposed Action area along the outer edge of the community. Additionally, this location was selected in part because of the large number of comments received during the public scoping period expressing concern that the sale of mineral material at the Sloan Hills site would impact mountain views. The Proposed Action area is not visible, or views are largely obstructed, from most other residential areas.

KOP 2 is located along Las Vegas Boulevard near its intersection with Sloan Road. This KOP is also situated near the I-15 corridor. This KOP was selected because of the Proposed Action area's proximity to these high-volume traffic areas. KOP 2 is located approximately 4,000 feet northwest of the Proposed Action area, and the proposed mining activities are most likely to be visible from this KOP.

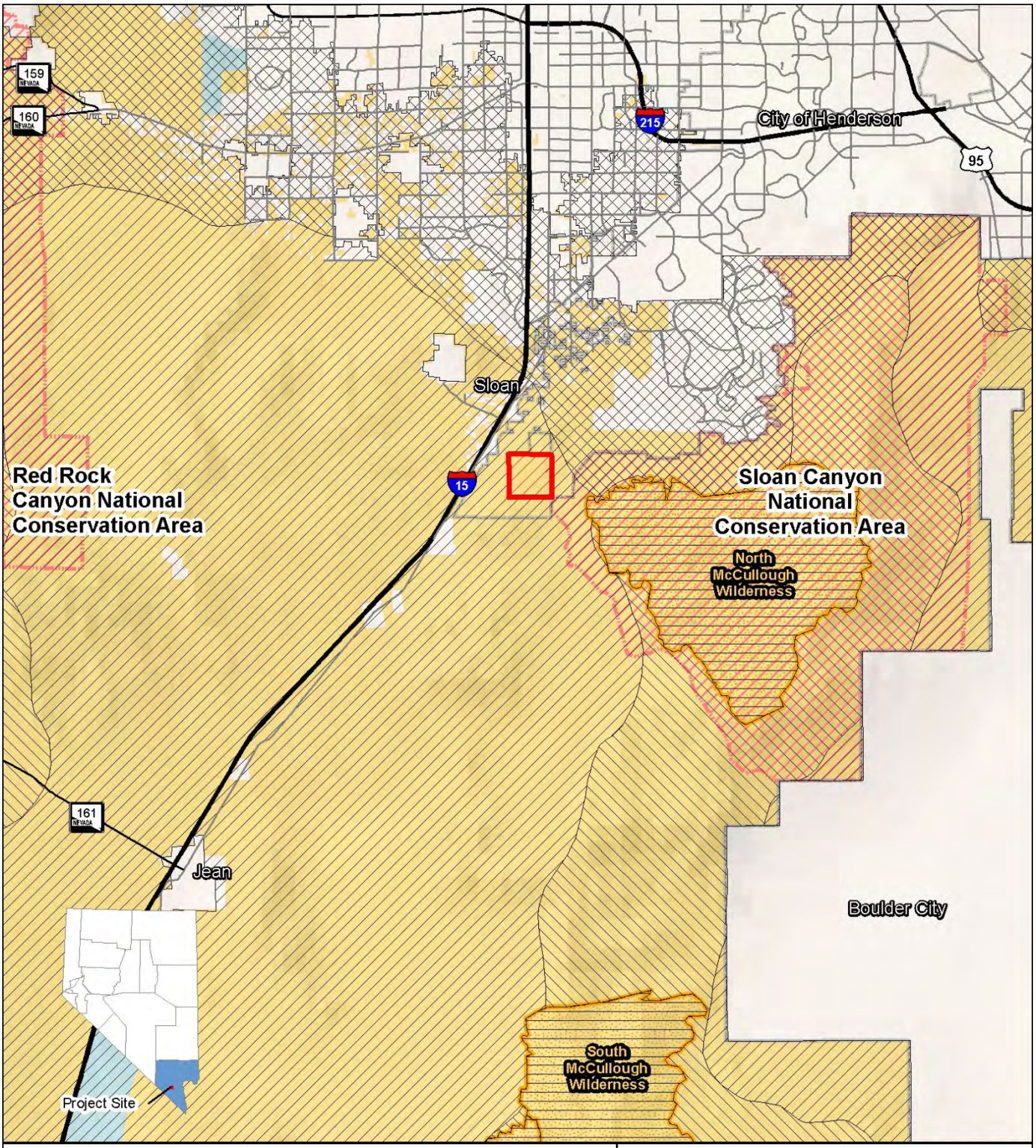
KOP 3 is located in the North McCullough Wilderness of the Sloan Canyon NCA, approximately 2.1 miles east of the Proposed Action area. This KOP was selected because designated wilderness areas are considered especially vulnerable to the adverse impacts resulting from changes in the visual character of an area.

KOP 4 is located at the intersection between Battista Lane and Larson Lane in unincorporated Clark County approximately 2.9 miles north of the Proposed Action area. This KOP is located at the south end of the Las Vegas Valley in a community zoned as Rural Neighborhood (up to two units per acre). This KOP was selected because rural communities are considered more sensitive to visual impacts.

KOP 5 is located in the town of Sloan near the intersection between Sloan Road and Huckleberry Trail approximately 1.2 miles northwest of the Proposed Action area. The location of this KOP is zoned Rural Open Land (0.5 unit per acre) and is adjacent to land zoned Light Manufacturing. This KOP was selected because this location represents the closest residential community that would be impacted by the proposed alternatives. Views from KOP 5 are nearly identical to the views from KOP 2; therefore, this KOP was not carried forward for further analysis.

KOP 6 is located in the community of Inspirada near the intersection between Beltrada Avenue and Via Firenze, approximately 3.5 miles northeast of the Proposed Action area. This KOP was selected because it is located in the future buildout area of the Inspirada master-planned community, and residents of Inspirada have expressed concern that this project would impact their views of the mountains. KOP 6 sits lower in elevation than KOP 1, and views of the Proposed Action area are not visible from this location; therefore, KOP 6 was not carried forward for further analysis.

KOP 7 is located along the western edge of the Sloan Canyon NCA approximately 0.8 mile from the Proposed Action area. This KOP was selected because of its proximity to the Proposed Action area and because of its location in the NCA.



Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement

Figure 3.8-1
Visual Resource Management Classifications

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS&J

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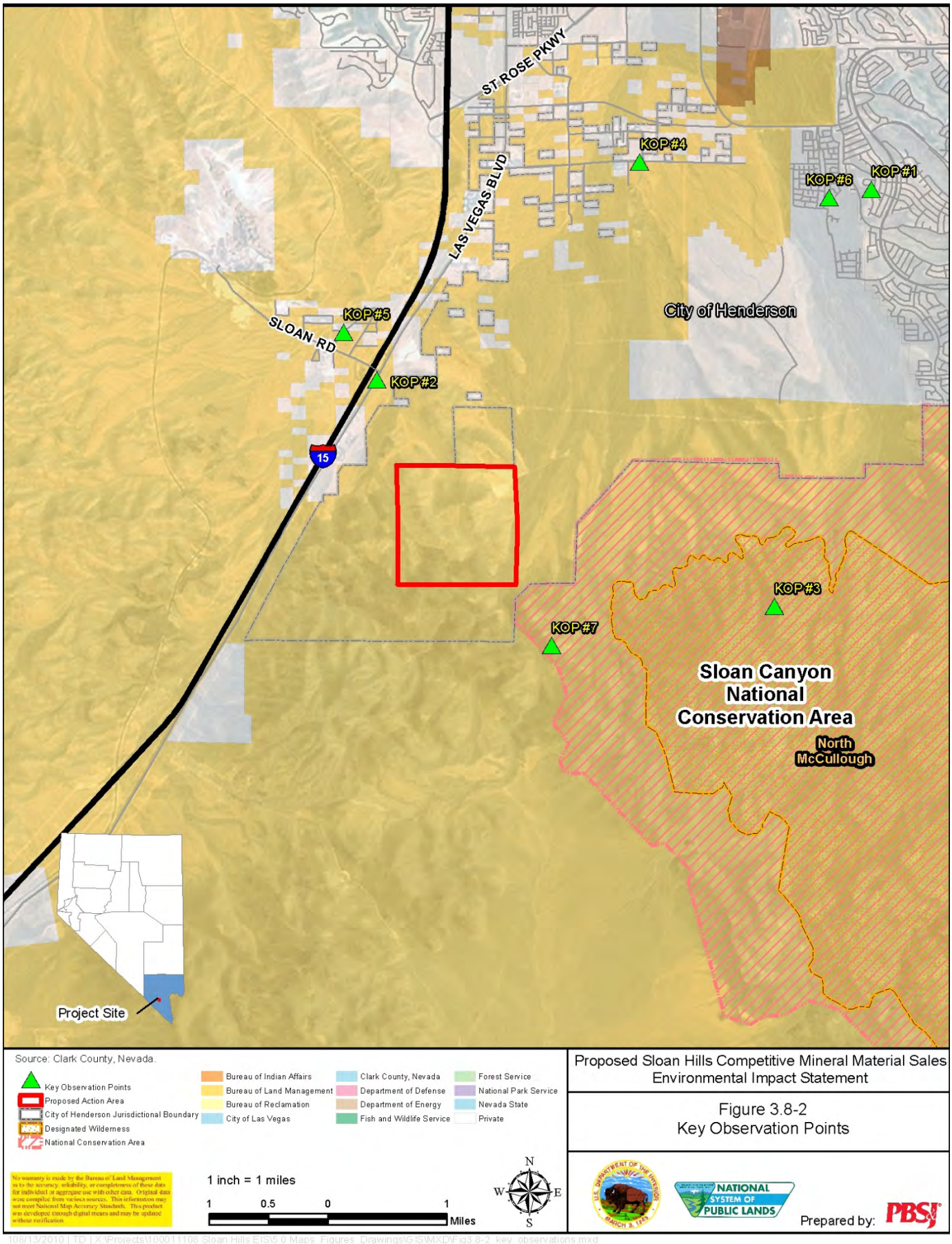
ST ROSE PKWY
LAS VEGAS BLVD
SLOAN RD
15
KOP #1
KOP #2
KOP #3
KOP #4
KOP #5
KOP #6
KOP #7
City of Henderson
Sloan Canyon
National
Conservation Area
North
McCullough
Project Site
Source: Clark County, Nevada.
Key Observation Points
Proposed Action Area
City of Henderson Jurisdictional Boundary
Designated Wilderness
National Conservation Area
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
City of Las Vegas
Clark County, Nevada
Department of Defense
Department of Energy
Fish and Wildlife Service
Forest Service
National Park Service
Nevada State
Private
1 inch = 1 miles
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Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement
Figure 3.8-2
Key Observation Points
NATIONAL SYSTEM OF PUBLIC LANDS
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PBS&J
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3.8.4 Lightscapes

Lightscapes is a measure of an area's ability to see the night sky. The primary cause of loss of night sky visibility is outdoor artificial lights. Lights can be directed to limit their light pollution by having down-facing light fixtures that limit the leakage of excess light past areas where it is needed.

The Clark County Unified Development Code states: "[a]ll on-site lighting of buildings, lawns, recreation areas, and parking areas will be designed to prevent light from shining directly onto residential uses. All light sources will be shielded and directed downward at all times to prevent adverse impacts to adjacent residential uses or zoning districts" (Title 30 Clark County Code Part 68.030).

Sources of light in the vicinity of the Proposed Action area include street lighting along I-15 and Las Vegas Boulevard. The recently-approved Southern Nevada Regional Heliport will also be a nearby source of light once constructed.

3.9 NOISE AND VIBRATION

Noise and vibration is a study of the modification of the noise and vibration characteristics of an area from proposed actions, particularly from vehicles. While noise and vibration can be readily measured, the perceived intensity of these measurements is a subjective judgment that is a sign of the human impression of one's surroundings.

3.9.1 Noise

Noise is the term generally given to the "unwanted" aspects of intrusive sound. Many factors influence how a sound is perceived and whether it is considered annoying to a listener. These factors include not only the physical characteristics of a sound, but also non-acoustic factors that influence the judgment of listeners regarding the "unwantedness" of a sound. Excessive noise can negatively affect the physiological or psychological well-being of individuals or communities.

Most "real world" sounds (e.g., a dog barking or a car passing) are complex mixtures of many different-frequency components. When the average amplitude of such sounds is measured with a sound level meter, it is common for the instrument to apply different adjustment factors to each of the measured sound's frequency components. These factors account for the differences in perceived loudness of each of the sound's frequency components relative to those that the human ear is most sensitive to (i.e., those at or near 1,000 cycles per second). This practice is called "A-weighting." The unit of A-weighted sound amplitude is also the decibel. But in reporting measurements to which A-weighting has been applied, an "A" is appended to decibels (dB) (i.e., dBA) to make this clear. Table 3.9-1 shows the A-weighted average sound levels commonly encountered in various environmental situations.

