3.0 Affected Environment

3.1 Introduction

This chapter describes the affected environment associated with the construction and operation of the Proposed Action, Alternative 1, or Alternative 2. The affected environment is analyzed in the physical project area, including all ancillary facilities [i.e., TL(s), borrow pit, access road(s)].

During the scoping process, additional alternatives were identified for the location of the generation facilities. In order to assess the Proposed Action and these alternatives, two areas were identified for describing the affected environment for this EIS: the Proposed Area, which contains the Proposed Action, and the Alternative Area, which contains the overlapping Alternatives 1 and 2 (see Figure 3-1). The TL route and borrow pit were assessed individually in each resource section, but would be components of any of the three build alternatives, if selected. This section documents the baseline (existing conditions) to identify and evaluate the environmental changes resulting from construction and operation of the proposed project.

The following acreage applies to the above-described areas:

- Proposed Area = 2,762 acres
- Alternative Area = 3,821 acres
- TL and Substation = 180 acres
- Borrow Pit = 40 acres

In addition, a Cumulative Effects Study Area (CESA) was defined for each resource, as described in Table 3-1, and the existing environment for these areas is described in each resource section.

Best available information is used to describe the existing environment and the proposed project, and the discussion is based on consideration of issues raised during the public scoping meetings and guidance from NEPA and other related statutes.

Table 3-1. CESAs

Resource	Analysis Area	CESA
Water quality and quantity (groundwater and surface water)	Project area and associated facilities	Surface water: Tonopah Flat (137A) hydrographic basin of the Big Smoky Valley watershed (see Figure 2-15) Groundwater: 53-year, 1-foot draw down contour (See Figure 3-7)
Waters of the United States	Project area and associated facilities	53-year, 1-foot drawdown contour (See Figure 3-7)
Geology and minerals (aggregate)	Project area and associated facilities	5-mile radius of project area and associated facilities
Air quality	San Antone allotment	San Antone allotment
Soils	Project area and associated facilities	5-mile radius of project area and associated facilities
Wildlife	Project area and associated facilities	The southern end of Big Smoky Valley and relevant Nevada Department of Wildlife hunt areas
Special status species	Project area and associated facilities	Tonopah Flats Area for special status wildlife and plants. 10-mile buffer from boundaries of detailed study area for migratory birds and golden eagles
Range resources	Project area and associated facilities	San Antone allotment
Land use authorizations and access	Project area and associated facilities	1-mile buffer around the project area and associated facilities
Recreation and wilderness	25-mile radius of project area and associated facilities	25-mile radius of project area and associated facilities
Visual resources	Viewshed of the project area and associated facilities	Viewshed of the project area and associated facilities
Auditory resources	1-mile buffer around the project area	1-mile buffer around the project area
Social and economic values	50-mile radius of the town of Tonopah	50-mile radius of the town of Tonopah
Hazardous materials	1-mile buffer around project area and associated facilities	1-mile buffer around project area and associated facilities
Cultural resources	Project area and associated facilities	Project area and associated facilities
Native American traditional values	Project area and associated facilities	53-year, 1-foot draw down contour
Paleontology	Project area and associated facilities	Project area and associated facilities
Environmental justice	Same as social and economic values	Same as social and economic values
Invasive, nonnative species	Project area and associated facilities	5-mile radius of project area and associated facilities
Wetlands/riparian zones	Project area and associated facilities	53-year, 1-foot drawdown contour
Migratory birds	Project area and associated facilities	10-mile buffer around the boundaries of the detailed study area

To comply with NEPA, BLM is required to address specific elements of the environments that are subject to requirements specified in statute or regulations or by executive order. Table 3-2 includes the resource areas that must be addressed in all environmental analysis (BLM 2008a).

Table 3-2. Supplemental authorities/elements that must be addressed

Supplemental Authority[a]	Not Present[b]	Present/ Not Affected	Present/ May Be Affected[c]	Rationale
Noxious weeds	X			No noxious weeds are documented in the Proposed or Alternative Areas; however, noxious weeds may be in the region.
Migratory birds			X	The proposed project may affect migratory birds.
Threatened and endangered species	X			No threatened or endangered species are within or near the project area.
Areas of Critical Environmental Concern (ACECs)	X			No ACECs are found within or near the project area.
Water quantity and water quality			X	The 10-foot drawdown contour for groundwater withdrawal is within the project site and is approximately 150 feet below ground surface; it does not affect any external wells, and the groundwater table is not connected to surface water features.
Wetlands, riparian zones, and waters of the United States	X			No wetlands, riparian zones, or waters of the United States are in or near the project area.
Floodplains	X			No floodplains are in or near the project area.
Wild and scenic rivers	X			No wild and scenic rivers are in or near the project area.
Air quality			X	Emissions from construction and operation of the proposed project would be within established federal, state, and regional thresholds.
Cultural/Historic properties			X	Historical properties are present within the Proposed and Alternative Areas.
Native American religious concerns	X			The U.S. Bureau of Land Management is actively coordinating with three tribes in the region and one descendancy group in the region. To date, no special concerns have been identified.
Environmental justice		X		The proposed project would not disproportionately affect environmental justice populations, and may bring economic development and jobs to the areas that would benefit all populations.
Waste – hazardous materials			X	Hazardous materials would be used on site; mitigation measures and Best Management Practices would reduce potential for spills and contamination.
Wilderness	X			No designated wilderness exists within or near the project area.
Forest and rangelands (Healthy Forest Restoration Act [HFRA] only)	X			No forests or rangelands defined by HFRA are in or near the project area.
Prime or unique farmlands	X			No prime or unique farmlands are present in or near the project area.
Heath and human safety			X	The proposed project would have no effect on public heath or safety by implementing the regulatory safety and health plans.

[a] See H-1790-1 (BLM 2008a) Appendix 1: Supplemental Authorities to be considered.

[b] Supplemental Authorities determined to be "Not Present" were not carried forward for further analysis.

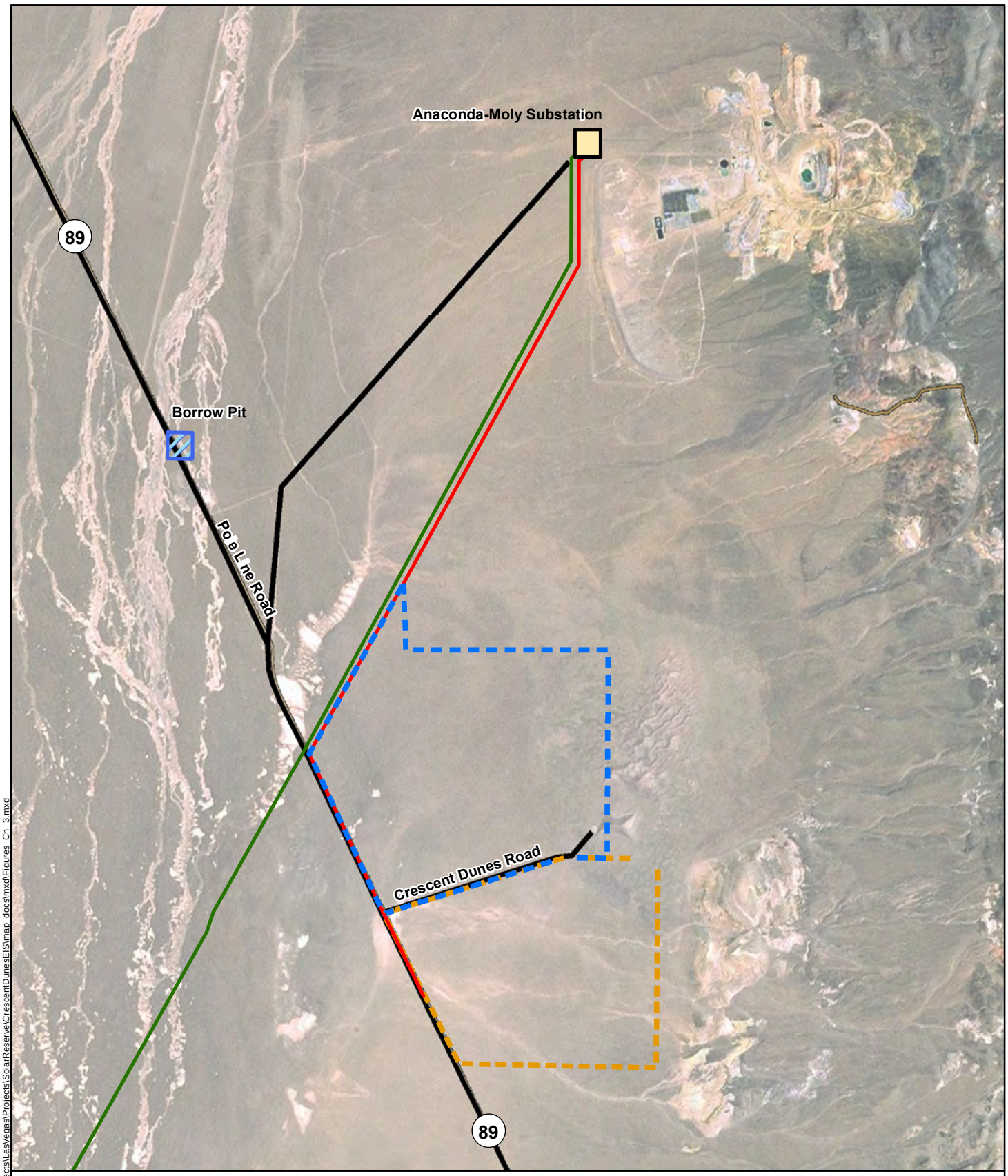
[c] Supplemental Authorities determined to be "Present/May be Affected" must be carried forward for analysis.

In addition to the critical elements of the human environment, other biological, physical and human resources are considered in the NEPA process. Table 3-3 lists resources considered by BLM for analysis in this document.

Table 3-3. Other resources considered for analysis in the EIS

Other Resources[a]	Not Present	Present/ Not Affected	Present/ May Be Affected	Rationale
Vegetation			X	Approximately 1,600 acres of vegetation would be removed due to construction of project components.
Wildlife resources			X	Wildlife may be injured or killed during construction and operation of the project.
Special status species (plants)			X	Removal of special status plant species and habitat would occur.
Special status species (wildlife)			X	Pale kangaroo mouse may be killed or injured during construction and operation of the facility.
Land use and access			X	Land use and access associated with the proposed project is consistent with the U.S. Bureau of Land Management's Tonopah Resources Management Plan (Tonopah RMP). Some impact to access of Crescent Dunes was identified
Geology		X		Construction and operation of the proposed project would not affect geologic resources within or near the project area because such resources would not be removed from the area.
Soils			X	Construction of the proposed project may increase erosion and soil compaction as well as diminish the potential for revegetation.
Minerals		X		The Tonopah RMP has indentified the area as low mineral potential. No areas of high, moderate, or low fluid mineral potential were identified within or near the project area.
Socioeconomics			X	Construction and operation of the project would create jobs for the local population, and add jobs to the community.
Noise		X		Project construction and operation activity would increase noise in and near the project area. There are no sensitive receptors within the project area.
Grazing			X	The proposed project would remove approximately 1,600 acres that could be used for grazing, resulting in a reduction in animal unit months in the project area.
Visual			X	The project would be visible to travelers and recreationalists at Crescent Dunes Special Recreation Management Area (SRMA).
Recreation			X	The project would be near the SRMA for Crescent Dunes.
Transportation and traffic		X		Traffic is expected to increase during construction activities because of the influx of construction and project materials. However, the analysis showed that it would not impact the overall traffic scenario of the area.
Wild horses and burros	X			The project area does not occur within a Horse Management Area.

[a] Other resources determined to be "Not Present" or "Present/Not Affected need to be carried forward for analysis or discussed further in the document based on the rationale provided.



N

NEVADA

Project Site

0 1 2 Miles

Legend

Transmission line

Existing

Planned

Borrow Pit

Alternative Area

Proposed Area

Roads

Substation

Figure 3-1 Alternative Locations

Crescent Dunes
Solar Energy Project

Aerial Source: ESRI 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3.mxd

3.2 Vegetation

This section addresses vegetation resources in the proposed project area. Vegetation resources covered in this section include plant communities and noxious and invasive plant species. Special status plant species are addressed in Section 3.4.1, Special Status Plant Species.

3.2.1 Area of Analysis and Methodology

The detailed study area for vegetation resources includes the Proposed Area, the Alternative Area, the borrow pit, and the TL and Anaconda Moly Substation corridor. An assessment of cumulative impacts includes the areas within a 5-mile radius from the boundary of the detailed study area, which includes the southern end of the Big Smoky Valley and San Antonio Mountains.

Data on the vegetation resources were obtained from the Natural Resources Conservation Service (NRCS) Ecological Area Inventory, the Southwest Regional Gap Analysis Project (GAP), NRCS custom soil survey reports, Nevada Department of Agriculture (NDA), and 2006-color aerial photography. GAP data provide geographic information system (GIS) land cover type information developed from satellite imagery (U.S. Geological Survey [USGS] 2004). Major Land Resource Area (MLRA) Ecological Area Descriptions provide data on soils and reclamation potential.

Prior to the field surveys, GAP data were used to identify vegetation communities and land cover types within the detailed study area and CESA. During field surveys, delineations and descriptions of vegetation communities and land cover types in the GAP data were verified, and adjustments to those delineations or descriptions were documented. Field surveys within the Proposed Area, TL corridor, and the proposed borrow pit were conducted by botanists from JBR Environmental Consultants, Inc. (JBR), on May 18–23, 2009. Because of the subsequent identification of the Alternative Area during the scoping process, field surveys for the Alternative Area were conducted on May 3–6, 2010. Botanists walked the detailed study area to confirm and delineate Gap Land Cover types, identify the distribution of noxious weeds and invasive plant species, and inventory special status plant species (see Section 3.4.2, Special Status Plant Species). GAP data for the CESA were not verified outside the detailed study area.

Establishment of reclamation goals requires an evaluation of the area's plant cover prior to construction. To support development of reclamation goals, information on projected plant cover within the Proposed Area, Alternative Area, borrow pit, and TL and Anaconda Moly Substation corridor has been summarized from the descriptions of the ecological areas within the detailed study area.

3.2.2 Regulatory Framework

3.2.2.1 BLM Policy

In addition to adhering to Nevada policies regarding noxious weeds, BLM also recognizes the problem of invasive annual grasses and actively seeks to control the spread of these species on BLM land in part by forming Cooperative Weed Management Areas and Integrated Weed Management Plans. BLM requires

that leasers of BLM land conduct a risk assessment for noxious weeds and invasive species and develop measures for prevention, control, and monitoring of such species in their project areas (BLM 2008b).

3.2.2.2 Nevada Regulations

Under NRS 555-005-201, NDA categorizes and maintains a list of noxious weeds that are determined to be a threat throughout the state. These statutes give NDA the power to investigate noxious weeds and require the landowners or occupants to control such weeds.

3.2.3 Affected Environment

The majority of Nevada is characterized as a basin and range setting, which is generally defined as parallel mountain ranges separated by valleys or intermontane basins. Valleys are generally drier and vegetated with shrubs and grasses (Griffith 2009). Mountain ranges have enough available moisture to support woody vegetation, including stands of pinyon pine and juniper trees (Griffith 2009). Winters are cold, with temperatures ranging from 20°F to 40°F. Temperatures in the summer are more variable, with the daytime highs ranging from 75°F to 90°F and nighttime lows ranging from 50°F to 60°F (Western Regional Climate Center 2010a). Annual rainfall in the region is approximately 5–10 inches per year, with slightly more precipitation in the winter and spring (January–May) (Western Regional Climate Center 2010a) (see Section 3.6, Air Quality).

3.2.3.1 Vegetation and Land Cover Types

The proposed project area is located at the southern end of the Big Smoky Valley east of the Crescent Dunes and the San Antonio Mountains. According to the Southwest Regional GAP, vegetation communities and land cover types identified within the southern end of the Big Smoky Valley and the San Antonio Mountains include:

- Inter-Mountain Basins Cliff and Canyon
- Inter-Mountain Basins Active and Stabilized Dunes
- Inter-Mountain Basins Playa
- Great Basin Pinyon-Juniper Woodland
- Inter-Mountain Basin Big Sagebrush
- Great Basin Xeric Mixed Sagebrush Shrubland
- Mojave Mid-Elevation Mixed Salt Desert Scrub
- Inter-Mountain Basins Mixed Salt Desert Scrub
- Inter-Mountain Basins Semi-Desert Shrub Steppe
- Inter-Mountain Basin Montane Sagebrush Steppe
- Inter-Mountain Basin Semi-Desert Grassland
- Inter-Mountain Basin Greasewood Flat
- Barren Lands
- Recently Mined or Quarried
- Invasive Annual Grasses

Below are the GAP land cover type descriptions abbreviated from USGS (2005) for all vegetation communities or land cover types found within the detailed study area and the CESA. Subsequent sections detail vegetation or land cover type specific to the Proposed Area, Alternative Area, borrow pit, TL and Anaconda Moly Substation, and CESA.

Inter-Mountain Basins Cliff and Canyon

This ecological system is found from foothills to subalpine elevations and includes barren and sparsely vegetated landscapes (generally less than 10 percent plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included is vegetation of unstable scree and talus slopes that typically occurs below cliff faces. Widely scattered tress and shrubs may include white fir (*Abies concolor*), common pinyon (*Pinus edulis*), limber pine (*Pinus flexilis*), singleleaf pinyon (*Pinus monophylla*), juniper (*Juniperus* spp.), sagebrush (*Artemisia tridentata*), antelope bitterbrush (*Purshia tridentata*), curlleaf mountain mahogany (*Cercocarpus ledifolius*), ephedra (*Ephedra* spp.), creambush (*Holodiscus discolor*), and other species.

Inter-Mountain Basins Active and Stabilized Dunes

This ecological system occurs in Intermountain West basins and consists of unvegetated to moderately vegetated (less than 10–30 percent plant cover) active and stabilized dunes and sandsheets. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand) and form patchy or open grasslands, shrublands, or steppe composed of Indian ricegrass, sand sagebrush (*Artemisia filifolia*), sagebrush, fourwing saltbush, ephedra, blackbrush (*Coleogyne ramosissima),* rubber rabbitbrush (*Chrysothamnus nauseosus*), yellow wildrye (*Leymus flavescens*), chokecherry (*Prunus virginiana*), purch (*Psoralidium lanceolatum*), antelope bitterbrush (*Purshia tridentata*), alkali sacaton, fourpart horsebrush (*Tetradymia tetramers*), or crinklemat (*Tiquilia* spp).

Inter-Mountain Basins Playa

This ecological system is composed of barren and sparsely vegetated playas (generally less than 10 percent plant cover) found in the shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil subhorizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include iodinebush (*Allenrolfea occidentalis*), greasewood (*Sarcobatus vermiculatus*), spiny hopsage (*Grayia spinosa*), Lemmon's alkaligrass (*Puccinellia lemmonii*), basin wildrye (*Leymus cinereus*), saltgrass (*Distichlis spicata*), and/or *Atriplex* spp.

Great Basin Pinyon-Juniper Woodland

This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada. These woodlands occur on warm, dry areas on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Woodlands dominated by a mix of singleleaf pinyon and Utah juniper (*Juniperus osteosperma*), pure or nearly pure occurrences of singleleaf pinyon, or woodlands dominated solely by Utah juniper comprise this system. Curlleaf mountain mahogany is a common associate. Understory layers are variable and may include shrubs such as sagebrush (*Artemisia* spp.) and bunch grasses.

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the western United States, typically in broad basins between mountain ranges, plains, and foothills between 1,500 and 2,300 meters (m) in elevation. Soils are typically deep, well-drained, and non-saline. These shrublands are dominated by sagebrush (*Artemisia tridentata* spp.). Scattered juniper species, greasewood, and *Atriplex* spp. may be present in some stands. Perennial herbaceous components typically contribute less than 25 percent vegetative cover. Common graminoid species include Indian ricegrass (*Achnatherum hymenoides*) and blue gramma (*Bouteloua gracilis*), as well as others.

Great Basin Xeric Mixed Sagebrush Shrubland

This ecological system occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hillslopes, saddles and ridges at elevations between 1,000 and 2,600 m (3,281 and 8,530 feet). Areas are dry, often exposed to desiccating winds, with typically shallow, rock, non-saline soils. Shrublands are dominated by black sagebrush (*Artemisia nova*) (middle and low elevations) or little sagebrush (*Artemisia arbuscula*) (higher elevation), and may be codominated by sagebrush (*Artemisia tridentata* ssp. *Wyomingensis*) or rabbitbrush (*Chrysothamnus viscidiflorus*). The herbaceous layer is likely sparse and composed of perennial bunch grasses such as Indian ricegrass, desert needlegrass (*Achnatherum speciosum*), squirreltail (*Elymus elymoides*), or Sandberg bluegrass (*Poa secunda*).

Mojave Mid-Elevation Mixed Salt Desert Scrub

This ecological system represents the extensive desert scrub in the transition zone above creosote bush (*Larrea tridentata*) – burro bush (*Ambrosia dumosa*) desert scrub and below the lower montane woodlands (700–1,800 m [2,297–5,906 feet] in elevation) that occurs in the eastern and central Mojave Desert. It is also common on lower piedmont slopes in the transition zone into the southern Great Basin. The vegetation in this ecological system is quite variable. Codominants and diagnostic species include blackbrush (*Coleogyne ramosissima*), California buckwheat (*Eriogonum fasciculatum*), Nevada ephedra (*Ephedra nevadensis*), spiny hopsage (*Grayia spinosa*), and either Joshua tree (*Yucca brevifolia*) or Spanish dagger (*Yucca schidigera*). Desert grasses such as Indian ricegrass and desert needlegrass may be present. Scattered juniper species or desert scrub species may also be present.

Inter-Mountain Basins Mixed Salt Desert Scrub

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes, and plains across the intermountain western United States. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more Atriplex species such as shadscale (*Atriplex confertifolia),* cattle saltbush (*Atriplex polycarpa*), or spinescale saltbush (*Atriplex spinifera*). Other shrubs present to codominant may include sagebrush*,* rabbitbrush*,* rubber rabbitbrush (*Ericameria nauseosa*), ephedra (*Ephedra nevadensis*)*,* spiny hopsage (*Grayia spinosa*)*,* and winterfat (*Krascheninnikovia lanata)*, as well as others. Greasewood (*Sarcobatus vermiculatus*) is generally absent, but if present does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as Indian ricegrass*,* blue grama*,* thickspike wheatgrass (*Elymus lanceolatus* ssp. *lanceolatus*)*,* western wheatgrass (*Pascopyrum*

smithii), James' galleta (*Pleuraphis jamesii*), big galleta (*Pleuraphis rigida*), Sandberg bluegrass, or alkali sacaton (*Sporobolus airoides*). Various forbs are also present.

The Inter-Mountain Basins Mixed Desert Scrub was the most extensive vegetation association throughout the detailed study area. In subsequent sections (Sections 3.4.1, Special Status Plant Species, and 3.4.2, Special Status Wildlife Species), this vegetation association is further delineated and refined to reflect dominant plant species and specific habitat for the pale kangaroo mouse and Nevada oryctes.