Table 3.9-1
Representative Environmental Noise Levels

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
Power saw	110	Rock band
Jet flyover at 100 feet		Crying baby
Subway 100		
Gas lawnmower at 3 feet		
Tractor	90	
		Food blender at 3 feet
Diesel truck going 50 mph at 50 feet	80	Garbage disposal at 3 feet
Noisy urban area during daytime		
Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet
Commercial area		Normal speech at 3 feet
Heavy traffic at 300 feet	60	Sewing machine
Air conditioner		Large business office
Quiet urban area during daytime	50	Dishwasher in next room
		Refrigerator
Quiet urban area during nighttime	40	Theater, large conference room (background)
Quiet suburban area during nighttime		
30		Library
Quiet rural area during nighttime		Bedroom at night, concert hall (background)
	20	
		Broadcast/recording studio
	10	
Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: California Department of Transportation, 1998

All rating systems used to measure environmental noise exposure recognize the strong correlation between the high acoustical energy content of a sound (i.e., its loudness and duration) and the disruptive effect it is likely to have as noise. Because environmental noise fluctuates over time, most such rating systems average the sound level over the time of exposure, and some add "penalties" during the times of day when intrusive sounds would be more disruptive to listeners. The equivalent continuous noise level ($L_{eq)}$ is a measure of ambient noise, while the community noise equivalent levels (CNEL) are measures of community noise.

Community noise exposures are most often represented by 24-hour descriptors, such as the day-night average sound level (L_{dn}) or CNEL. One-hour and shorter-period descriptors are useful for characterizing noise caused by short-term activities, such as the operation of construction equipment. Community noise environments are generally perceived as "quiet" when the L_{dn}/CNEL is below 45 dBA, "moderate" in the 45 to 60 dBA range, and "loud" above 60 dBA. Very noisy urban residential areas are usually around 70 dBA L_{dn}/CNEL. Along major roadways, noise levels are typically between 65 and 75 dBA L_{dn}/CNEL. Any noise intrusions that cause short-term interior levels to rise above 45 dBA at night can disrupt sleep. Exposure to noise levels greater than 85 dBA for 8 hours or longer can cause permanent hearing damage.

When evaluating changes in 24-hour community noise levels, a difference of 3 dBA is a barely perceptible increase to most people. A 5 dBA increase is readily noticeable, while a difference of 10 dBA would be perceived as a doubling of loudness.

3.9.2 Vibration

Vibrating objects in contact with the ground radiate energy through that medium; if a vibrating object is massive enough and/or close enough to the observer, its vibrations are perceptible. The ground motion caused by vibration from sources other than blasting should be characterized in terms of inches per second and can be represented by vibration decibels (VdB) relative to a reference level of 1 micro-inch per second (similar to the practice of representing sound decibels relative to the air pressure reference level at the threshold of human hearing).

There is an alternative way of characterizing vibration magnitude that is particularly useful in cases where vibration has the potential to cause structural damage, particularly from blasting and other construction activities. Peak particle velocity (PPV) is defined as the maximum instantaneous peak velocity induced by the vibration. Groundborne vibration from blasting results when some of the explosive energy not used in breaking rock travels through the ground in all directions as wave motion. This wave motion travels mainly along the surface with its energy level rapidly decreasing with distance from the blast.

Blasting is proposed as part of the mining operations to fragment material for excavation and transport. Blasting must conform to the standards set forth in 30 CFR 816.67, which state that overpeak sound-pressure levels cannot exceed 133 dB. The three major adverse effects of blasting are flyrock, air blast, and ground motion. Each of these effects is described below.

Flyrock is rock that is ejected into the air or along the ground from a blast. Flyrock is controlled by the blasting design and by limiting access in the vicinity of the blast. The regulation at 30 CFR 816.67(c) prohibits flyrock from being cast more than one half the distance to the nearest dwelling, beyond the area of control (required under 30 CFR 816.66(c)), or beyond the permit boundary.

Other energy liberated from the blast is converted into vibrations as either ground motion or air overpressure (air blast). Ground motion is the principal vibration that will result from blasting, though air

blast may be more noticeable because of the accompanying noise effects. Like other noises, air blast is measured in decibels; however, because the overpressure is normally at low frequencies and may be felt more than heard, measurements are not A-weighted like other noises. Instead, a flat or linear weighting is used. Ground motion is a wave motion spreading outward from the blast, like ripples spreading outward after a stone is dropped into water. This ground motion is measured as peak particle velocity and is used as an indicator of possible blast damage.

The general human response to different levels of groundborne vibration levels is shown in Table 3.9-2. Most perceptible indoor vibration is caused by sources in buildings, such as the operation of mechanical equipment, movement of people, or the slamming of doors. Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration from traffic is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings.

Table 3.9-2
Human Response to Different Levels of Groundborne Vibration

Vibration Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception for many people.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Source: Hansen et al., 2006

3.9.3 Existing Conditions

The Proposed Action is located in the undeveloped desert in Clark County, approximately 13 miles south of Las Vegas and approximately 0.5 mile east of I-15. The Clark County Comprehensive Master Plan designates the parcels as federal land, which are held by the federal government and managed by the BLM. The site is divided into two halves: the North Site and the South Site. The Proposed Action area totals 640 acres of steep terrain ranging from approximately 2,800 feet to 3,300 feet above mean sea level. Access to the Proposed Action area is primarily provided by dirt roads, which are used for various purposes including land management and recreation. Although no structures or residents occupy the area, off-highway vehicles have significantly disturbed the land in the immediate vicinity.

3.9.3.1 Existing Noise Levels

In deserts where the natural sound pressure levels are very low, vehicular use on a route associated with recreational activities affect hearing in some vertebrates. Natural deserts do not exceed 66 dBA, and no desert animal creates sounds above 56 dBA. Mechanized sounds increase the decibels in the desert. A

motorcycle ranges from 40 to 100 dBA. Within 300 feet, the peak noise level created by a motorcycle exceeds those of naturally occurring sounds (BLM, 2003b).

No noise measurements or detailed field reconnaissance were conducted to measure existing noise sources or noise levels in sensitive areas. Precise data on existing noise sources (such as types, numbers, locations, and operating times) were not generally available at the time of this study. Therefore, assumed sound levels were based on sound levels typically associated with identified noise sources and types of land use settings. Typical source noise levels used for estimating existing noise conditions in the study area are shown in Table 3.9-3.

Ambient noise levels in the Proposed Action area and vicinity generally are assumed to be low and typical of remote desert areas (i.e., 35 to 50 dBA), except as may be modified by noise-generating activities in the vicinity, including:

- Noise associated with occasional recreational and support activities
- Ambient vehicular traffic noise on I-15 and Las Vegas Boulevard, which is located just west of the project area
- Aircraft overflights associated with McCarran International Airport and Jean Airport, located north and south of the project site, respectively
- Occasional military aircraft overflights associated with flight corridors from Nellis Air Force Base
- Natural sources, such as wind, rain, thunder, and wildlife

Table 3.9-3
Source Noise Used for Estimating Existing Noise Levels

	Noise Source	Source-to-Receiver Distance (feet)	Noise Exposure Estimates[1]
Mining and Excavation-Related Noise Sources	Bucket loader	50	89
	Haul trucks (100 tons)	50	88
	Ore trucks (tractor-trailer)	50	88
	Water truck	50	91
	Front-end loader	50 80	
		300 70	
	Fork lift	50	73
	Dozer	50 92	
		300 77	
	Rock drill	50	95
	Dragline crane	50 88	
		300 73	
	Scraper	50 92	
		300 77	
	Pumps	50	71
	Generators	50	83
	Compressors	50	86
Traffic-Related Noise Sources	Interstate highway[2]	50 75	
		200 65	
		800 and up	50
	Roadways[3]	50 70	
		200 60	
		400 and up	50
	Railroad lines[4]	30 75	
		240 60	
		800 and up	45

Mining source: Minor, Michael & Associates, 2000
Transportation source: Hansen et al., 2006

1 All noise exposure estimates are based on typical highway or vehicle operation. Railroad noise levels are described in day-night average sound level; all others are in equivalent noise level daytime.
2 Highways with four or more lanes that permit trucks, with traffic at 60 mph.
3 Roads with traffic at 55 mph, but without trucks.
4 Mainline railroad corridors typically carrying 5 to 10 trains per day at speeds of 30 to 40 mph.

3.9.3.2 Off-Highway Vehicle Noise Levels

OHVs routinely traverse portions of the Proposed Action area and generate noise. OHV noise levels are variable, with older vehicles producing higher noise levels than newer ones. Tests conducted at the Oregon Dunes National Recreation Area concluded that, even with mufflers, noise levels from all-terrain vehicles are found to be in the range of 81 to 111 dBA per unit at a distance of 20 inches (Scharf, 1999). A noise level of 111 dBA at 20 inches is estimated to attenuate to a level of approximately 85 dBA at a distance of 50 feet. For purposes of this section, 92 dBA is the average assumed noise level at 50 feet for OHV use in the Proposed Action area.

The level of OHV activities in or near the Proposed Action area varies throughout the year. The BLM prohibits OHV usage on the North Site portion of the Proposed Action area, while activity on the South Site portion is sporadic and not strictly monitored. Background OHV noise levels in and around the project area range from low to moderate, depending on the weather and the time of year.

3.9.3.3 Sensitive Receptors

Generally, sensitive noise receptors are those areas of human habitation or substantial use where the intrusion of noise has the potential to adversely impact the occupancy, use, or enjoyment of the environment. These areas can include residences, schools, hospitals, parks, and places of business requiring low levels of noise. The habitats of listed threatened and endangered animals and water fowl are also considered sensitive receptor sites. Because the BLM parcels under consideration for mining development are situated in a rather remote area, no such typical sensitive human receptors are in the immediate vicinity.

Parks and residential properties in the vicinity of the Proposed Action include the Sloan Canyon NCA, Inspirada, and Anthem. The environment of Sloan Canyon NCA is generally quiet and is characterized by unique scenic and geologic features and extraordinary cultural resources. Surroundings can vary from lowland dry lakebeds to volcanic rock peaks reaching more than 5,000 feet.

The closest area of likely sensitive receptors would be the town of Sloan, located approximately 1 mile north of the potential BLM mining parcels. The distance from the northwest corner of the North Site to the nearest residential use is approximately 1.3 miles.

Other sensitive receptors to noise in the project area are wildlife species, which are discussed in Section 3.3. The study of animal response to noise is a function of many variables, including characteristics of the noise, duration of the noise, life history characteristics of the species, habitat type, season and current activity of the animal, sex, age, and previous exposure (Manci et al., 1988). Existing sources of noise that may affect wildlife in the Proposed Action area include OHV use, automobile traffic, aircraft, heavy machinery, and construction equipment in the surrounding areas.

3.9.4 Applicable Plans, Policies, and Regulations

3.9.4.1 Federal

"Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (EPA, 1974) evaluates the effects of environmental noise on health and safety. The document provides information for state and local governments to use in developing their own ambient noise standards. The EPA has determined that to protect the public from activity interference and annoyance outdoors in residential areas, noise levels should not exceed an L_{dn} of 55 dBA.

3.9.4.2 State

No state plans, policies, or regulations are applicable to the Proposed Action.

3.9.4.3 Regional

Clark County has a noise regulation in Title 30 of the Unified Development Code; however, the requirements of the County noise code do not apply to construction or demolition activities when conducted during daytime hours. As such, the project would not be subject to the County noise regulations if construction activities are limited to daytime hours. Although not specifically defined in the County code, daytime hours are typically defined as the hours between 7:00 a.m. and 10:00 a.m.

The Clark County Code has established similar standards as those set forth in EPA guidelines (Table 3.9-4).

Table 3.9-4
Impulsive Noise–Maximum Permitted Sound Levels (dB)

Within Residential Districts		Within Business and Industrial Districts	
Daytime	**Nighttime**	**Daytime**	**Nighttime**
56 46		65	61

Source: Clark County Code, Section 30.68.020, Table 30.68-2

3.9.4.4 Local

The City of Henderson noise regulation falls under Title 8, Public Peace and Safety, of the municipal code. The City of Henderson defines a noise disturbance as "any sound that endangers or injures the safety or health of humans or animals, or annoys or disturbs a reasonable person of normal sensitivities, or endangers or injures personal or real property." Section 8.84.030(F) exempts the noise associated with the erection, excavation, demolition, alteration, or repair of any building, street, or highway in any new or existing residential district or section from the City's noise ordinance if it occurs between 6:00 a.m. and 6:00 p.m.