Inter-Mountain Montane Sagebrush Steppe

This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general, this system shows an affinity for mild topography, fine soils, and some source of subsurface moisture. It is composed primarily of mountain sagebrush (*Artemisia tridentata* ssp. *Vaseyana*) and other sagebrush species. Antelope bitterbrush (*Purshia tridentata*) may codominate or even dominate some stands. Other common shrubs include snowberry (*Symphoricarpos* spp.), serviceberry (*Amelanchier* spp.), rabbitbrush, and wax currant (*Ribes cereum*). Most stands have an abundant perennial herbaceous layer (over 25 percent cover). Common graminoids include Arizona fescue (*Festuca arizonica*), Idaho fescue (*Festuca idahoensis*), needle and thread grass (*Hesperostipa comata*), as well as others. In many areas, frequent wildfires maintain an open herbaceous-rich steppe condition, although at most areas, shrub cover can be unusually high for a steppe system (greater than 40 percent), with the moisture providing equally high grass and forb cover.

Inter-Mountain Basins Semi-Desert Shrub-Steppe

This ecological system occurs throughout the intermountain western United States, typically at lower elevations on alluvial fans and flats with moderate to deep soils. This semiarid shrub-steppe is typically dominated by graminoids (greater than 25 percent cover) with an open shrub layer. Characteristic grasses include Indian ricegrass, blue grama, saltgrass (*Distichlis spicata*), needle and thread (*Hesperostipa comata*), James' galleta, Sandberg's bluegrass, and alkali sacaton. The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include fourwing saltbush (*Atriplex canescens*), sagebrush (*Artemisia tridentata*), rabbitbrush (*Chrysothamnus* spp.), Ephedra species, broom snakeweed *(Gutierrezia sarothrae*), and winterfat. Sagebrush species may be present but do not dominate. The general aspect of occurrences may be either open shrubland with patchy grasses or patchy open herbaceous layer. Disturbance may be important in maintaining the woody component. Microphytic crust is very important in some stands.

Inter-Mountain Basins Semi-Desert Grassland

This widespread ecological system occurs throughout the intermountain western United States on dry plains and mesas at approximately 1,450 to 2,320 m (4,757 to 7,612 feet) elevation. These grasslands occur in lowland and upland areas and may occupy swales, playas, mesatops, plateau parks, alluvial flats, and plains, but areas are typically xeric. The dominant perennial bunch grasses and shrubs within this system are all very drought-resistant plants. These grasslands are typically dominated or codominated by Indian ricegrass, three awn grass (*Aristida* spp.), blue grama, deer grass (*Muhlenbergia* sp.), or James' galleta (*Pleuraphis jamesii*) and others. This community may include scattered shrubs and dwarf shrubs of species of sagebrush, *Atriplex* sp., or winterfat.

Inter-Mountain Basins Greasewood Flat

This ecological system occurs throughout much of the western United States in intermountain basins and extends onto the western Great Plains. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Areas typically have saline soils, a shallow water table, and flood intermittently, but remain dry for most of the growing season. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by greasewood, fourwing saltbush, shadscale, or winterfat that may be present to codominant. Occurrences are often surrounded by mixed salt desert scrub. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of alkali sacaton, salt grass (where water remains ponded the longest), or common spikerush (*Eleocharis palustris*) herbaceous types.

Barren Lands, Non-specific

Barren areas consist of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulation of earthen material. Generally, vegetation accounts for less than 15 percent of total cover.

Recently Mined or Quarried

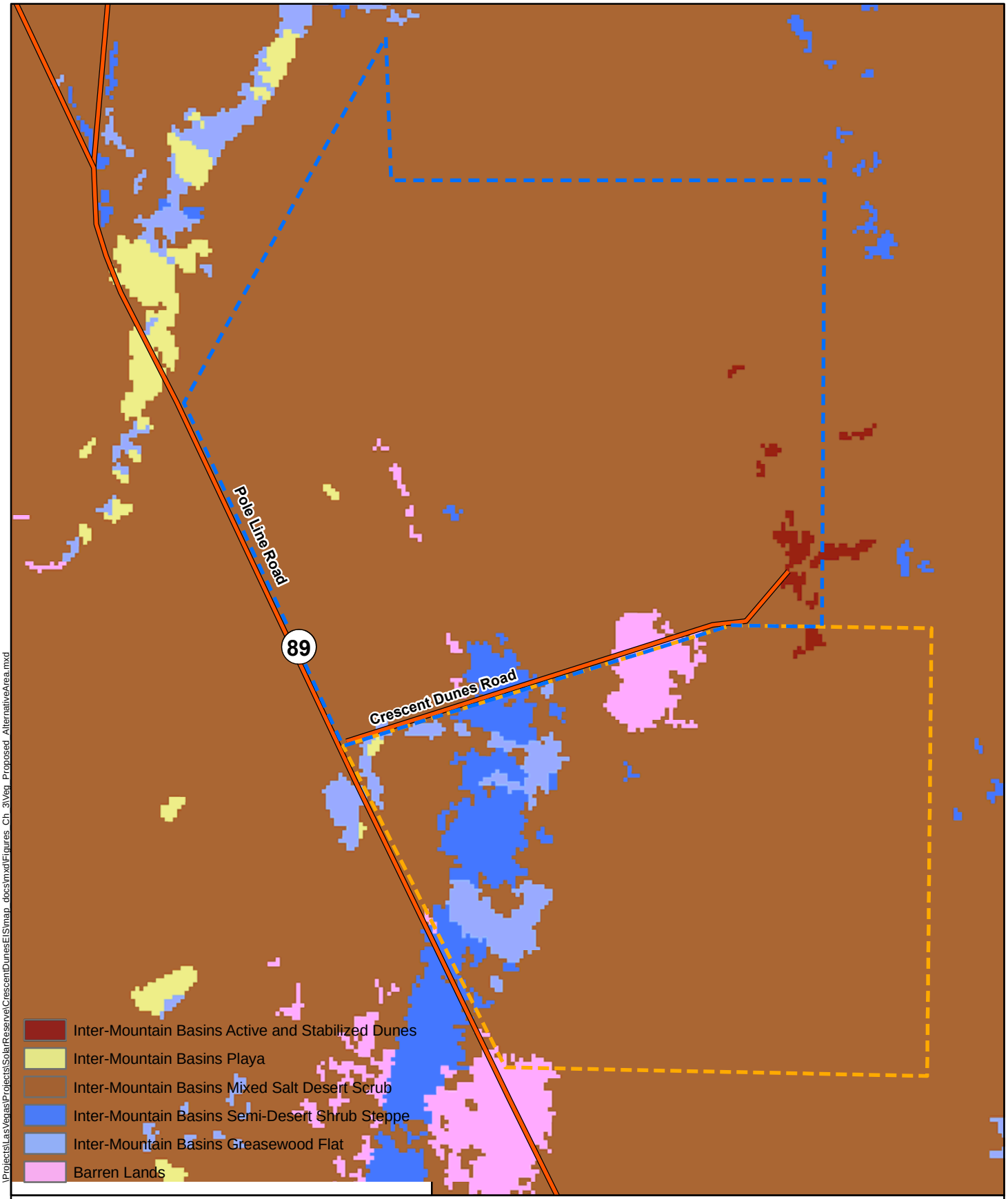
Areas where open pit mining or quarries are visible in the imagery (images acquired between 1999 and 2001), and are 2 hectares or greater in size.

Invasive Annual Grasses

Areas that are dominated by introduced annual grass species such as *Avena* spp., *Bromus* spp., and *Schismus* spp.

3.2.3.1.1 Proposed Area

The topography of the Proposed Area is generally flat with elevations ranging from approximately 5,000–5,060 feet. Six vegetation communities or land cover types were mapped and observed in the Proposed Area (see Table 3-4). Since GAP land cover type data are derived from satellite imagery, the vegetation community or land cover type observed during field surveys may deviate slightly from the USGS descriptions. During field surveys, biologists noted deviations in the land cover type description and distributions. Table 3-4 provides the number of acres of each vegetation community/land cover type mapped with GAP data, and the deviations in GAP data as observed during field surveys. Figure 3-2 illustrates the distribution of each vegetation community or land cover type in the Proposed and Alternative Areas. Projected plant cover percentages for soil units/ecological areas within the Proposed Area are presented in Table 3-5. Reclamation potential associated with soil units is addressed in Section 3.9, Soils.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Veg_Proposed_AlternativeArea.mxd

Figure 3-2 Vegetation / Land Cover Types within the Proposed and Alternative Areas

Crescent Dunes Solar Energy Project

Source: USGS

Table 3-4. Approximate area of each vegetation community and land cover type within the Proposed Area

Southwest Regional Gap Analysis Project (GAP) Vegetation Community or Land Cover Type	Area (acres)	Field Observations
Inter-Mountain Basins Mixed Salt Desert Scrub	2,408	Field surveys generally confirmed the GAP vegetation association description and distribution.
Inter-Mountain Basins Semi-Desert Shrub-Steppe	176	Field surveys generally confirmed distribution of the GAP vegetation association description. However, during field surveys biologists observed that greasewood was not always a component of this community.
Inter-Mountain Basins Active and Stabilized Dune	6	Field surveys generally confirmed the GAP vegetation association description; however, the northern portion of Proposed Area is classified as active and stabilized dunes, and although the soils are sandy, no active or stabilized dunes are present.
Inter-Mountain Basins Greasewood Flat	120	Field surveys generally confirmed the GAP vegetation association description and distribution.
Intermountain Basins Playa	3	Field surveys generally confirmed the GAP vegetation association description and distribution.
Barren Lands	74	Field surveys generally confirmed the GAP vegetation association description and distribution.

Table 3-5. MLRA ecological areas and project plant cover estimates within the Proposed Area

Soil Units within the Proposed Area	Corresponding Major Land Resource Area (MLRA) Ecological Area	Estimated Plant Cover
Belcher (BEB)	R029XY046NV – Sandy Loam 5-8 P.Z.	15–25 percent
Broyes (BrB)	R028BY017NV – Loamy 5-8 P.Z.	5–15 percent
Dune Land (DU)	No corresponding MLRA Ecological Area	Not applicable
Playas (PN)	No corresponding MLRA Ecological Area	Not applicable
Stumble (STC)	R029XY012NV Sandy 5-8 P.Z.	15–25 percent
Tipperary (TGE)	R027XY016NV Loamy Upland 5-8” P.Z.	20–30 percent

3.2.3.1.2 Alternative Area

The topography of the Alternative Area is generally flat with an elevation of approximately 5,000–5,060 feet. Five vegetation communities or land cover types were mapped and observed in the proposed area (see Table 3-6). Since GAP land cover type data are derived from satellite imagery, the vegetation community or land cover type observed during field surveys may deviate slightly from the USGS descriptions. During field surveys, biologists noted deviations in the land cover type description and distributions. Table 3-6 provides the number of acres of each vegetation community or land cover type mapped with GAP data, and the deviations in GAP data as observed during field surveys. Figure 3-2 illustrates the distribution of each vegetation community or land cover type. Project plant cover percentages for soil units/ecological areas within the Alternative Area are presented in Table 3-7. Reclamation potential associated with soil units is addressed in Section 3.9, Soils.

Table 3-6. Approximate area of each vegetation community and land cover type within the Alternative Area

Southwest Regional Gap Analysis Project (GAP) Vegetation Community or Land Cover Type	Area (acres)	Field Observations
Inter-Mountain Basins Mixed Salt Desert Scrub	3,721	Field surveys generally confirmed the GAP vegetation association description and distribution. However, it was noted that Lemon scurfpea and Indian ricegrass were more dominant in the eastern portion of the site. Nevada dalea was predominant in the central portion of the alternative area, and Bailey's greasewood was predominant in the western portion of the site.
Inter-Mountain Basins Semi-Desert Shrub-Steppe	38	Field surveys generally confirmed the GAP vegetation association description and distribution.
Intermountain Active and Stabilized Dunes	26	Field surveys generally confirmed the GAP vegetation association description and distribution.
Inter-Mountain Basins Greasewood Flat	3	Field surveys generally confirmed the GAP vegetation association description and distribution.
Barren Lands	39	Field surveys generally confirmed the GAP land cover type description and distribution.
Intermountain Basins Playa	2	Field surveys generally confirmed the GAP land cover type description and distribution.