3.10 TRANSPORTATION

This section describes the existing transportation network and traffic conditions in the Proposed Action area. This section summarizes highways and roads in the area and provides information on their current operating conditions.

3.10.1 Existing Roadway Network

The Proposed Action area is located approximately 2 miles south of the Las Vegas urban area. This part of Nevada, between Las Vegas and the California border, is relatively undeveloped, with only a few small towns (Goodsprings, Jean, Sloan, and Primm); a small airport in Jean that is mainly used by gliders and sky divers; a few casinos, hotels, and outlet stores; a state correctional facility; and several other mining operations. I-15 is the major transportation corridor in this part of the state, and it primarily serves through traffic connecting southern California with Las Vegas and points north. Currently, no paved roads provide access to the project site, although several dirt roads crisscross the area around the project and connect with South Las Vegas Boulevard.

An active railroad line runs parallel to I-15 and Las Vegas Boulevard, with grade-separated crossings of both roads.

3.10.1.1 Principal Regional Highways

The principal regional highways described below are located in the vicinity and are shown in relationship to the Proposed Action area in Figure 3.10-1.

I-15

I-15 is the fourth-longest north-south transcontinental interstate highway in the U.S., traveling through California, Nevada, Arizona, Utah, Idaho, and Montana. The total distance in Nevada, between the California and Arizona borders, is 123.8 miles; this consists of approximately 28 miles between the California boundary and the southern edge of the Las Vegas urban area, approximately 30 miles traversing the Las Vegas urban area, and another 66 miles between the northern edge of the urban area and the Arizona boundary. I-15 crosses the California-Nevada border at the community of Primm, and crosses the Nevada-Arizona border at the city of Mesquite.

Between the southern edge of the Las Vegas urban area and the California border, I-15 is generally six lanes (three lanes in each direction). The exception is at the Primm Interchange where I-15 narrows to four lanes (two lanes in each direction) on the I-15 structure over Primm Boulevard.

Traffic on this southern section of I-15 primarily consists of trips to and from Las Vegas, and through trips where both the origin and destination are outside of Nevada; for example, as a primary trucking route connecting southern California with much of the rest of the country, a high percentage of truck

traffic is on this portion of I-15. Traffic also includes local trips, connecting the few isolated and sparsely populated communities located between Las Vegas and the California border, with the Las Vegas urban area.

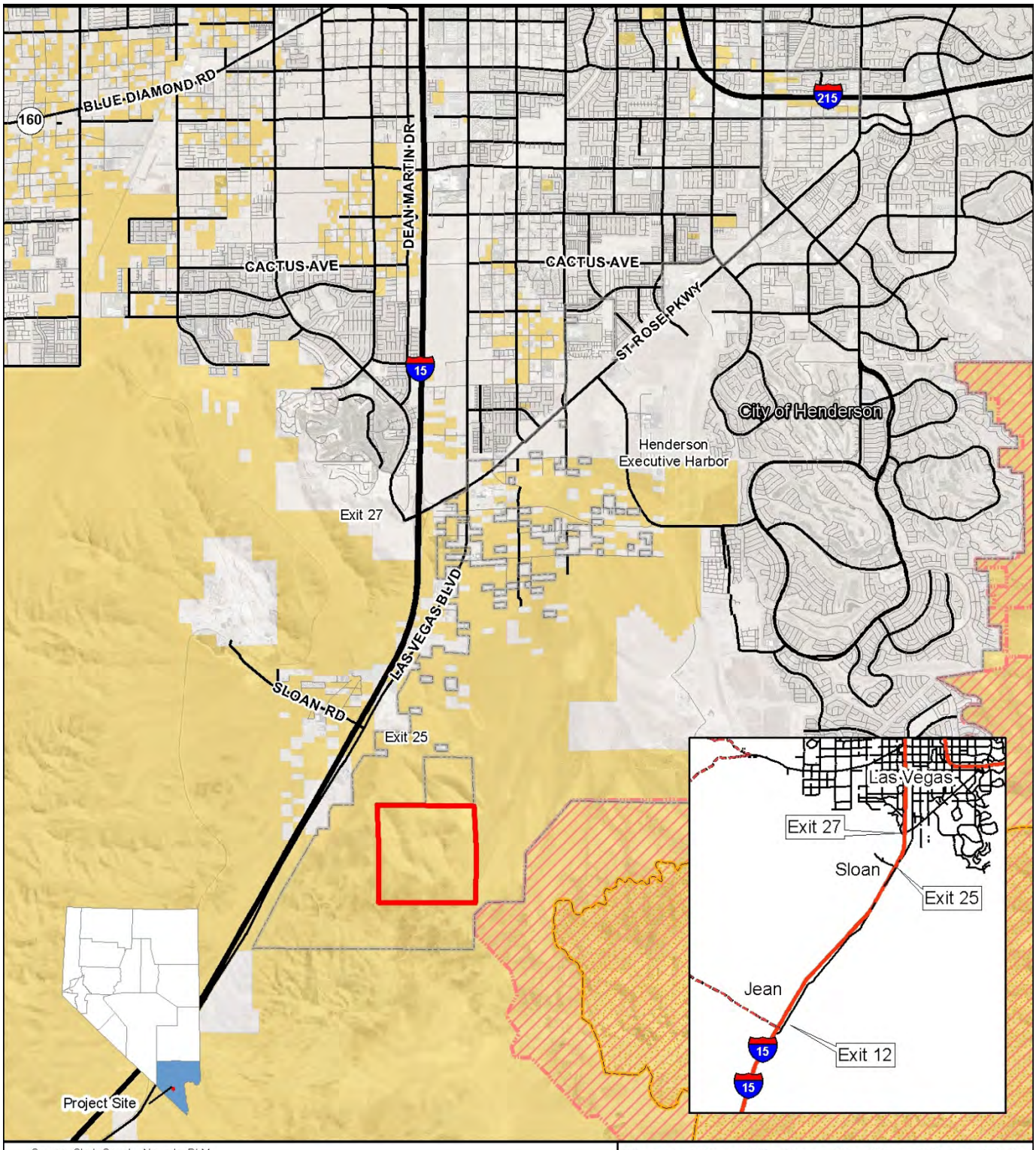
Las Vegas Boulevard

Las Vegas Boulevard, also known as State Route (SR) 604 at various points, runs north-south parallel to the east and immediately adjacent to I-15 (in some areas within 50 feet) for approximately 50 miles, from the community of Jean, located approximately 28 miles south of Las Vegas, through the urban area, to the industrial area of Apex on the northern edge of the urban area. It provides direct access to I-15 via on- and off-ramps in the vicinity of the Proposed Action. The boulevard reappears in Primm, near the border with California, but is currently not connected to its northern sections.

Virtually all traffic would access the Proposed Action area via Las Vegas Boulevard. It is classified as a minor arterial and is a two-lane road with one lane in each direction in the immediate vicinity of the proposed project. Most of the intersections along Las Vegas Boulevard in the vicinity of the project are side street stop-controlled. Las Vegas Boulevard primarily serves local traffic, including trips to and from the employment sites scattered along the I-15 corridor, as well as a small number of residences.

St. Rose Parkway

St. Rose Parkway, also known as SR 146, is a major east-west route in the Las Vegas urban area, connecting I-15 with the 215 Beltway. It is located approximately 2 miles north of the project site, begins at the Exit 27 interchange on I-15 south of the Las Vegas Strip, and ends at the Pecos Road (Exit 6) interchange on 215 in Henderson. The roadway is classified as a principal arterial and alternates between four and eight lanes. The major intersections along St. Rose Parkway are signalized, and the intersections with minor side streets are side street stop-controlled. St. Rose Parkway serves the Henderson Executive Airport, the commercial and residential development in the southern part of the Las Vegas urban area, and through traffic between points north and east of Las Vegas traveling to points south and west of the urban area.



Source: Clark County, Nevada, BLM.

- Proposed Action Area
- City of Henderson Jurisdictional Boundary
- Designated Wilderness
- National Conservation Area
- Bureau of Land Management
- Private

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.

1 inch = 7,000 feet

7,000 3,500 0 7,000 Feet

N W E S

Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement

Figure 3.10-1
Principal Regional Highways

NATIONAL SYSTEM OF PUBLIC LANDS

Prepared by: PBS&J

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Dean Martin Drive/Industrial Road

Dean Martin Drive/Industrial Road, located to the west of I-15, runs north-south parallel to both Las Vegas Boulevard and I-15 for approximately 13 miles. Industrial Road, from its intersection with Southern Highlands Parkway to Twain Avenue was renamed Dean Martin Drive in 2005. From Twain Avenue to its end at Wyoming Avenue in downtown Las Vegas, the street remains named Industrial Road. It alternates between two and seven lanes wide, and is classified as a minor arterial. Intersection controls along Dean Martin Drive/Industrial Road include traffic signals at the intersections with other major streets, and side street stop-controlled at intersections with collectors and local streets. Although the road also runs immediately adjacent to I-15, unlike Las Vegas Boulevard it does not provide direct access to I-15. It primarily serves the residential and commercial development located on the west side of I-15 and provides connections to major east-west arterials, such as Blue Diamond Road, Tropicana Avenue, Flamingo Road, and Sahara Avenue.

3.10.1.2 Local Roads

Several dirt roads provide access to the general area of the Proposed Action. These roads connect with Las Vegas Boulevard. No intersection controls, such as stop signs, are at these intersections. The small amount of traffic on these roads appears to be primarily service vehicles traveling to and from the mining and other work sites in the desert east of I-15.

3.10.2 Existing Traffic Volumes and Level of Service

Traffic volumes for the principal roadways in the study area were obtained from intersection peak hour counts collected in 2003, 2006, and 2007, and daily counts from the NDOT. The NDOT data collected between 2003 and 2008 using automatic traffic recorders were used to factor the intersection peak hour turning volumes up to 2010 and to establish existing annual average daily traffic volumes.

The operations of roadway facilities are described with the term level of service (LOS). LOS is a qualitative description of traffic flow from the perspective of motorists based on factors such as speed, travel time, delay, freedom to maneuver, traffic volume, and the capacity of the roadway. The *Highway Capacity Manual 2000* (Transportation Research Board, 2000) defines six service levels. Letters designate each level, from LOS A (indicating traffic flows with little or no delay) to LOS F (indicating over-saturated conditions where traffic flow exceeds capacity). *Highway Capacity Manual 2000* methodologies were used to analyze peak hour LOS for basic freeway segments, freeway merge and diverge influence areas, and surface street intersections in the study area. Tables 3.10-1, 3.10-2, and 3.10-3 summarize LOS definitions for freeways and intersections.

Table 3.10-1
Level of Service Definitions for Basic Freeway Segments

LOS	Description	Density Range (PC/MI/LN)
A	Describes free-flow operations. Free-flow speeds prevail.	0–11
B	Represents reasonably free flow, and free-flow speeds are maintained.	>11–18
C	Provides for flow with speeds at or near the free-flow speed of the freeway.	>18–26
D	Describes the level at which speeds begin to decline slightly with increasing flows, and density begins to increase somewhat more quickly.	>26–35
E	At this level's highest density value, describes operation is at capacity of the freeway.	>35–45
F	Describes breakdown in vehicular flow and queues forming behind the breakdown points.	>45

Source: Transportation Research Board, 2000
PC/MI/LN = Passenger cars per mile per lane

Table 3.10-2
Level of Service Definitions for Freeway Weave Segments and Merge and Diverge Areas

LOS	Weaving Segments Density Range (PC/MI/LN)	Merge and Diverge Areas Density Range (PC/MI/LN)
A	0–10	0–10
B	>10–20	>10–20
C	>20–28	>20–28
D	>28–35	>28–35
E	>35–43	>35
F	>43	Demand exceeds capacity/unstable operations.

Source: Transportation Research Board, 2000

PC/MI/LN = Passenger cars per mile per lane

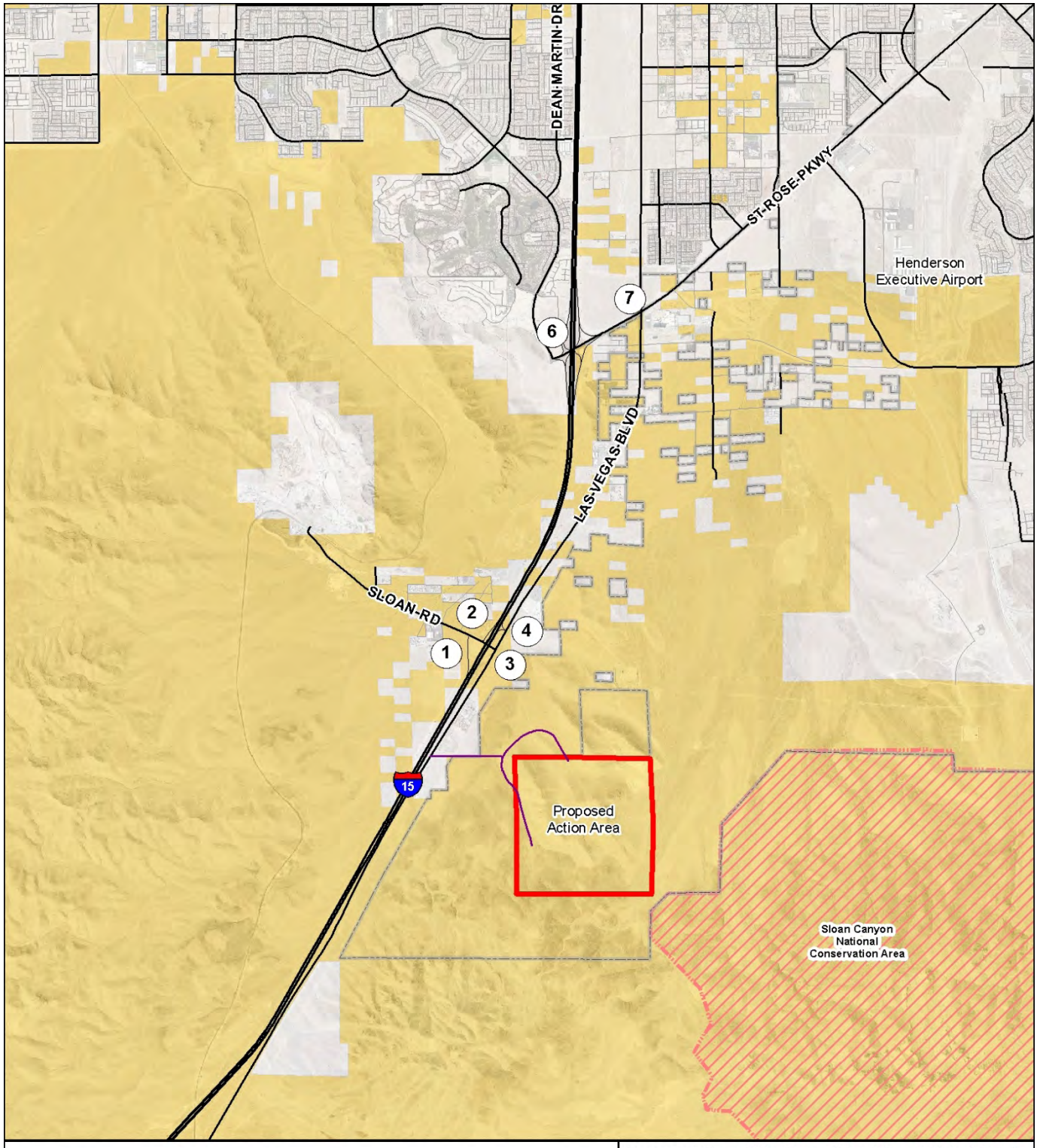
Table 3.10-3
Level of Service Definitions for Intersections

LOS	General Description	Criteria for Intersections (Control Delay per Vehicle, Sec/Veh)	
		Unsignalized	Signalized
A	Traffic flows with very little delay and speeds are optimal. Most vehicles do not stop at all.	0–10 <	10
B	Traffic flows with very little delay and speeds may be slightly reduced. Very infrequent and short waits at traffic signals. More vehicles stop at intersections than for LOS A.	>10–15 >	10–20
C	Traffic speeds continue to slow. Some vehicles may stop at this level, although many vehicles still pass through the intersection without stopping.	>15–25 >	20–35
D	Congestion becomes more noticeable. Many vehicles stop, and the proportion of vehicles not stopping declines.	>25–35 >	35–55
E	Low speeds and traffic back-ups at intersections. Often considered to be the limit of acceptable delay.	>35–50 >	55–80
F	Very slow speeds and congestion. Long traffic backups. Very likely to wait for multiple greens to get through an intersection. This is considered to be unacceptable to most drivers.	>50	>80

Source: Transportation Research Board, 2000

Sec/Veh = Seconds per vehicle

The traffic analysis for the Proposed Action area included the I-15 freeway between St. Rose Parkway and Sloan Road, the intersections at the freeway ramp connections to the local cross streets, and the adjacent intersections on the east side of the interchanges. Locations of intersections that were analyzed are shown on Figure 3.10-2. Peak hour traffic volumes and lane arrangements for the freeway mainline and ramps are shown on Figure 3.10-3. The peak hour traffic volumes and lane arrangements are shown for each intersection on Figure 3.10-4. The AM peak hour traffic volumes reflect a 1-hour time slice from counts taken between 7:00 a.m. and 9:00 a.m., while the PM peak hour traffic volumes reflect a 1-hour time slice from counts taken between 4:00 p.m. and 6:00 p.m.


DEAN-MARTIN-DR
ST-ROSE-PKWY
Henderson
Executive Airport
LAS-VEGAS-BLVD
SLOAN-RD
7
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3
15
Proposed
Action Area
Sloan Canyon
National
Conservation Area
Access Road & Utility Corridor
Proposed Action Area
City of Henderson Jurisdictional Boundary
National Conservation Area
Bureau of Land Management
Private
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification
1 inch = 5,000 feet
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Proposed Sloan Hills Competitive Mineral Material Sales
Environmental Impact Statement
Figure 3.10-2
2010 Existing Intersection Locations
NATIONAL SYSTEM OF PUBLIC LANDS
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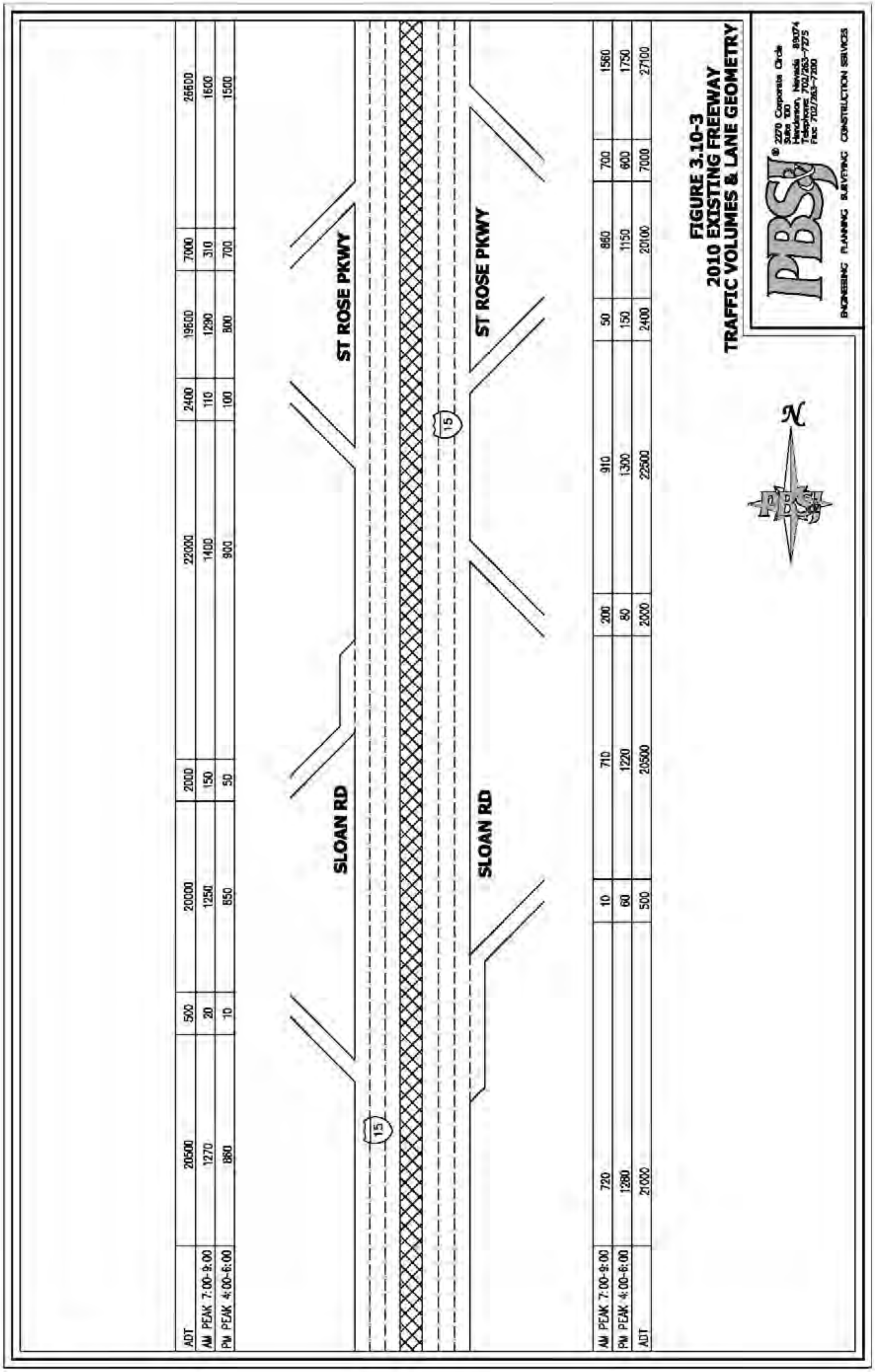