Table 3-7. MLRA ecological areas and project plant cover estimates within the Alternative Area

Soil Units within the Proposed Area	Corresponding Major Land Resource Area (MLRA) Ecological Area	Estimated Plant Cover
Belcher (BEB)	R029XY046NV – Sandy Loam 5-8 P.Z.	15–25 percent
Dune Land (DU)	No corresponding MLRA Ecological Area	Not applicable
Stumble (STC)	R029XY012NV Sandy 5-8 P.Z.	15–25 percent
Timper (TEB)	R029XY017NV Loamy 5-8" P.Z.	15–25 percent
Tipperary (TGE)	R027XY016NV Loamy Upland 5-8" P.Z.	20–30 percent
Yomba (Ym)	R029XY017NV Loamy 5-8" P.Z.	15–25 percent

3.2.3.1.3 Borrow Pit

The topography in the borrow pit area is generally flat, with an elevation of approximately 4,881–4,972 feet. Three land cover types were observed in the proposed project area (Table 3-8). Since GAP land cover type data are derived from satellite imagery, the vegetation community or land cover type observed during field surveys may deviate slightly from the USGS descriptions. During field surveys, biologists noted deviations in the land cover type description and distributions. Table 3-8 provides the number of acres of each vegetation community or land cover type mapped with GAP data, and the deviations in GAP data as observed during field surveys. Figure 3-3 illustrates the distribution of each vegetation community or land cover type. Project plant cover percentages for soil units/ecological areas within the borrow pit area are presented in Table 3-9. Reclamation potential associated with soil units is addressed in Section 3-9, Soils.

Table 3-8. Approximate area of each vegetation community and land cover type within the borrow pit

Southwest Regional Gap Analysis Project (GAP) Vegetation Community or Land Cover Type	Area (acres)	Field Observations
Inter-Mountain Basins Mixed Salt Desert Scrub	40	Field surveys generally confirmed the GAP vegetation association description and distribution. The dominant shrubs were Bailey's greasewood and littleleaf horsebrush.

Table 3-9. MLRA ecological areas and project plant cover estimates within the borrow pit

Soil Units within the Proposed Area	Corresponding Major Land Resource Area (MLRA) Ecological Area	Estimated Plant Cover
Yomba (Ym)	R029XY017 – Loamy 5-8 P.Z.	15–25 percent
Yomba (including Playas)	R029XY017 – Loamy 5-8 P.Z.	15–25 percent

3.2.3.1.4 TL and Anaconda Moly Substation

The topography along the TL and Anaconda Moly Substation corridor rises slightly from the valley floor to the location of the substation, with an elevation of approximately 4,880–5,200 feet. Three vegetation communities or land cover types were observed within the TL and Anaconda Moly Substation corridor. Table 3-10 lists the land cover types/vegetation communities within the TL and Anaconda Moly Substation corridor. Since GAP land cover type data are derived from satellite imagery, the vegetation community/land cover type observed during field surveys may deviate slightly from the USGS descriptions. During field surveys, biologist noted deviations in the land cover type description and distributions. Table 3-10 provides the number of acres of each vegetation community or land cover type, and the deviations in GAP data observed during field surveys. Figure 3-3 illustrates distribution of each vegetation community or land cover type. Plant cover percentages for soil units/ecological areas within the TL and Anaconda Moly Substation corridor are presented in Table 3-11. Reclamation potential associated with soil units is addressed in Section 3.9, Soils.

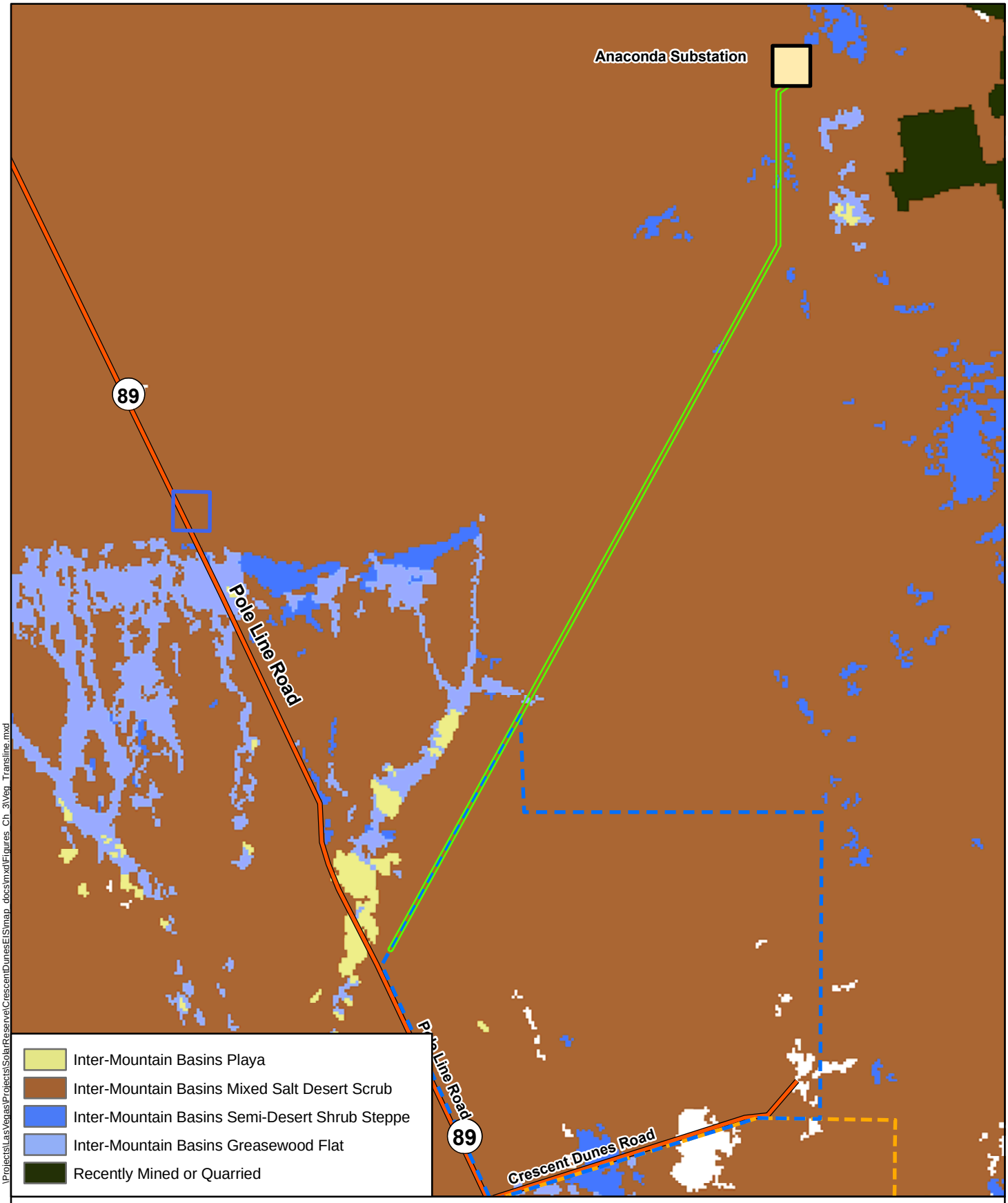


Figure 3-3 Vegetation / Land Cover Types within Borrow Pit, Transmission Line and Anaconda Substation Corridor

Crescent Dunes Solar Energy Project

Source: USGS

Table 3-10. Approximate area of each vegetation community and land cover type within the TL and Anaconda Moly Substation corridor

Southwest Regional Gap Analysis Project (GAP) Vegetation Community or Land Cover Type	Area (acres)	Field Observations
Inter-Mountain Basins Mixed Salt Desert Scrub	113	The southern part of the transmission line (TL) corridor next to Pole Line Road was dominated by Bailey's greasewood (*Sarcobatus baileyi*). At the northern end of the TL, fourwing saltbush and Bailey's greasewood were dominant.
Inter-Mountain Basins Semi-Desert Shrub-Steppe	1	Field surveys generally confirmed the GAP vegetation association description and distribution.
Inter-Mountain Basins Greasewood Flat	1	Field surveys generally confirmed the GAP vegetation association description and distribution.

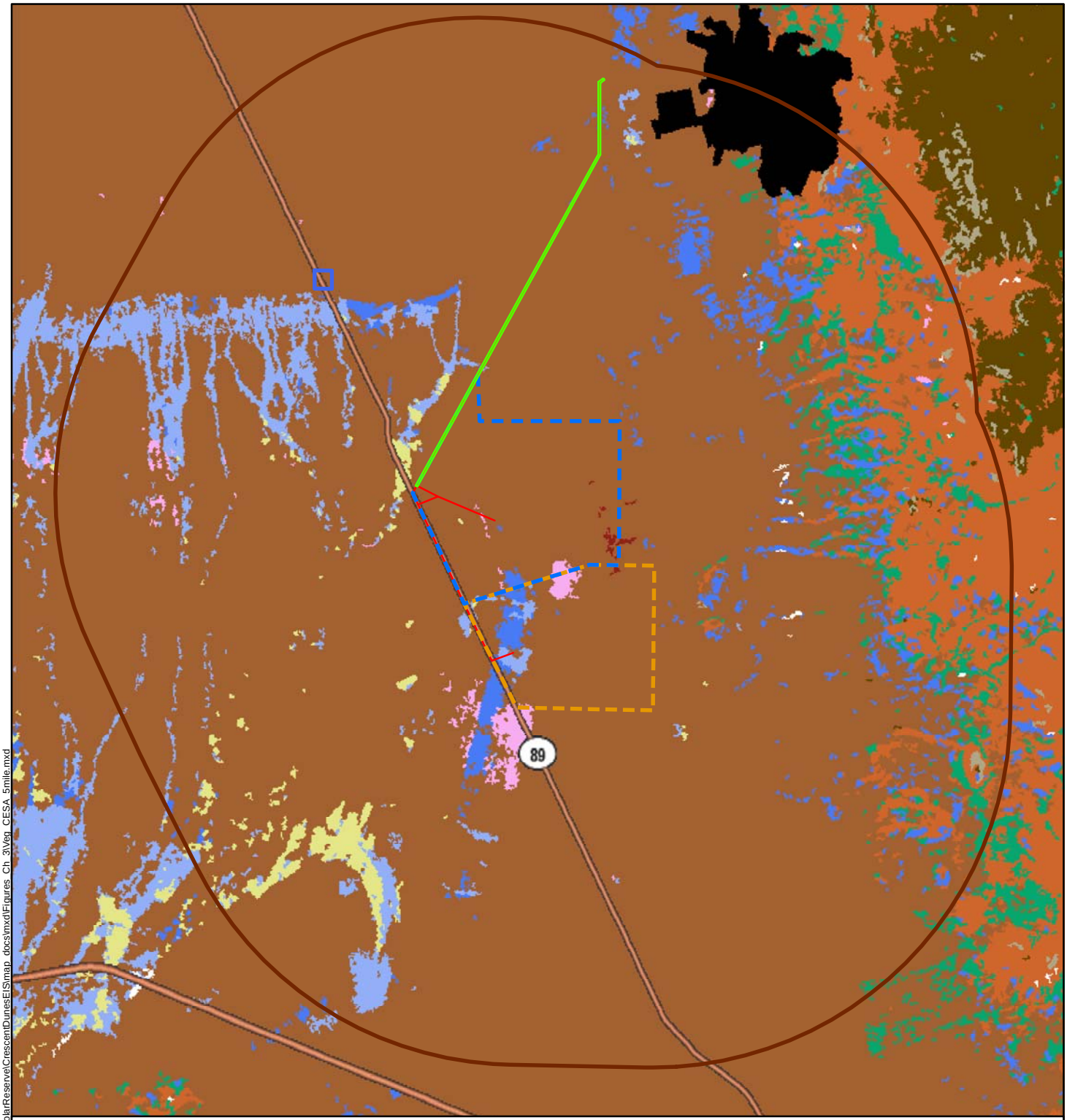
Table 3-11. MLRA ecological areas and project plant cover estimates within the TL and Anaconda Moly Substation corridor

Soil Units within the Proposed Area	Corresponding Major Land Resource Area (MLRA) Ecological Area	Estimated Plant Cover (basal and crown)
Stumble (STC)	R029XY012NV – Sandy 5-8 P.Z.	15–25 percent
Timper (TEB)	R029XY017NV – Loamy 5-8" P.Z.	15–25 percent
Yomba (Ym)	R029XY017NV – Loamy 5-8" P.Z.	15–25 percent

3.2.3.1.5 CESA

All fifteen GAP vegetation communities/land cover types described previously were identified in the CESA. Differences between land cover types generally follow elevation changes from the valley floor to mountain slopes. For example, in the San Antonio Mountains, land cover types include Great Basin Pinyon-Juniper Woodland and Intermountain Basins Cliff and Canyon (see Figure 3-4). These are typical land cover types throughout the mountain ranges of the Great Basin.

Generally, within the CESA, the valley floor has a higher percentage of the Mixed Salt Desert Scrub and Inter-Mountain Basin Desert Scrub Steppe. As the elevation increases between the valley floor and the mountain slopes, sagebrush becomes increasingly more predominant on the landscape until reaching an elevation where sufficient moisture exists to support pinyon-juniper woodlands. The steep slopes of the San Antonio Mountains have exposed cliffs with minimal vegetation where limited soil and moisture are unable to support it. The exception to this generality is the presence of the Crescent Dunes between the valley floor and the San Antonio Mountains. The Crescent Dunes are unvegetated sand dunes. Table 3-12 illustrates the area vegetation community or land cover type and the proportion of each within the CESA.



Inter-Mountain Basins Cliff and Canyon
Inter-Mountain Basins Arctive and Stabilized Dunes
Inter-Mountain Basins Playa
Great Basin Pinyon-Juniper Woodland
Inter-Mountain Basins Big Sagebrush Shrubland
Great Basin Xeric Mixed Sagebrush Shrubland
Inter-Mountain Basins Mixed Salt Desert Scrub
Inter-Mountain Basins Montane Sagebrush Steppe
Inter-Mountain Basins Big Sagebrush Steppe
Inter-Mountain Basins Semi-Desert Shrub Steppe
Inter-Mountain Basins Greasewood Flat
Barren Lands
Agriculture
Recently mined or quarried

Legend

Borrow Pit (40 acres)
Planned
Transmission Line Buffer
CESA (5-mile buffer)
Alternative Area
Proposed Area

Figure 3-4 Vegetation / Land Cover Types within the CESA

Crescent Dunes Solar Energy Project

Source: USGS

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Veg_CESA_5mile.mxd

Table 3-12. Summary of area of each vegetation community or land cover type and their proportion within the CESA

Vegetation Community or Land Cover Type	Area (acres)	Proportion of Area in the CESA
Inter-Mountain Basins Cliff and Canyon	109.59	0.11%
Inter-Mountain Basins Active and Stabilized Dunes	43.12	0.04%
Inter-Mountain Basins Playa	100.52	0.10%
Great Basin Pinyon-Juniper Woodland	41.35	0.04%
Inter-Mountain Basins Big Sagebrush Shrubland	2061.5	2.08%
Great Basin Xeric Mixed Sagebrush Shrubland	6,936.94	7.00%
Mojave Mid-Elevation Mixed Desert Shrub	31.56	0.03%
Inter-Mountain Basins Mixed Salt Desert Scrub	81,992.96	82.71%
Inter-Mountain Basins Montane Sagebrush Steppe	1.78	0.00%
Inter-Mountain Basins Semi-Desert Shrub Steppe	2,821.95	2.85%
Inter-Mountain Basins Semi-Desert Grassland	1.78	0.00%
Inter-Mountain Basins Greasewood Flat	3,094.47	3.12%
Barren Lands	532.38	0.54%
Recently Mined or Quarried	1,349.51	1.36%
Invasive Annual Grassland	11.11	0.01%
Total	**99,130.52**	**100.00%**

3.2.3.2 Noxious Weeds and Invasive Species

The NDA list of noxious and invasive weeds includes 43 species identified as noxious in the State of Nevada. Weeds from this list that have been identified previously in Nye County include hoary cress (*Cardaria draba)* and Russian knapweed (*Acroptilon repens)* (Nevada Weed Action Committee 2001), but others may be present in the Big Smoky Valley.

Invasive species such as cheatgrass (*Bromus tectorum*) are also a concern in the area because it has been identified throughout the Great Basin. Because cheatgrass disturbs native ecosystems, the key to controlling this invasive species is understanding the current distribution and minimizing the dispersal and establishment of the species (Peterson 2003).

3.2.3.2.1 Proposed Area

No noxious weeds were found in the Proposed Area; however, two invasive nonnative species were observed in the Proposed Area: halogeton (*Halogeton gomeratus*) and Russian thistle (*Salsola* sp.). Halogeton was observed infrequently throughout the proposed project area. However, Russian thistle was prevalent, especially in sandier soils throughout the proposed project area. Cheatgrass was not observed in the detailed study area.

3.2.3.2.2 Alternative Area

No noxious weeds were found in the Alternative Area; however, two invasive nonnative species were observed in the Alternative Area: halogeton and Russian thistle.

3.2.3.2.3 Borrow Pit

Three tamarisk (*Tamarisk* sp.) plants were observed in the proposed borrow pit area along an ephemeral channel. Tall whitetop (*Lepidium latifolium*) was observed in a wash outside the southwest boundary of the proposed borrow pit area.

3.2.3.2.4 TL and Anaconda Moly Substation

No noxious weeds were found in the TL and Anaconda Moly Substation corridor; however, two invasive nonnative species were observed in the TL and Anaconda Moly Substation corridor: halogeton and Russian thistle.

3.2.3.2.5 CESA

It is likely that many of the noxious and invasive species are present throughout the CESA. Cheatgrass may be the greatest concern because it is now widely spread throughout the Great Basin. Other noxious weeds may be present within the CESA, including but not limited to tall whitetop, hoary cress, tamarisk, and Russian knapweed.

3.3 Wildlife Resources

This section covers general wildlife resources. It describes wildlife species, including game, that are relatively abundant and are not classified as "special status species" under statute, regulations, or agency guidelines. Special status species are covered in Section 3.4.2, Special Status Wildlife Species.

3.3.1 Area of Analysis and Methodology

The area of analysis for wildlife resources includes the Proposed Area, the Alternative Area, the borrow pit, and the TL and Anaconda Moly Substation corridor. A cumulative effects assessment will include the southern end of the Big Smoky Valley and relevant NDOW hunt areas.

3.3.2 Regulatory Framework

The BLM RMPs provide management standards for wildlife and wildlife habitat. BLM field offices, in cooperation with NDOW, monitor wildlife and habitat conditions and maintain crucial wildlife habitat. NDOW and BLM jointly manage habitat for mule deer, pronghorn antelope, and other game species.

3.3.3 Affected Environment

The detailed study area is completely within the southern end of the Big Smoky Valley. Although the specific land cover types may vary, the area is dominated by low growing shrubs and grasses that mostly provide 10–25 percent vegetative cover (see Section 3.2, Vegetation). East of the Proposed Area are the Crescent Dunes, which are mainly barren and consist only of exposed sand. Directly east of the dunes are the San Antonio Mountains, which rise to an elevation of approximately 6,300 feet within the CESA. These mountains provide rocky cliffs, sagebrush steppe, and some pinyon-juniper woodland.

3.3.3.1 Proposed Area

3.3.3.1.1 Mammals

According to the ecological area descriptions and GAP data, the main components of vegetation in this area include greasewood, blackbrush, four-wing saltbush, and Indian ricegrass. This vegetation provides food, water, and cover for many small mammals such as Jackrabbits (*Lepus californicus*), kit foxes (*Vulpes macrotis*), ground squirrels (*Spermophilus* spp.), desert woodrats (*Neotoma lepida*), pocket mice (*Perognathus* spp.), deer mice (*Peromyscus maniculatus*), grasshopper mice (*Onychomys* spp.), and kangaroo rats (*Dipodomys* spp.). Additionally, many bat species may forage within the project area.

3.3.3.1.2 Game

Many big game species are common throughout the Great Basin Desert, including American pronghorn (*Antilocapra americana*), mule deer (*Odocoileus hemionus*), bighorn sheep (*Ovis canadensis*), and elk (*Cervus elaphus*). According to NDOW, the project area falls within designated pronghorn habitat. Pronghorn tracks were observed in the project area during field surveys and it is likely that they utilize this area. Mule deer likely use this area for foraging; however, the area has not been designated as important or unique habitat for this species by NDOW. It is unlikely that bighorn sheep utilize the area because they prefer the steep cliffs of the surrounding mountain ranges; however, bighorn sheep may migrate through the area.

3.3.3.1.3 Birds

Most birds that utilize the project area are protected by the Migratory Bird Treaty Act (MBTA) (see Section 3.4.2, Special Status Wildlife Species); however, some birds may utilize the project area year round. For example, ravens (*Corvus corax*) may prey on reptiles, insects, and small mammals that are present throughout the project area. Horned larks (*Eremophila alpestris*) may forage on seeds and insects in the project area. Both common ravens and horned larks were observed during field surveys within the proposed area (in May 2009).

3.3.3.1.4 Reptiles

A wide variety of reptiles may be present in the project area, including western whiptail (*Cnemidophorus tigris*), leopard lizard (*Gambelia wislizenii*), gopher snake (*Pituophis melanoleucus*), and desert horned lizard (*Phrynosoma platyrhinos*) as well as others. These species as well as others are present in a wide variety of valley habitats and most likely utilize the project area.

3.3.3.2 Alternative Area

The wildlife found in the Alternative Area is consistent with the wildlife described in the Proposed Area.

3.3.3.3 Borrow Pit

The wildlife found in the borrow pit area is consistent with the wildlife described in the Proposed Area.

3.3.3.4 TL and Anaconda Moly Substation

The wildlife found in the TL and substation area is consistent with the wildlife described in the Proposed Area.

3.3.3.5 CESA

Species composition of wildlife throughout most of the valley portion of the CESA is similar to that described for the Proposed Area because most of the habitat is the same (see Section 3.2, Vegetation). However, the San Antonio Mountain Range is within the CESA and provides different habitat than the proposed area, including sagebrush, rock outcrops (including cliffs), and pinyon and juniper woodlands (see Section 3.2, Vegetation). These mountains may provide suitable habitat for species not found within the detailed study area. Common game species that may utilize this habitat include bighorn sheep, mountain lion (*Puma concolor*), and mule deer. A variety of additional mammals might utilize these higher mountainous habitats, including bobcat (*Lynx rufus*), ground squirrels (*Spermophilus* spp.), and voles (*Microtus* spp.). Steep slopes with exposed cliffs may provide good roosting habitat for a variety of bat species, golden eagles, and other raptors (see Section 3.4.2, Special Status Wildlife Species).