FIGURE 3.10-3
2010 EXISTING FREEWAY
TRAFFIC VOLUMES & LANE GEOMETRY

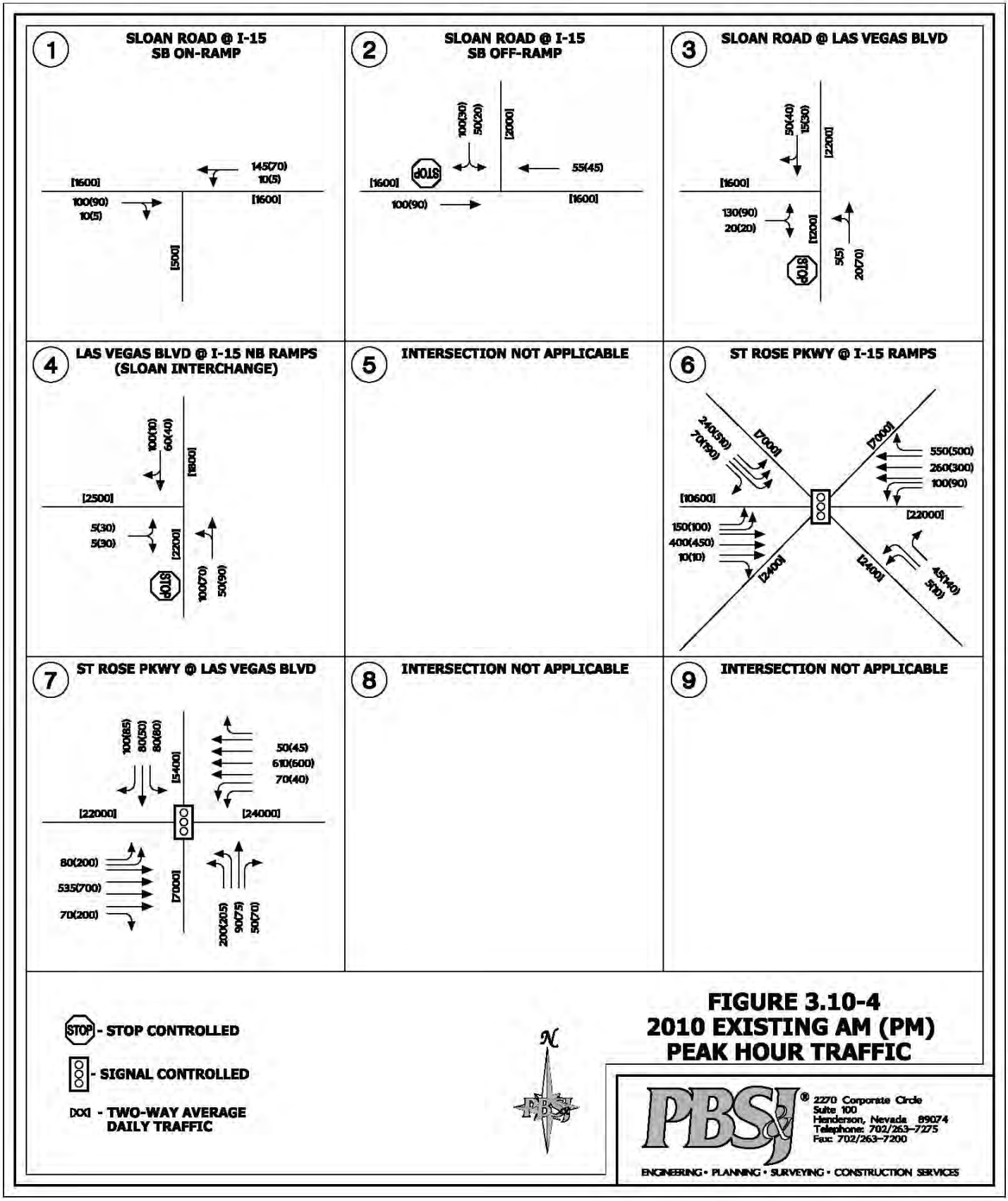


FIGURE 3.10-4
2010 EXISTING AM (PM)
PEAK HOUR TRAFFIC

Tables 3.10-4, 3.10-5, 3.10-6, and 3.10-7 show the existing conditions analysis for the freeway segments and intersections in the Proposed Action area. Per the Transportation Element of the Clark County Comprehensive Master Plan (Clark County Department of Comprehensive Planning, 2008), LOS D is considered to be the design objective for non-residential local, collector, and arterial streets. Based on this, all roadway segments operate at acceptable LOS as roadway capacity exceeds existing volumes.

Table 3.10-4
I-15 2010 Freeway Traffic Operations Analysis

Freeway Segment	AM Peak		PM Peak	
	Density (Veh/Ln/Mi)	LOS	Density (Veh/Ln/Mi)	LOS
I-15 Northbound				
South of Sloan Road off-ramp	3.8	A	6.8	A
Between Sloan Road on-ramp and St. Rose Parkway off-ramp	4.8 A		6.9	A
North of St. Rose Parkway on-ramp	8.3	A	9.3	A
I-15 Southbound				
North of St. Rose Parkway off-ramp	8.5	A	7.9	A
Between St. Rose Parkway on-ramp and Sloan Road off-ramp	7.4 A		4.8	A
South of Sloan Road on-ramp	6.7	A	4.6	A

Veh/Ln/Mile = Vehicles per lane per mile

Table 3.10-5
I-15 2010 Merge/Diverge Traffic Operations Analysis

Freeway Segment	Analysis Type	AM Peak Hour		PM Peak Hour	
		Density (Veh/Ln/Mi)	LOS	Density (Veh/Ln/Mi)	LOS
I-15 Northbound					
Sloan Road off-ramp	Diverge	6.9	A	11.0	B
Sloan Road on-ramp	Merge	9.1	A	10.8	B
St. Rose Parkway off-ramp	Diverge	8.4	A	11.3	B
I-15 Southbound					
St. Rose Parkway on-ramp	Merge	11.4	B	8.7	A
Sloan Road off-ramp	Diverge	12.0	B	8.3	A
Sloan Road on-ramp	Merge	10.4	B	8.2	A

Veh/Ln/Mile = Vehicles per lane per mile

Table 3.10-6
I-15 2010 Unsignalized Intersection Traffic Operations Analysis

Reference Number	Intersection Location	AM Peak Hour		PM Peak Hour	
		Density (Veh/Ln/Mi)	LOS	Density (Veh/Ln/Mi)	LOS
1	Sloan Road at I-15 southbound on-ramp Westbound left	7.4	A	7.4	A
2	Sloan Road at I-15 southbound off-ramp Southbound approach	9.5	A	9.0	A
3	Sloan Road at Las Vegas Boulevard Northbound left Eastbound approach	7.3 9.5	A A	7.3 9.6	A A
4	I-15 northbound on-/off-ramp at Las Vegas Boulevard Northbound left Eastbound approach	7.7 10.0	A A	7.4 9.7	A A

Veh/Ln/Mile = Vehicles per lane per mile

Table 3.10-7
I-15 2010 Signalized Intersection Traffic Operations Analysis

Reference Number	Intersection Location	AM Peak Hour		PM Peak Hour	
		Density (Veh/Ln/Mi)	LOS	Density (Veh/Ln/Mi)	LOS
6	St. Rose Parkway at I-15 on-/off-ramps	29.2	C	30.1	C
7	St. Rose Parkway at Las Vegas Boulevard	30.7	C	31.3	C

Veh/Ln/Mile = Vehicles per lane per mile

3.11 SOCIOECONOMICS

Socioeconomics are described using demographic and employment measures because these elements are the key factors that influence housing demand, education needs, and infrastructure requirements. Socioeconomic data and information are provided at two geographic levels for the purposes of this analysis: the project region and the study area. Each is defined differently in this section than in other sections of this EIS.

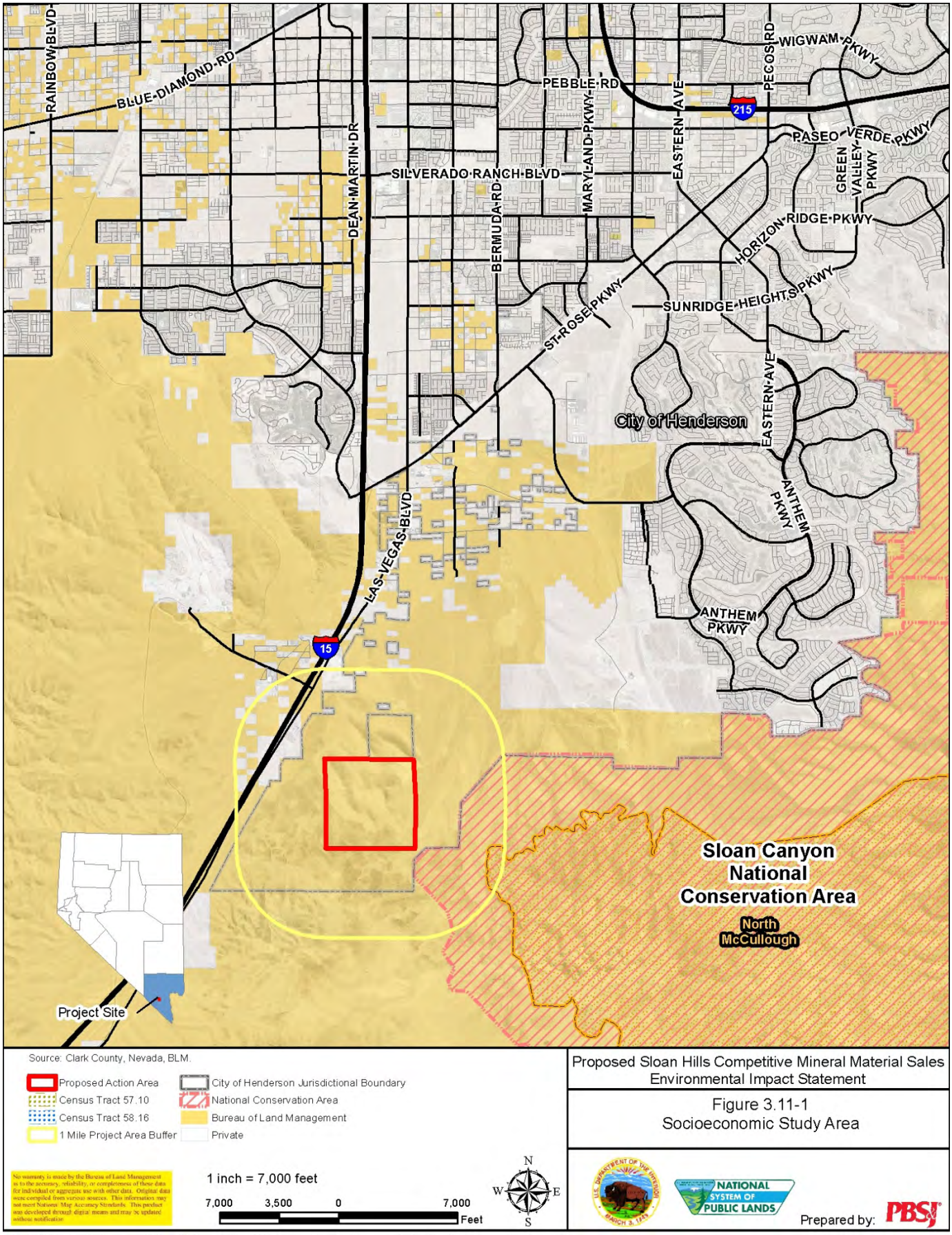
The project region includes Las Vegas, North Las Vegas, Boulder City, Henderson, and unincorporated Clark County. The project region provides a broad perspective for the region within which the proposed project occurs, while the study area focuses on the area immediately adjacent to the Proposed Action area.

The study area covers the Proposed Action area (approximately 640 acres) and includes an area within a 1-mile buffer around the perimeter of the Proposed Action area. It is located in an unincorporated area of Clark County south of Las Vegas and southwest of Henderson. The Proposed Action area southeastern edge lies just outside the western edge of the Sloan Canyon NCA, an area with no permanent population. Figure 3.11-1 shows the study area boundary and the 2000 U.S. Census Bureau Census Tracts that overlap the study area either partially or fully.

3.11.1 Employment and Economy

The level of employment for a given area can be used to draw conclusions on the health and stability of the local economy. Total annual employment includes full-time and part-time jobs. Employment estimates include individuals employed by businesses, public organizations, and those who are self-employed.

The employment, industry, and earnings data presented in this section were obtained from the Nevada Department of Employment, Training, and Rehabilitation, which uses the Standard Industrial Classification system to identify business establishments by the principal activity in which they are engaged. The Standard Industrial Classification system was expanded in 2001 to the North American Industry Classification System to clarify several industries. Because the industry categories used in the North American Industry Classification System and Standard Industrial Classification systems are slightly different, it is difficult to make direct comparisons concerning industry changes over time in terms of the number of employees, the number of establishments, and earnings. For comparison purposes in this analysis, similar types of service industries have been combined from the Standard Industrial Classification and North American Industry Classification System.


RAINBOW BLVD
BLUE DIAMOND RD
DEAN MARTIN DR
PEBBLE RD
MARYLAND PKWY
EASTERN AVE
PECOS RD
WIGWAM PKWY
215
PASEO VERDE PKWY
GREEN VALLEY PKWY
SILVERADO RANCH BLVD
BERMUDA RD
HORIZON RIDGE PKWY
SUNRIDGE HEIGHTS PKWY
ST ROSE PKWY
City of Henderson
EASTERN AVE
ANTHEM PKWY
LAS VEGAS BLVD
15
ANTHEM PKWY
Sloan Canyon National Conservation Area
North McCullough
Project Site
Source: Clark County, Nevada, BLM.
Proposed Action Area
Census Tract 57.10
Census Tract 58.16
1 Mile Project Area Buffer
City of Henderson Jurisdictional Boundary
National Conservation Area
Bureau of Land Management
Private
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification
1 inch = 7,000 feet
7,000 3,500 0 7,000
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S
Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement
Figure 3.11-1
Socioeconomic Study Area
NATIONAL SYSTEM OF PUBLIC LANDS
Prepared by: PBS&J
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Table 3.11-1 summarizes the labor force characteristics for Nevada and Clark County. The unemployment rate for Nevada and Clark County remained low and continued to decline from 1990 to 2000; however, as a result of the nation's economic downturn, it has risen dramatically from 6.7 percent in 2008 to 14.0 percent for Nevada and increased from 6.6 percent in 2008 to 13.8 percent for Clark County in 2010.