3.4 Special Status Species (Plants and Wildlife)

In this EIS, the term "special status species" encompasses species that are listed as threatened or endangered or species proposed or candidates for listing under the Endangered Species Act of 1973 as amended (50 CFR 17.11 [listed animals], 50 CFR 1712 [listed plants], and subsequent notices published in the Federal Register). It also encompasses species listed as protected by the State of Nevada under NRS 501.100–503.104, NRS 527.050, and NRS 527.60–527.300, and species listed as BLM sensitive species.

3.4.1 Special Status Plant Species

3.4.1.1 Area of Analysis and Methodology

The detailed study area for special status plant species includes the Proposed Area, the Alternative Area, the borrow pit, and the TL and Anaconda Moly Substation corridor. The CESA for special status plant species was determined to be the Tonopah Flats area.

According to the Nevada Natural Heritage Program (NNHP) data, no special status plant species have previously been recorded within 2 kilometers (1.24 miles) of the project area. Field surveys for special status plant species and cacti were conducted on May 18–23, 2009, for the Proposed Area, the TL corridor, and the borrow pit area. Field surveys for special status plants and cacti in the Alternative Area were conducted on May 3–6, 2010. Biologists completed pedestrian surveys for special status plant species by walking transects spaced 15 meters (49 feet) apart over a portion of the project area. As the biologist became more familiar with the particular habitats and soils associated with special status plant species, these habitats were searched thoroughly and special status plant species locations were recorded. Information on habitat and soil preferences for BLM sensitive species gathered during field surveys were used to identify the amount of potential habitat for special status plant species throughout the CESA.

3.4.1.2 Regulatory Framework

3.4.1.2.1 BLM Policy

BLM has implemented policies for special status species found on BLM-managed lands. BLM's list of special status species includes species that are listed or proposed for listing under the Endangered Species Act (ESA) and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. Additionally, all federal candidate species, proposed species, and delisted species (for 5 years after delisting) will be conserved as BLM sensitive species (BLM 2008b).

3.4.1.2.2 Nevada Protected Species Regulations

The State of Nevada has identified plant species that are declining in their range throughout Nevada or are otherwise rare and at risk of extinction. Plants warranting such protection are listed as Critically Endangered under NRS 503.104. Taking of these plants is prohibited without a permit obtained from the Nevada Division of Forestry (Nevada Administrative Code [NAC] 527.250).

3.4.1.2.3 Nevada State Protection of Christmas Trees, Cacti, and Yucca

Under NRS 527.060–527.120, it is illegal for any individual or company to cut, destroy, remove, or posses any Christmas tree, cactus, yucca, or portions of such plants. This statute is applicable to any cacti or yucca on BLM-managed lands.

3.4.1.3 Affected Environment

3.4.1.3.1 Proposed Area

The field surveys did not identify any BLM sensitive plant in the Proposed Area during the May 2009 field surveys. However, in the 2010 surveys of the Alternative Area, Nevada oryctes (*Oryctes nevadensis*), a BLM sensitive species, was found to be widespread throughout the Inter-Mountain Basins Mixed Salt Desert Scrub vegetation association, where the dominant shrub cover was Nevada dalea (*Psorothamnus polydenius*) and the soils were Stumble Loamy fine sand 0-8 percent slopes (STC) (Figure 3-5 and Figure 3-14 in Section 3.8, Soils). Because this species appears only in years with optimal rainfall and temperature patterns (NNHP 2001), it is likely that Nevada oryctes is present throughout similar habitat in the Proposed Area even though it was not detected during the 2009 surveys. Anecdotal observations of four Nevada oryctes plants made during the 2010 small mammal trapping surveys in the Proposed Area support this conclusion. Based on this information, it can be assumed that Nevada oryctes is present within the same Nevada dalea-dominated Mixed Salt Desert Scrub vegetation association in the Proposed Area, which is approximately 2017 acres (Figure 3-5). Additionally, three cactus species were observed throughout the project area, including Wiggins' cholla (*Cylindropuntia echinocarpa*), sand cholla (*Grusonia pulchella*), and pricklypear (*Opuntia polyacantha* var. *erinacae*).

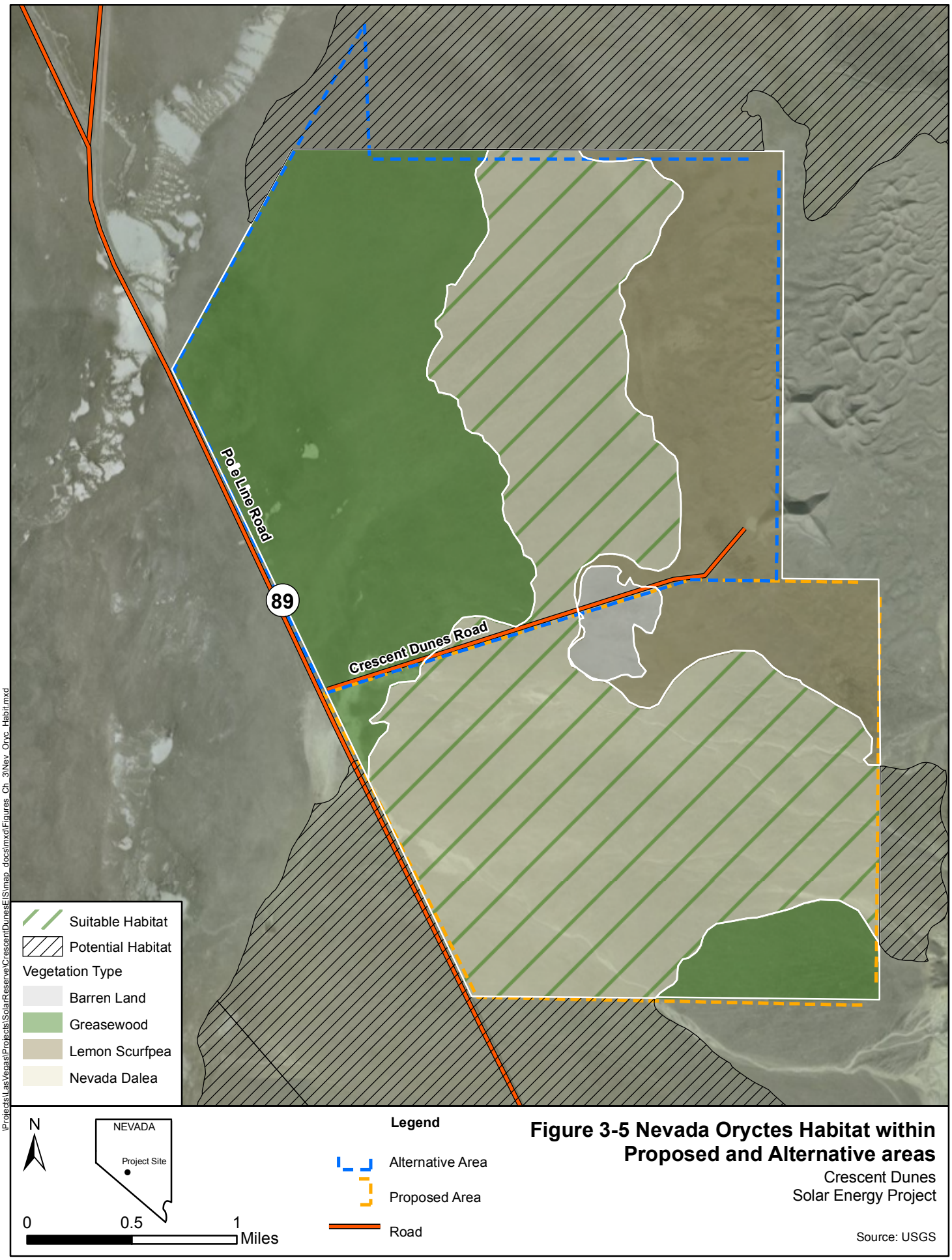


Figure 3-5 Nevada Oryctes Habitat within Proposed and Alternative areas

Crescent Dunes
Solar Energy Project

Source: USGS

3.4.1.3.2 Alternative Area

As discussed above, during 2010 field surveys biologists observed the Nevada oryctes (a BLM sensitive species) throughout approximately 1119 acres of the Alternative Area where the Mixed Salt Desert Scrub vegetation association is dominated by Nevada dalea and the soil is sandy. Because of the number of plants observed in the area, a detailed count of the plants was not obtained, but the boundary of the area within which the plants were observed was mapped (Figure 3-5, and Figure 3.15 in Section 3.8, Soils).

Additionally, one cactus species, sand cholla, was observed throughout the Alternative Area.

3.4.1.3.3 Borrow Pit

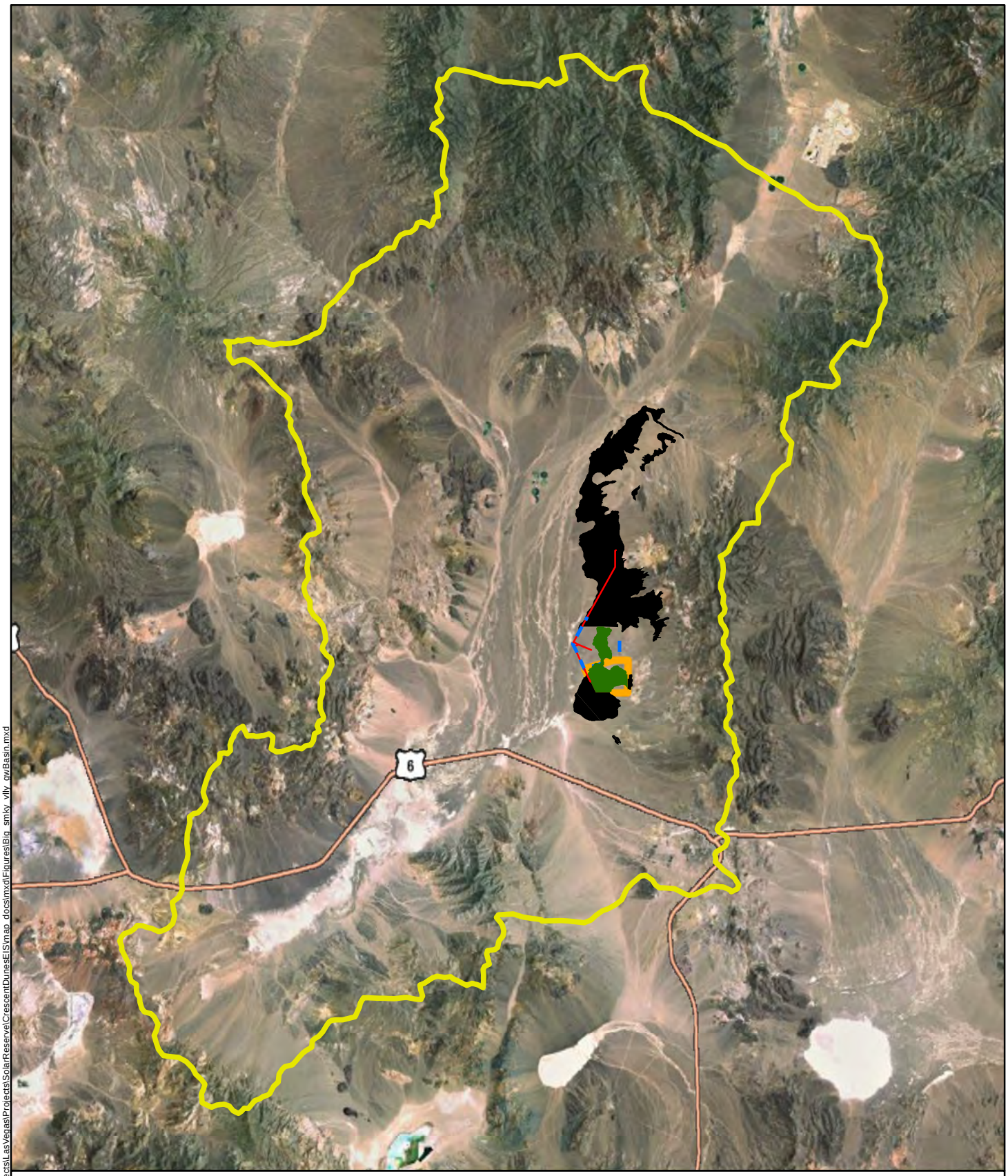
One cactus was found in proposed borrow pit. No other BLM sensitive species or associated habitat or soils were found throughout the borrow pit area (Figure 3.16 in Section 3.8, Soils).

3.4.1.3.4 TL and Anaconda Moly Substation

In 2009, one Nevada oryctes plant was found within the TL and Anaconda Moly Substation corridor (Figure 3-5). However, botanists observed that the Nevada dalea dominated the Mixed Salt Desert Scrub vegetation association throughout the TL corridor. As mentioned above, this is the vegetation association in which the Nevada oryctes was found to be common during the 2010 surveys. Although only one plant was found in 2009, the presence of this species is probably more widespread during years with optimal rainfall and temperatures, and may be more abundant within the TL corridor than previously documented.

3.4.1.3.5 CESA

Detailed surveys for special status plant species were not conducted throughout the CESA for this project. However, after overlaying the distribution of Nevada oryctes plants over the NRCS soils data it was determined that oryctes distribution is closely associated with the STC soil type (Figure 3-6). The STC soil type (i.e. oryctes habitat) occupies approximately 25,880 acres within the CESA. Additionally, information on observations of the species is available from the NNHP. Previous observations of the Nevada oryctes have been documented in Churchill, Esmeralda, Humboldt, Mineral, Pershing, Storey, and Washoe counties in Nevada, as well as Inyo County of California (NNHP 2001). Nevada oryctes may be found in similar soil types in these counties.



N

NEVADA

Project Site

0 5 10 Miles

Legend

Tonopah Flat sub area

Potential

Suitable

Planned Transmission Line

Alternative Area

Proposed Area

3-6 Nevada Oryctes Plant Habitat throughout the CESA

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

\Projects\LasVegasProjects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures\Big_smky_vly_awBasin.mxd

3.4.2 Special Status Wildlife Species

3.4.2.1 Area of Analysis and Methodology

The area of analysis for special status species includes the Proposed Area, Alternative Area; borrow pit, and TL and Anaconda Moly Substation corridor. The CESA for sensitive wildlife varied depending on the species. For pale kangaroo mice, the CESA was determined to be the Tonopah Flats Area (Figure 3-8). For golden eagles, the CESA was determined to be 10-mile radius around the perimeter of the detailed study area (Figure 3-9).

To develop a concise list of special status wildlife species potentially occurring in the detailed study area, data were compiled from USFWS (2009), the Nevada BLM Sensitive Species list, the Nevada State Protected Species list (NAC 503.030 for mammals, NAC 503.050 for birds, NAC 503.075 for amphibians, NAC 503.080 for reptiles), and the NHHP database. Agency biologists (USFWS, NDOW, and BLM) were consulted on several occasions to provide additional input. This information was used to develop a list of special status wildlife species that could occur within the project area. Species with no potential to occur because of documented range or distribution or a lack of preferred habitat (i.e., pinyon jays that only occur in pinyon-juniper habitat) were not included in this analysis. Based on an evaluation of listed species and habitats, and with concurrence from USFWS, no federally listed threatened, endangered, candidate, or proposed species occur in the project area (USFWS 2009a).

To assess the existing conditions of golden eagles in the project area and the CESA, BLM biologists, in coordination with USFWS biologists, developed a general approach to evaluate potential impacts on this species. The initial step was to evaluate data on previously documented and currently known nesting sites, and identify potential nesting habitat by reviewing topographic maps and other data. Multiple data sources were used to conduct this analysis including data from: NDOW, BLM, NRCS Soil Survey, MLRA, GAP, aerial photographs, current literature, Great Basin Bird Observatory, topographic maps, and National Climatic Data Center. BLM biologists conducted field surveys and aerial surveys of historic or known nesting sites and as well as potential habitat throughout the CESA. Field surveys for golden eagles were conducted June 4, 2010 in the southern portion of the San Antonio Mountains. Surveys focused on determining golden eagle occupancy and condition of two previously documented nests and potential nesting habitat in the area. Aerial surveys were on June 24, 2010 throughout the CESA. Transects were flown from southeast to northwest in a zigzag manner. All areas with rocky outcrops, mountains, and cliffs (i.e. potential golden eagle nesting habitat) were examined for golden eagles or sign (i.e. white wash or nests). Transects throughout portions of the CESA that were considered less suitable golden eagle habitat were approximately 2-3 miles apart. All potential golden eagles and nests locations were recorded with a GPS unit. Additionally, GAP data within the CESA was used to identify the extent of potential golden eagle habitat. The intermountain basin cliff and canyon land cover type was considered as potential nesting habitat.

According to NDOW, two Nevada State Protected Species could occur within the project area: the pale kangaroo mouse (*Microdipodops pallidus*) and the dark kangaroo mouse (*Microdipodops megacephalus*) (NDOW 2009). Field surveys were conducted in April 17–19 and May 5–19, 2010, to determine the

presence or absence of these species in the Proposed Area and Alternative Area. Evaluating potential habitat it was found that there would not be suitable habitat in and around the borrow pit and transmission line, therefore surveys were not recommended for these components. Surveys for kangaroo mice consisted of a live-trapping effort within different habitats (soil units) of the Proposed Area and Alternative Area. Ten trap lines were established in the Proposed Area and Alternative Area (five trap lines in each) (Figure 3-7). Additionally, two trap lines were established outside the Proposed and Alternative Areas. Trapping efforts were conducted for up to four nights at each trapping location. Trapping did not occur within the borrow pit or TL areas (JBR 2010a). Information on habitat and soil preferences for the pale kangaroo mouse gathered during field surveys were used to identify the amount of potential habitat for kangaroo mice throughout the CESA.

3.4.2.2 Regulatory Framework

3.4.2.2.1 Endangered Species Act of 1973

The Endangered Species Act protects plants and animals that are listed by the federal government as "endangered" or "threatened." The law requires federal agencies, in consultation with USFWS to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a "taking" of any listed species of endangered fish or wildlife. Likewise, the import, export, interstate, and foreign commerce of listed species are all generally prohibited.

3.4.2.2.2 Migratory Bird Treaty Act

The MBTA (16 USC 703) makes it unlawful to pursue, hunt, take, capture, kill, or possess any migratory bird, or part, nest, or egg of such bird listed in wildlife protection treaties among the United States and Great Britain (on behalf of Canada), Mexico, Japan, and the former Union of Soviet Socialist Republics. In addition, this act also contains a clause that prohibits baiting or poisoning of these bird species. The current list of species covered by MBTA can be found in 50 CFR 10.13. Because several migratory bird species may occur within the study corridor, the MBTA applies to those bird species that may be affected during implementation of the proposed project. The MBTA (16 USC 701–718h) prohibits the "taking" of any migratory birds, including hunting, pursuing, wounding, killing, possessing, or transporting any migratory bird, nest, egg, or part thereof.

3.4.2.2.3 Bald and Golden Eagle Protection Act

The Bald and golden eagle Protection Act (16 USC 668–668c) prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles or golden eagles, including pursing, shooting, poisoning, wounding, killing, capturing, trapping, collecting, molesting, or disturbing bald eagles or golden eagles. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner any bald or golden eagle, alive or dead, or any part, nest, or egg thereof."

3.4.2.2.4 BLM Policy

BLM has implemented policies for special status species found on BLM-managed lands. BLM's list of special status species includes species that are listed or proposed for listing under the Endangered Species Act (ESA) and species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. Additionally, all federal candidate species, proposed species, and delisted species (for 5 years after delisting) will be conserved as BLM sensitive species (BLM 2008b).

3.4.2.2.5 Nevada Regulations

The State of Nevada has identified wildlife species that are declining in their range throughout Nevada or are otherwise rare and at risk of extinction. Sensitive and protected animal species are protected in Title 45 of NRS (NRS 501.100 through 503.104). Classification of wildlife species and related regulations are detailed in Chapter 503 of NAC. Taking of these species is allowed only after obtaining necessary permits or authorizations from NDOW.

3.4.2.2.6 Nevada State Protection and Propagation of Native Fauna

NRS 503.584 through 503.589 provide for the protection and propagation of native fauna, including migratory birds. The Board of Wildlife Commissioners determines which species will be fully protected under this statute (i.e., State of Nevada Protected Species).

3.4.2.2.7 South Central Nevada Sage Grouse Conservation Plan

This plan covers the south central portions of Nevada, including the project area, and was prepared by the South Central Planning Team, which consists of concerned citizens, property owners, land managers, land users, local governments, and other interested parties (South Central Planning Team 2004). The conservation strategy in this document reflects ideas consistent with the Management Guidelines for Sage Grouse and Sagebrush Ecosystems in Nevada (BLM 2000), and the Western Association of Fish and Wildlife Agencies (Connelly et al. 2000). The conservation plan includes an initial analysis of sage-grouse populations and habitat within the south central Nevada sage-grouse planning area and indentifies management recommendations for these populations and habitats.

3.4.2.3 Affected Environment

3.4.2.3.1 Proposed Area

Mammals

Four sensitive mammal species could potentially occur in the Proposed Area. The listing status, a description of suitable habitat, and an assessment of the potential for the species to occur and the potential for impacts to the species are included in Table 3-13.

Table 3-13. Special status mammal species potentially found in the project area

Species	Status[a]	Habitat	Presence in Project Area
Pygmy Rabbit *Brachylagus idahoensis*	BLM	Dense sagebrush with friable soils	Unlikely, no evidence found in sagebrush habitats in borrow pit area
Dark Kangaroo Mouse *Microdipodops megacephalus*	NV Protected	Gravelly to sandy habitats	Potential
Pale Kangaroo Mouse *Microdipodops pallidus*	NV Protected	Sandy habitats	Potential
Desert Bighorn Sheep *Ovis canadensis nelsoni*	BLM	Mountains	Highly unlikely, other than crossing between mountain ranges
California Myotis *Myotis Californicus*	BLM	Lower Sonoran desert scrub to forests Roosts in cliff crevices	Potential forager in the area
Western Small-footed Myotis *Myotis ciliolabrum*	BLM	Desert scrub, grasslands, sagebrush steppe, pinyon-juniper woodlands Roosts in caves, mines, and trees	Potential forager in the area
Long-eared Myotis *Myotis evotis*	BLM	Found throughout the state primarily associated with forests. Roosts in hollow trees, mines, caves and buildings	Unlikely except during migration
Little Brown Bat *Myotis lucifugus*	BLM	Primarily found at higher elevations and higher latitudes Roosts in hollow trees, rock outcrops, buildings, and occasionally mines and caves	Unlikely except during migration
Fringed Myotis *Myotis thysanodes*	BLM	Found throughout central and southern Nevada in a wide variety of habitats from low desert scrub to high elevation forests Roosts in mines, caves, trees and buildings	Potential forager in the area
Western Pipistrelle *Pipistrellus hesperus*	BLM	Lower and upper Sonoran desert habitats Roosts in rock crevices, mines, caves, or occasionally buildings and vegetation	Potential forager in the area
Brazilian free-tailed bat *Tadarida brasiliensis*	BLM	Found in a wide variety of habitats throughout Nevada Roosts in cliff faces, mines, caves, buildings, bridges and hollow trees	Potential forager in the area