Table 3.11-1
Labor Force Characteristics of Nevada and Clark County

	Labor Force	Employment	Unemployment	Unemployment Rate
Nevada				
1990	655,896 622,5	16	33,380	5.1
2000	1,062,845 1,015,2	21	47,624	4.5
2008	1,373,462 1,282,0	12	91,450	6.7
2009	1,369,891 1,208,6	21 161,2	70	11.8
2010*	1,374,554 1,186,7	55 187,7	99	14.0
Clark County				
1990	407,763 387,8	81	19,882	4.9
2000	727,521 693,9	33	33,588	4.6
2008	987,998 922,8	78	65,120	6.6
2009	982,483 865,0	70	117,413	12.0
2010*	987,759 851,4	96	136,263	13.8

Source: Nevada Department of Employment, Training, and Rehabilitation, 2010
* Based on October 2010 data; other years are provided using annual data.

Table 3.11-2 summarizes the number of people employed by all economic sectors in Nevada and Clark County for the first quarter of 2009. Nevada has 86.7 percent and Clark County has 88.3 percent of their employment in the private sector, indicating their economies are largely service-based.

Table 3.11-2
Employment by Industry for Nevada and Clark County First Quarter 2009

	Nevada		Clark County	
Industry	Average Employment	Percentage of All Industries	Average Employment	Percentage of All Industries
Total Private	1,005,538	86.7	743,125	88.3
Agriculture, Forestry, Fishing, Hunting	2,105	0.2	109	> 0.1
Mining 11,503		1.0	288	> 0.1
Utilities	5,844	0.5	3,939	0.5
Construction 91,476		7.9	74,120	8.8
Manufacturing 42,427		3.7	22,340	2.7
Wholesale Trade	36,190	3.1	22,173	2.6
Retail Trade	129,257	11.1	93,334	11.1
Transportation and Warehousing	51,176	4.4	35,582	4.2
Information 14,582		1.3	10,688	1.3

Table 3.11-2
Employment by Industry for Nevada and Clark County First Quarter 2009

Industry	Nevada		Clark County	
	Average Employment	Percentage of All Industries	Average Employment	Percentage of All Industries
Finance and Insurance	33,679	2.9	25,385	3.0
Real Estate and Rental and Leasing	23,377	2.0	18,379	2.2
Professional and Technical Services 51,445		4.4	36,016	4.3
Management of Companies and Enterprises	18,043 1.6		13,560	1.6
Administrative and Waste Services	70,455	6.1	54,012	6.4
Educational Services	76,472	6.6	50,819	6.0
Health Care and Social Assistance	99,711	8.6	68,074	8.1
Arts, Entertainment, and Recreation	27,236	2.3	16,948	2.0
Accommodation and Food Services	283,613	24.4	237,104	28.2
Other Services, Excluding Public Administration	27,062 2.3		19,003	2.3
Public Administration	63,456	5.5	38,591	4.6
Federal Government	17,150	1.5	11,484	1.4
State Government	33,275	2.9	15,463	1.8
Local Government	104,210	9.0	71,139	8.5
Total, All Industries	1,160,173	100.0	841,212	100.0

Source: Nevada Department of Employment, Training, and Rehabilitation, 2009

The largest industry in Nevada and Clark County is accommodation and food services, comprising 24.4 percent total employment in Nevada and 28.2 percent of total employment in Clark County. This is followed by retail trade at 11.1 percent for both Nevada and Clark County, and health care and social assistance at 8.6 and 8.1 percent for Nevada and Clark County, respectively. These data indicate that tourism and recreation play a key role in the Clark County economy.

Consistent with the top industries for Clark County, 14 of the 20 largest employers in Clark County are in the accommodation and food services industry. Table 3.11-3 shows the 20 largest employers in Clark County for the first quarter of 2009.

Table 3.11-3
Top Employers in Clark County First Quarter 2009

Employer	Industry	Size Class (Employees)
Clark County School District	Local government	30,000 to 39,999
Clark County	Local government	9,000 to 9,499
Wynn Las Vegas	Accommodation and food services	8,500 to 8,999
Bellagio LLC	Accommodation and food services	8,000 to 8,499
MGM Grand Hotel/Casino	Accommodation and food services	7,500 to 7,999
Mandalay Bay Resort and Casino	Accommodation and food services	6,000 to 6,499
Las Vegas Metropolitan Police	Local government	5,500 to 5,999
University of Nevada, Las Vegas	State government	5,500 to 5,999
Caesars Palace	Accommodation and food services	5,000 to 5,499
The Venetian Casino Resort	Accommodation and food services	4,500 to 4,999
Mirage Casino Hotel	Accommodation and food services	4,500 to 4,999
University Medical Center of Southern Nevada	Local government	4,000 to 4,499
The Palazzo Casino Resort	Accommodation and food services	3,500 to 3,999
Encore Las Vegas	Accommodation and food services	3,000 to 3,499
Flamingo Las Vegas Operating	Accommodation and food services	3,000 to 3,499
Rio Suites Hotel and Casino	Accommodation and food services	3,000 to 3,499
Luxor	Accommodation and food services	3,000 to 3,499
City of Las Vegas	Local government	3,000 to 3,499
Paris Las Vegas	Accommodation and food services	3,000 to 3,499
Harrah's Las Vegas Boulevard South	Accommodation and food services	3,000 to 3,499

Source: Nevada Department of Employment, Training, and Rehabilitation, 2009

3.11.2 Value of Mineral Material

According to the Nevada Bureau of Mines and Geology's Nevada Mineral Industry 2008 publication, the most important Nevada industrial minerals in 2008 were construction aggregate, diatomite, cement, barite, lithium, magnesia, lime and limestone, gypsum, silica, and dolomite, each valued at more than $10 million. Construction aggregate is the third most valuable commodity produced in the state in 2008, with a total production value of almost $225 million. Construction aggregate produced in the Las Vegas area in 2008 was estimated at about 28 million tons. Community pits and other aggregate mining facilities administered by the BLM and operated by a number of companies contributed about 8 million tons to the

total production of the Las Vegas and adjacent southern Nevada area in 2008 (Nevada Bureau of Mines and Geology, 2009).

Aggregate production, which in recent years had been increasing as a result of Nevada's expanding population and need for construction materials for homes, schools, streets, highways, airports, resort hotels, and other businesses, experienced a decline of nearly 18 percent from 2007 to 2008 due to the economic recession. Nonetheless, demand for construction raw materials is likely to remain strong because of Nevada's increasing population and need for highways. According to the U.S. Census Bureau, Nevada's population reached 2.7 million in 2008, an increase of 37 percent from 1.9 million in the 2000 census. The growing population requires raw construction materials. Population growth has been particularly noticeable in the Las Vegas metropolitan area, especially Clark County (Nevada Bureau of Mines and Geology, 2009).

3.11.3 Population

Most of Nevada's estimated 2010 population is located in Clark County (72 percent). In 2000 the population of Clark County was estimated at 1,375,765. In 2010 the estimated population was 1,952,040, a 30 percent increase from 2000. Henderson and Las Vegas comprise 13.7 and 30.2 percent, respectively, of Clark County's population. Clark County is one of the fastest-growing counties in the U.S.; its population more than doubled between 1990 and 2009, increasing from an estimated 741,459 in 1990 to 1,952,040 in 2008, a 163 percent increase. Table 3.11-4 shows population trends for Henderson, Las Vegas, Clark County, and Nevada.

Table 3.11-4
Population Trends in Project Region

Geographic Area	Population (1990)	Population (2000)	Population (2009)	Percentage Change 1990-2000	Percentage Change 2000-2009	Percentage Change 1990-2009
Henderson	64,942	175,381	267,687	170.1	52.6	312.2
Las Vegas	258,295	478,434	591,422	85.2	23.6	129.0
Clark County	741,459	1,375,765	1,952,040	85.5	41.9	163.3
Nevada	1,201,833	1,998,257	2,711,206	66.3	35.7	125.6

Sources: State of Nevada Demographer, 2009; U.S. Census Bureau, 2001; Census of Population and Housing, 1990a

In 2000 the median age of Clark County was 34.4, which is slightly lower than the median age of Nevada as a whole (35.0 years). Both Henderson (35.9 years) and Las Vegas (34.5 years) had slightly higher median ages when compared to Clark County. Within the total population, the percentage of males in comparison to females is comparable for Nevada, Clark County, Henderson, and Las Vegas. The percentage of males in 2000 was 50.9 percent for both the State of Nevada and Clark County, 49.6 percent for Henderson, and 50.8 percent for Las Vegas.

The population of Nevada is projected to increase during the next 20 years; however due to the recent economic situation, the State of Nevada Demographer released two sets of projections in 2010 – the first is based on a low employment growth scenario and the second is based on a high employment growth scenario. The State of Nevada Demographer's low employment growth scenario estimates that Nevada's population will increase by 0.5 percent between 2009 and 2030, with an overall population decline projected through 2023. The high employment growth scenario estimates that Nevada's population will increase by 30.9 percent between 2009 and 2030, with the highest rate of growth anticipated to occur between 2016 and 2023 (20.8 percent increase) (Table 3.11-5). Simultaneously, the low employment growth scenario predicts that Clark County will increase by 1.4 percent between 2009 and 2030, while the high employment growth scenario predicts a population increase of 36.4 percent between 2009 and 2030. The population projections are estimated from historic population trends and do not account for future probable and foreseeable developments and events.

Table 3.11-5
Population Projections for Nevada and Clark County

Year	Nevada		Clark County	
	Projected Population	Percentage Change	Projected Population	Percentage Change
Low Employment Growth Scenario				
2009	2,711,205	—	1,952,040	—
2016	2,654,109	-2.2	1,919,790	-1.7
2023	2,644,022	-0.4	1,919,529	-0.01
2030	2,725,233	3.0	1,979,045	3.0
High Employment Growth Scenario				
2009	2,711,205	—	1,952,040	—
2016	2,748,710	1.4	2,014,984	3.1
2023	3,320,761	17.2	2,530,306	20.4
2030	3,923,330	15.4	3,066,872	17.5

Source: State of Nevada Demographer, 2010

As shown in Table 3.11-6, the racial composition of the study area is predominantly White (88 percent), followed by Hispanic or Latino (6.7 percent), and Asian (1.9 percent). There is a smaller percentage of ethnic minorities in the study area than in Henderson, Las Vegas, North Las Vegas, Clark County, and Nevada (Census of Population and Housing, 1990a).

Table 3.11-6
Study Area Race and Ethnicity

Area	Total Population	Percentage White	Percentage Black or African American	Percentage American Indian and Alaska Native	Percentage Asian	Percentage Native Hawaiian and Other Pacific Islander	Percentage Hispanic or Latino
CT 57.10	2,774	88.2	1.7	0.4	3.6 0.1	5.2	
CT 58.16	3,877	87.8	1.2	0.4	1.0 0.2	7.7	
Total Study Area Census Tracts	6,651 88.0		1.3	0.4	1.9	0.2	6.7
Project Region							
Boulder City	14,966	91.8	0.7	0.5	0.7 0.1	4.3	
Henderson 175,3	81	78.2	3.6 0.5		3.9	0.4	10.7
Las Vegas	478,434	58.0	10.1 0.5		4.7	0.4	23.6
North Las Vegas	115,488 37.1		18.6	0.5 3.1		0.5	37.6
Clark County	1,375,765	60.2 8.8		0.6	5.2	0.4	22.0
State							
Nevada 1,998,2	57	65.2	6.6 1.1		4.4	0.4	19.7

In terms of educational attainment, 80.7 percent of Nevada's population 25 years and older graduated from high school or higher, and 18.2 percent had attained a bachelor's degree or higher. Similarly, 79.5 percent of Clark County's population 25 years and older graduated from high school or higher, and 17.3 percent had attained a bachelor's degree or higher. Henderson and Las Vegas had 88.5 and 78.5 percent, respectively, graduating from high school or higher, and 23.7 and 18.2 percent, respectively, attaining a bachelor's degree or higher (Census of Population and Housing, 1990b). According to the Clark County School District's 2008-2009 District School Improvement Plan, during the 2008-2009 school year the District will operate 349 schools, 210 elementary schools (90 year-round and 120 nine-month), 59 middle schools, 45 high schools, 27 alternative schools, and 8 special needs schools. The District operates one of the nation's largest school construction and modernization programs. Approximately $4.9 billion will be spent through 2009 to build new schools and improve existing schools. In the fall of 2009, the District opened three new elementary schools and three high schools.

The Clark County School District is among the fastest-growing school districts in the nation. During the past 5 years, enrollment has increased by more than 58,000 students at a rate between 2 and 5 percent each year. Since 1986 the District has constructed 196 new and replacement schools, and has completed more than 200 school additions and thousands of modernization projects to bring existing schools to new school standards. In 1988 Clark County voters approved a $600 million bond issue that funded construction of 57 new schools. Since then, voters have approved three additional initiatives, including the latest 1998 Capital Improvement Program. One of the most ambitious school construction initiatives

ever funded, the 1998 Capital Improvement Program was made possible by the foresight of the Nevada Legislature and Clark County voters. The "tax freeze"-based program, originally projected at $3.5 billion, by 2010 will have provided more than $4.9 billion for school construction and modernization, providing 101 new schools and replacing 11 schools (not part of the original program). Although the 1998 program is nearing conclusion, two other funding sources that exist in addition to the capacity to bond—a real estate transfer tax and a portion of the hotel room tax—will allow the District to continue to address capital improvement needs on a limited basis until another bond is proposed (Clark County School District, 2009).

The estimated total housing units in Clark County in 2008 was 784,892 units, an increase of 40.2 percent from the estimated 559,799 units in 2000. The increase in housing was higher than the increase in housing stock in Nevada, which increased from 827,457 units in 2000 to 1,098,307 in 2008, a 32.7 percent increase. However, the largest increase in housing units is in Henderson, which has seen a dramatic rise in units from 71,428 in 2000 to 108,316 in 2008, a 51.6 percent increase. While not as dramatic, Las Vegas has also witnessed an increase in housing units from 190,862 in 2000 to 236,730 in 2008, a 24 percent increase (Census of Population and Housing, 1990a; U.S. Census Bureau, 2008). As of October 2009, approximately 1,184 homes are available for sale in Henderson, and 4,526 homes are available for sale in Las Vegas (Home Listings Finder, 2009).

Other selected social characteristics that provide a basis for comparison of the inhabitants include the percentages of the population that are veterans, disabled, foreign-born, married, use English as the primary language at home, and homes with persons 65 years old or older. The percentage of the population made up of civilian veterans in Nevada was 16.1 percent, Clark County (15.6 percent), Henderson (16.4 percent), and Las Vegas (15.4 percent). The disability status of the population was 20.6 for Nevada, Clark County (21.1 percent), Henderson (16.1 percent), and Las Vegas (22.2 percent). Approximately 15.8 percent of Nevada's population was foreign-born, while Clark County reported 18.0 percent, Henderson had 8.3 percent, and Las Vegas had 18.9 percent. The married population made up 53.5 percent of the population 15 years and older in Nevada, 52.4 percent in Clark County, 57.6 percent in Henderson, and 52.1 percent in Las Vegas. The percentage of the population that speaks a language other than English at home was 23.1 percent in Nevada, 26 percent in Clark County, 13.2 percent in Henderson, and 26.8 percent in Las Vegas. Households with persons 65 years or older totaled 21.3 percent for Nevada, 21 percent in Clark County, 19.2 percent in Henderson, and 22.7 percent in Las Vegas (Census of Population and Housing, 1990b).

3.11.4 Property Valuation and Taxation

In Clark County, the sales and use tax is 8.100 percent (Nevada Department of Taxation, 2009). This 8.100 percent tax is several taxes combined, based on Nevada's statutes and locally adopted option taxes. Clark County's 8.100 percent tax is as follows: Sales Tax-General Fund, 2.00 percent; Local School Support Tax, 2.60 percent; Basic City-Council Relief Tax, 0.50 percent; Supplemental City-County

Relief Tax, 1.75 percent; Public Mass Transportation, 0.50 percent; Control of Floods Tax, 0.25 percent; Infrastructure Tax, 0.25 percent; and Sales and Use Tax Act of 2005 0.25 percent.

For 2009-2010, the total secured and unsecured tax roll for Clark County has a taxable value of $263.06 billion with an assessed value of $92.07 billion and $2.43 billion in tax dollars. This is a decrease from the previous 2008-2009 assessment. In 2008-2009, there was $320.34 billion taxable value with an assessed value of $112.12 billion and $2.47 billion in tax dollars (Clark County Assessor, 2009).

3.12 SPECIAL MANAGEMENT AREAS

The BLM administers more than 264 million acres of public lands in the U.S. Much of this land is administered for multiple-purpose use; however, the BLM is also responsible for administering lands in the National Landscape Conservation System. This system includes more than 886 federally recognized areas and approximately 27 million acres of National Monuments, NCAs, Wilderness Areas, Wilderness Study Areas, Wild and Scenic Rivers, National Scenic and Historic Trails, and Conservation Lands of the California Desert. Several areas entered into the National Landscape Conservation System are located in the vicinity of the Proposed Action area.

3.12.1 National Conservation Areas

National Conservations Area is a BLM designation for certain protected lands in the U.S. Such lands are designated by Congress to conserve, protect, enhance, and manage public lands for the benefit and enjoyment of present and future generations. Sixteen designated NCAs are in the U.S., two of which are in the vicinity of the Proposed Action area: Sloan Canyon NCA and Red Rock NCA.

Sloan Canyon National Conservation Area

The Sloan Canyon NCA, located 0.1 mile to the east of the Proposed Action area, is managed to conserve, protect, and enhance the cultural, archaeological, natural, wilderness, scientific, geological, historical, biological, wildlife, educational, and scenic resources of this area. Established in 2002, the Sloan Canyon NCA encompasses approximately 48,000 acres. The area features significant archaeological sites, scenic vistas, important wildlife habitat, and opportunities for primitive recreation. The Sloan Canyon NCA was established by Title VI of the Clark County Public Land and Natural Resources Act of 2002 (16 USC 460), which also required that the BLM develop a plan for the appropriate use and management of the NCA within 3 years of enactment. The Sloan Canyon National Conservation Area Resource Management Plan and Final Environmental Impact Statement (BLM, 2005) provides guidance for planning and management actions for the NCA for the next 15 to 20 years. The focus of the RMP is to describe the appropriate uses and management of the NCA; authorize the use of motorized vehicles in the NCA for reconstructing water development projects to enhance the area; include a plan for litter cleanup and public lands awareness campaign on public lands in and around the NCA; and to recommend a location for a right-of-way for a rural roadway to provide the City of Henderson with access to this area.

The main attraction within Sloan Canyon NCA is the Sloan Canyon Petroglyph Site, one of the most notable cultural resources in southern Nevada. The NCA also contains over 400 rock art panels with nearly 1,200 designs which represent native cultures dating from the Archaic to Historic era.

Historically, recreational use of the Sloan Canyon NCA has been low. However, with the population growth experienced in Clark County over recent years, recreation has become more prevelant. As urban growth in the Las Vegas Valley has expanded to reach the northern portion of the NCA, hiking, mountain biking, equestrian, and illegal off-highway vehicle (OHV) use have become more prevalent in the NCA (BLM, 2009). Because of its rugged character and greater isolation, the southern portion of the NCA receives little visitation and recreational uses are limited primarily to cross-country hiking and equestrian use. Recreational use has been concentrated on the NCA perimeter, primarily in the Dutchman's Pass, Hidden Valley, and Petroglyph Canyon areas. Due to extreme high temperatures in the summer months, recreational use of the NCA peaks in the period from October to May (BLM, 2009).

Red Rock Canyon National Conservation Area

Red Rock Canyon NCA was designated by Congress with the enactment of the Red Rock Canyon National Conservation Area Establishment Act of 1990. This 195,819-acre area encompasses unique geologic features and spectacular landscapes as well as world-class climbing and hiking opportunities. It also provides habitat to plant and animal species that are unique to the Mojave Desert. Red Rock Canyon NCA offers numerous recreation opportunities including a 13-mile scenic drive, more than 30 miles of hiking trails, rock climbing, horseback riding, mountain biking, road biking, picnic areas, and a visitor center with exhibit rooms and a bookstore. The NCA is located approximately 10 miles northwest of the Proposed Action area.

3.12.2 Areas of Critical Environmental Concern

The ACEC is a conservation program located in the western U.S. and managed by the BLM. The ACEC program was established by the passing of FLPMA in 1976. The FLPMA mandate directs the BLM to protect important riparian corridors, threatened and endangered species habitats, cultural and archeological resources and unique scenic landscapes that the agency assesses as in need of special management attention. Use restrictions in ACEC address activities such as limiting motorized vehicle use to designated roads, trails, or areas; restricting open OHV use and speed events; closure to surface mining; closure to grazing; avoidance for new roads or rights-of-way; and limiting the intensity of recreational use. Additional use restrictions in ACEC are specific to the area and resources being protected and result in individual management prescriptions for each ACEC. Four ACECs are located in the vicinity of the Proposed Action area.

The Sloan Rock Art ACEC encompasses approximately 320 acres and is located approximately 2 miles east of the Proposed Action area. Management focus for this ACEC is on archaeological and cultural resources.

The Desert Tortoise Conservation Center/Arden ACEC encompasses approximately 470 acres and is located approximately 6 miles northwest of the Proposed Action area. Management of this ACEC is focused on the protection of desert tortoise and its habitat.

The Arden Historic Sites ACEC encompasses approximately 970 acres and is located approximately 6miles northwest of the Proposed Action area. This ACEC focuses on management of prehistoric and historic values. Management goals are to manage cultural resources for conservation of their overriding scientific or historic importance, sociocultural, educational, and recreational uses.

The Bird Springs ACEC encompasses approximately 150 acres and is located approximately 10 miles west of the Proposed Action area. This is a multiple management focus ACEC and includes management of prehistoric and historic values.

3.12.3 Special Recreation Management Areas

A Special Recreation Management Area (SRMA) designation by BLM intensifies management of areas where outdoor recreation is a high priority. It helps direct recreation program priorities toward areas with high resource values, elevated public concern, or significant amounts of recreational activity. These areas provide numerous recreation opportunities, including OHV, equestrian, picnic, hiking, mountain biking, camping, commercial tour businesses, and sightseeing. Some SRMAs may contain unique land features such as dry lakebeds and sand dunes, which identify the purpose of the SRMA, while others are less noticeable and blend with the surrounding environment. The SRMAs may also contain sensitive cultural and natural resources, mineral resources including active and potential mining claims and abandoned mine lands, all types of rights-of-way authorizations, grazing allotments, ACEC, Wilderness Areas and Wilderness Study Areas, and public land available for disposal through land sales and Recreation and Public Purposes lease. Areas with an SRMA designation can be expected to see investments in recreation facilities and visitor services aimed at reducing resource damage and mitigating user conflicts. It is BLM policy to prepare implementation-level plans for each SRMA to fully describe management actions and objectives.

The Proposed Action area is located in the Jean Lake/Roach SRMA, which encompasses approximately 225,000 acres. This area is used extensively for casual use and other types of recreation such as motorcycling, OHV and 4x4-wheel driving, horseback riding, mountain biking, and small game hunting. Two additional SRMAs are in the vicinity of the Proposed Action area. The Las Vegas Valley SRMA encompasses approximately 446,000 acres and is located 0.8 mile to the north of the Proposed Action area. OHV use and hunting are restricted in the Las Vegas Valley SRMA. The Nelson/Eldorado SRMA encompasses approximately 82,700 acres and is located approximately 9 miles to the east of the Proposed Action area. OHV use is the primary recreation activity in this SRMA.

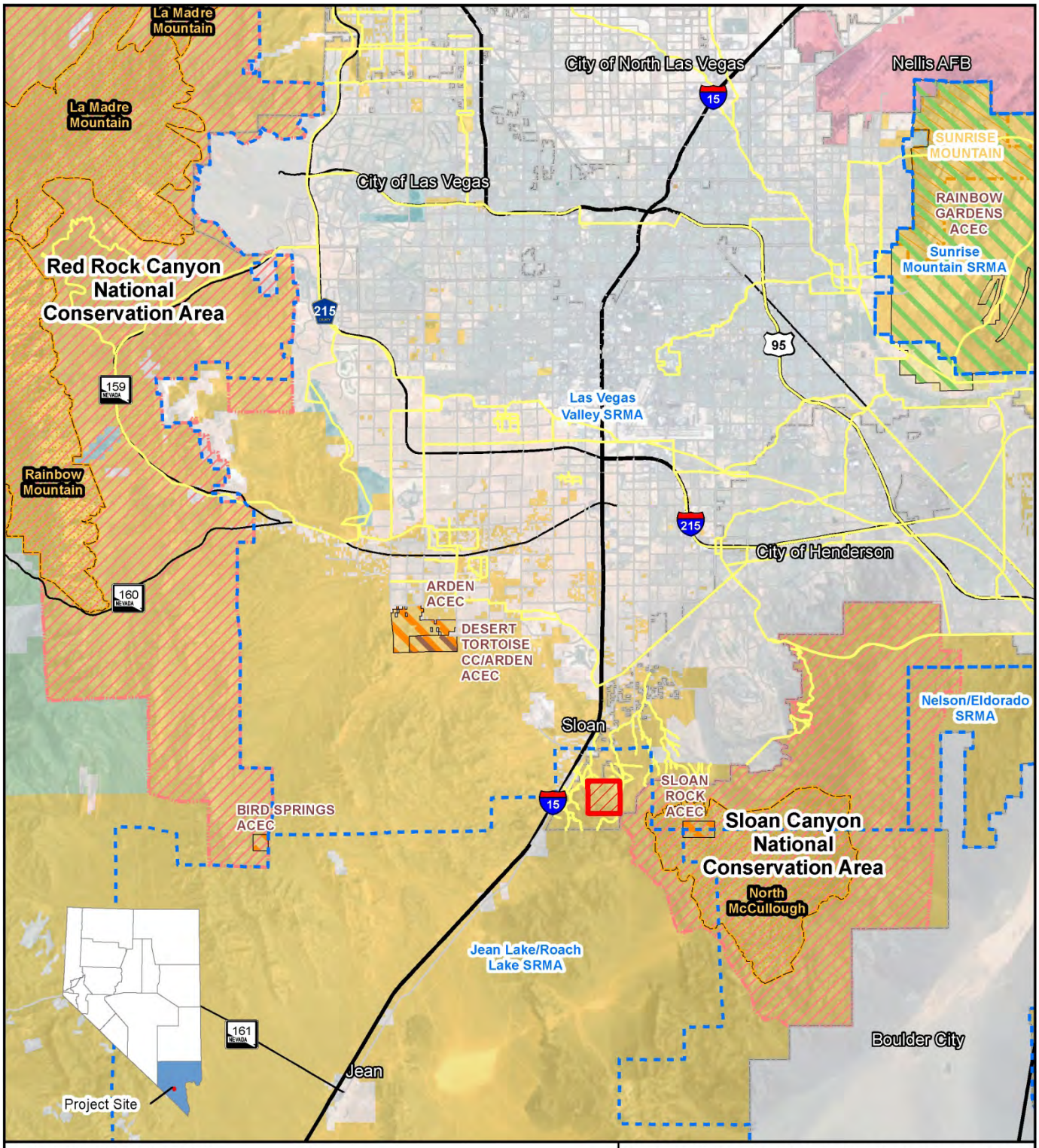
3.12.4 Wilderness Areas

Twenty wilderness areas and four wilderness study areas are wholly or partially in Clark County. To the southeast of the Proposed Action area, approximately 1 mile, is the 14,763-acre North McCullough Wilderness Area, located entirely in the southwest portion of the Sloan Canyon NCA. The Clark County Act Title II (Wilderness Areas) designated the North McCullough Wilderness Area on November 6, 2006, and is a component of the National Wilderness Preservation System. Before designation, most of the current wilderness was part of the 47,166-acre North McCullough Wilderness Study Area (BLM, 1998). Today, the North McCullough Wilderness Area is managed according to the Wilderness Act of 1964 (PL 88-577; 16 USC 1131-1136), FLPMA, the Clark County Act, and the BLM Wilderness Regulations published in 43 CFR 6300 (BLM, 2005).

The North McCullough Wilderness Area is located in the northern half of the north-south trending McCullough Range and is immediately adjacent to the Las Vegas Valley (Figure 3.12-1). Elevations range from 2,850 feet at the lower end of the central valley to 5,058 feet of the McCullough Range ridgeline on the eastern side of the wilderness area. The northern boundary contains the Sloan Canyon Petroglyph Site and crosses portions of the Sutor Hills. The western boundary is characterized as rounded to flat-topped volcanic peaks, whereas the eastern boundary is characterized by steep slopes (BLM, 2005). Vegetation in the wilderness area consists of the Mojave Desert scrub community and supports a variety of special-status species that include species federally listed as threatened, endangered, proposed for listing, or candidates for listing under the ESA. Special-status species also include species that have been designated by the BLM State Director as Sensitive and those listed or proposed for listing by the State of Nevada in a category implying potential endangerment or extinction. These species are further described in Section 3.3.

The North McCullough Wilderness Area is home to a variety of plants and animals, including the northernmost extent of the range of teddy bear cholla (*Cylindropuntia bigelovii*) as well as the only known population of black grama (*Bouteloua eriopoda*) in Nevada. Other species present include desert bighorn sheep, mule deer (*Odocoileus hemionus*), Gambel's quail (*Callipepla gambelii*), desert tortoise, banded Gila monster, and golden eagle (BLM, 2005).

Some key components in designating the North McCullough as a wilderness area include naturalness, solitude, and opportunities for primitive and unconfined recreation. The wilderness area should appear natural and have few signs of human use. Despite the proximity to a largely populated urban area, the portion of the North McCullough Wilderness Area that occurs outside of the Petroglyph Management Area possesses good opportunities for solitude because of the historically low levels of visitor use, lack of trails and other developments, and topography that provides some natural screening from the adjacent urban area or other wilderness users (BLM, 2005). The primitive character of the entire North McCullough Wilderness Area is essentially intact except for the occurrence of some introduced plants.


La Madre Mountain
La Madre Mountain
City of North Las Vegas
Nellis AFB
15
SUNRISE MOUNTAIN
City of Las Vegas
RAINBOW GARDENS ACEC
Sunrise Mountain SRMA
Red Rock Canyon National Conservation Area
215
95
159 NEVADA
Las Vegas Valley SRMA
Rainbow Mountain
215
City of Henderson
160 NEVADA
ARDEN ACEC
DESERT TORTOISE CC/ARDEN ACEC
Nelson/Eldorado SRMA
Sloan
SLOAN ROCK ACEC
15
BIRD SPRINGS ACEC
Sloan Canyon National Conservation Area
North McCullough
Jean Lake/Roach Lake SRMA
161 NEVADA
Boulder City
Jean
Project Site
Source: Clark County, Nevada, BLM.
Proposed Action Area
Existing Trails
Municipal Boundary
Special Recreation Management Area
National Conservation Area
Designated Wilderness
Wilderness Study
Biological ACEC
Cultural ACEC
Cultural/Biological ACEC
Desert Tortoise ACEC
Desert Tortoise/Cultural ACEC
Bureau of Indian Affairs
Bureau of Land Management
Bureau of Reclamation
City of Las Vegas
Clark County, Nevada
Department of Defense
Fish and Wildlife Service
Forest Service
Nevada State
Private
No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual or aggregate use with other data. Original data were compiled from various sources. This information may not meet National Map Accuracy Standards. This product was developed through digital means and may be updated without notification.
1 inch = 4 miles
4 2 0 4
Miles
N
W
E
S
Proposed Sloan Hills Competitive Mineral Material Sales Environmental Impact Statement
Figure 3.12-1
Special Management Areas
NATIONAL SYSTEM OF PUBLIC LANDS
Prepared by: PBS&J
10/13/2010| TD | X:\Projects\100011108 Sloan Hills EIS\5.0 Maps_Figures_Drawings\GIS\MXD\Fig3.12-1_recreation.mxd

Recreation activities are restricted in wilderness areas. Motor vehicles, motorized equipment, and mechanical transport, including mountain bikes, cannot be used in these areas. Special recreation permits for outfitting and guiding may be approved, but competitive permitted events are not authorized. Recreational uses of the wilderness area include hiking, rock scrambling, hunting, and photography with year-round accessibility (BLM, 2005).

3.13 RECREATION

Public lands in the Las Vegas Valley and Proposed Action area contain ecologically diverse habitats that offer a range of recreational opportunities managed by local, county, state, and federal agencies. Recreational activities generally include casual or dispersed uses and organized events. Typical dispersed recreation includes camping, picnicking, mountain biking, hiking, rock climbing, sightseeing, photography, and OHV use. Organized recreation includes competitive and commercial events or activities, such as OHV guided tours and all-terrain bicycle events, which generally require a special recreation use permit from the BLM.

Recreation areas in the vicinity of the Proposed Action area include BLM-administered lands managed for multiple-use activities, Sloan Canyon NCA, and the North and South McCullough wilderness areas. The Sloan Canyon NCA is located in the northern half of the McCullough Range in the northeastern portion of the Mojave Desert. These areas offer residents and vacationers a variety of year-round recreational opportunities.

The BLM defines recreation value through a process called Recreation Opportunity Spectrum (ROS). This process identifies the recreation opportunities based on the area's setting and activities and then assigns the area to one of five categories that defines its management objectives (Table 3.13-1). The project vicinity is designated as Roaded Natural, which means that "visitor use can be moderate to high with managerial controls being low to high. Specific opportunities include picnicking, hiking, OHV touring, free play and events, camping, nature study, enjoying scenery, and interpretive activities" (BLM, 1998). The North McCullough Wilderness Area is classified as ROS class Primitive, while the Sloan Canyon NCA is ROS class Semi-primitive Non-motorized. The Proposed Action area and immediately adjacent public lands are ROS class Rural.

Table 3.13-1
Recreation Opportunity Spectrum Class Definitions

ROS	Class Description
Primitive	Opportunity for isolation from manmade sights, sounds, and management controls in an unmodified natural environment. Only facilities essential for resource protection are available. A high degree of challenge and risk are present. Visitors use outdoor skills and have minimal contact with other users or groups. Motorized use is prohibited.
Semi-primitive Non-motorized	Some opportunity for isolation from manmade sights, sounds, and management controls in a predominantly unmodified environment. Opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Concentration of visitors is low, but evidence of users is often present. Onsite managerial controls are subtle. Facilities are provided for resource protection and the safety of users. Motorized use is prohibited.
Semi-primitive Motorized	Some opportunity for isolation from manmade sights, sounds, and management controls in a predominantly unmodified environment. Opportunity to have a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills. Concentration of visitors is low, but evidence of other area users is present. Onsite managerial controls are subtle. Facilities are provided for resource protection and the safety of users. Motorized use is permitted.
Roaded Natural	Mostly equal opportunities to affiliate with other groups or be isolated from sights and sounds of man. The landscape is generally natural with modifications moderately evident. Concentration of users is low to moderate, but facilities for group activities may be present. Challenge and risk opportunities are generally not important in this class. Opportunities for both motorized and non-motorized activities are present. Construction standards and facility design incorporate conventional motorized uses.
Roaded Modified	Similar to the Roaded Natural setting, except this area has been heavily modified (roads or recreation facilities). This class still offers the opportunity for a high degree of interaction with the natural environment, to have moderate challenge and risk, and to use outdoor skills.
Rural	Area is characterized by a substantially modified natural environment. Opportunities to affiliate with others are prevalent. The convenience of recreation sites and opportunities are more important than a natural landscape or setting. Sights and sounds of man are readily evident, and the concentration of users is often moderate to high. Developed sites, roads, and trails are designed for moderate to high uses.
Urban	Area is characterized by a substantially urbanized environment, although the background may have naturally appealing elements. High levels of human activity and concentrated development, including recreation opportunities, are prevalent. Developed sites, roads, and other recreation opportunities are designed for high use.

Source: BLM, 1981

Off-Highway Vehicle Use

Management of OHV activities on public lands is to conserve soil, wildlife, water quality, native vegetation, air quality, and cultural resources while providing for appropriate recreational opportunities and promoting the safety of all users (BLM, 1981). The use of OHVs on BLM-administered lands has increased in popularity in recent years and accounts for more than 4 million visitors annually throughout the district administered by the Las Vegas Field Office (BLM, 1998). The term OHV collectively refers to a motorized vehicle that is capable of off-highway travel, and includes street-legal, licensed vehicles (e.g., dual sport motorcycles, 4x4-wheel drive vehicles, and sport utility vehicles) and all-terrain vehicles, and dirt motorcycles that are not street-legal or licensed (BLM, 1981).

Off-highway access is designated to protect resources and the landscape from damage, to ensure public safety, and to minimize conflict among users. The three main designations are open, limited, or closed to OHV use. The OHV designation on BLM-administered lands in the vicinity of the proposed project area is limited to OHV use. The OHV designation includes:

- Restricted OHV use to meet specific resource management objectives
- Vehicle travel permitted only on existing roads and trails in existence prior to the designation
- Vehicle travel permitted only on designated roads and trails that are identified, signed, and mapped by the BLM
- Vehicle travel limited by the numbers and types of vehicles
- Vehicle limited by time or season
- Vehicle travel limited to license or permitted use

Operators of OHVs must comply with Nevada laws and federal regulations when operating on public lands. Wilderness areas are closed to OHV use.

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