[a] BLM = Nevada BLM Sensitive Species, NV Protected = protected under Nevada Revised Statutes 501.105 and listed under Nevada Administrative Code 503.030

The pale kangaroo mouse relies on the sandy soils and the open salt desert scrub vegetation like the habitat that occurs near the dunes in the project area (Wilson and Ruff 1999). Although, the GAP vegetation data illustrate only a small area of the Active and Stabilized Dunes vegetation association (see Section 3.2, Vegetation) within the Proposed Area. Biologists noted that within the northeastern portion of the Proposed Area, the soils were sandier and contained more dune or "mini" dune features. Mini dune features are small sandy mounds that are vegetated with shrubs and little understory. This Mixed Salt Desert Scrub vegetation association was dominated by lemon scurfpea. Farther west of the

dunes, the Mixed Salt Desert Scrub vegetation association was dominated by Nevada dalea and also contained sandy soil or inclusions of mini dune features. It is within these two habitats where the most pale kangaroo mice were captured (JBR 2010a); therefore, these areas were delineated as suitable habitat (Figure 3-7). A small area of barren land was identified as potential habitat because it was close to the dune and lemon scurf pea community, and even though it did not have any vegetation, sandy soils were present. Generally, pale kangaroo mice were not trapped at sites that lacked sandy soils, dune, or mini dune features. This included the southeastern portion of the proposed project site where Bailey's greasewood was the dominant component of the Mixed Salt Desert Scrub vegetation association. Based on results of the field surveys, it was determined that kangaroo mouse suitable habitat was closely associated with two soil types including Dune Land (DU), and Tipperary fine sand (TGE). The Stumble Loamy Fine Sand soil type was identified both as suitable habitat and potential habitat. Within the proposed area, approximately 2,448 acres were identified as suitable habitat and 287 acres were identified as potential habitat.

Although historical literature identifies stabilized dunes as habitat for the dark kangaroo mouse (Hall and Linsdale 1929), more recent research shows that dark kangaroo mice prefer gravelly soils in valley bottoms dominated by sagebrush, rabbitbrush, and horsebrush (Ghiselin 1970; Wilson and Ruff 1999). During surveys, no dark kangaroo mice were captured in the Proposed or Alternative Areas, or off-site. Additionally, no dark kangaroo mouse habitat was observed in the Proposed or Alternative Areas.

As illustrated in Table 3-13, a wide variety of special status bats have the potential to occur in the area. Generally, bats are unlikely to roost in the area as most bat species roost in trees, cliff faces, mines, and buildings (Bradley et al. 2006), which are not present in the project area. However, bats may potentially forage throughout the project area or migrate through the Lower Big Smoky Valley.

Migratory Birds

Eleven bird species that are considered to have special status were observed or could potentially occur in the project area (Table 3-14). The listing status and a description of suitable habitat are included in Table 3-14.

In addition to the birds identified in Table 3-14, a wide variety of birds protected under the MBTA could utilize the Proposed Area for nesting, foraging, or as a migratory corridor. Field surveys were conducted during the avian spring migration period (May 2009, April/May 2010). Species observed included black-throated sparrows (*Amphispiza bilineata*) and loggerhead shrike (*Lanius ludovicianus*). Like most valleys in Nevada, the Big Smoky Valley contains playas that may be seasonally inundated and wetlands that could provide temporary habitat for migrating birds such as American avocets, vesper sparrows, and Northern Harriers, as well as others (Great Basin Bird Observatory 2010).

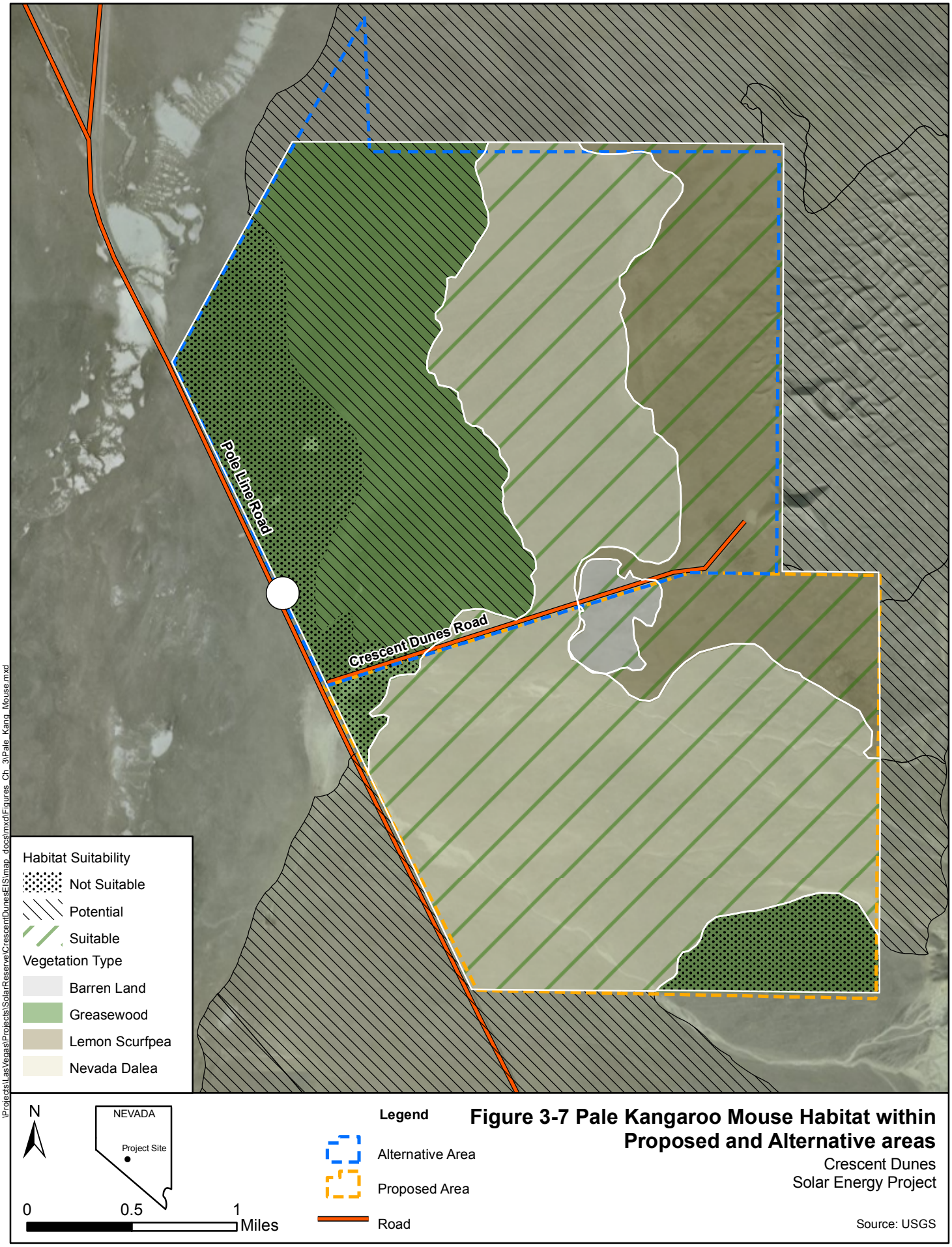


Figure 3-7 Pale Kangaroo Mouse Habitat within Proposed and Alternative areas

Crescent Dunes
Solar Energy Project

Source: USGS

Golden Eagles

Golden eagles were observed in the region of the proposed project during 2010 field surveys and from anecdotal observations of field staff. Like much of the Big Smoky Valley, the project area is potential foraging habitat for golden eagles, though it provides no unique resources compared with the remaining area, and does not contain roosting or nesting habitat. Field surveys by BLM biologists confirmed that a golden eagle nest in the San Antonio Mountains, approximately 8 miles southeast from the project area, was active and contained young birds (BLM 2010a). One inactive nest was found approximately 4 miles east of the proposed project area. This nest was determined to be inactive and not occupied this season based on the lack of fresh whitewash and the sloughing of the nest material. Overall, the condition of the nest was considered fair to good.

Table 3-14. Birds considered special status species observed in or that may occur in the project area

Species	Status[a]	Habitat	Presence in Project Area
Sage Sparrow *Amphispiza belli*	BLM	Sagebrush, saltbush, coastal scrub	Potential, not observed
Golden Eagle *Aquila chrysaetos*	BLM	Mountains, deserts, plains	Potential forager, nests have been documented within 5 miles of the Proposed Area
Short-eared Owl *Asio flammeus*	BLM	Open country, ground nester	Potential, no evidence of nesting found
Burrowing Owl *Athene cunicularia*	BLM	Open country, nest areas usually include elevated perch	Potential, very sandy nature of soils in majority of area may makes nesting unlikely
Swainson's Hawk *Buteo swainsoni*	BLM	Open country, plains, prairie, agricultural areas	Potential forager
Greater Sage-grouse *Centrocercus urophasianus*	BLM C	Sagebrush habitats	Unlikely, sagebrush in gravel pit area, but no evidence of sage-grouse found
Prairie Falcon *Falco mexicanus*	BLM	Open country, nests on cliffs and outcrops	Potential forager
Loggerhead Shrike *Lanius ludovicianus*	BLM	Open country in greasewood, sagebrush, agricultural areas	Observed in borrow pit area
Long-billed Curlew *Numenius americanus*	BLM	Wet and dry uplands, wetlands, agricultural fields	Potential migrant
Vesper Sparrow *Pooecetes gramineus*	BLM	Grasslands, farmlands, forest clearings, sagebrush	Potential migrant
Brewer's Sparrow *Spizella breweri*	NV Sensitive	Sagebrush habitat	Recorded in sagebrush in borrow pit area

[a] BLM = Nevada BLM Sensitive Species; NV Sensitive = protected under Nevada Revised Statutes (NRS) 501.105, NRS 501.110, NRS 501.181 and listed under Nevada Administrative Code 503.050; C = U.S. Fish and Wildlife Service candidate species

Reptiles

No special status reptiles were observed in or have the potential to occur within the Proposed Area.

Insects

Three BLM sensitive species of insects are endemic to the Crescent Dunes: Crescent Dunes Aegialia Scarab (*Aegialia crescent*), Crescent Dunes Aphodious Scarab (*Aphodius* sp.), and Crescent Dunes Sirican Scarab (*Serica ammomenisco*). According to NNHP, these species have been documented on Crescent Dunes. It is unlikely that these three species would be present in the Proposed Area because they are associated with the sand dunes and the dunes do not extend into the proposed project area.

Alternative Area

Since the Alternative Area is directly adjacent to the Proposed Area, the existing environment for wildlife special status species is very similar. Also, since the Alternative Area overlaps the Crescent Dunes, it is likely that endemic beetle species are present within the Alternative Area.

During 2010 trapping efforts, the presence of pale kangaroo mice was confirmed within the Alternative Area. Similar to the Proposed Area, more mice were caught in the eastern portion of the Alternative Area near the dunes where the Mixed Salt Desert Scrub Community was dominated by lemon scurfpea and Nevada dalea (Figure 3-7). Some pale kangaroo mice were caught in the Mixed Salt Desert Scrub vegetation association dominated by greasewood where sandier soils or mini dune features were present. However, no pale kangaroo mice were captured in the westernmost portion of the Alternative Area that was dominated by greasewood, where sandy soils or mini dune features were not present. Within the alternative area, approximately 1,936 acres were identified as suitable habitat and 1,227 acres were identified as potential habitat.

3.4.2.3.2 Borrow Pit

Special status wildlife species composition is similar to that of the Proposed Area. Species that are dependent on habitat near or endemic to the Crescent Dunes such as kangaroo mice and beetle species are not likely to be found in the borrow pit area because of the lack of appropriate habitat.

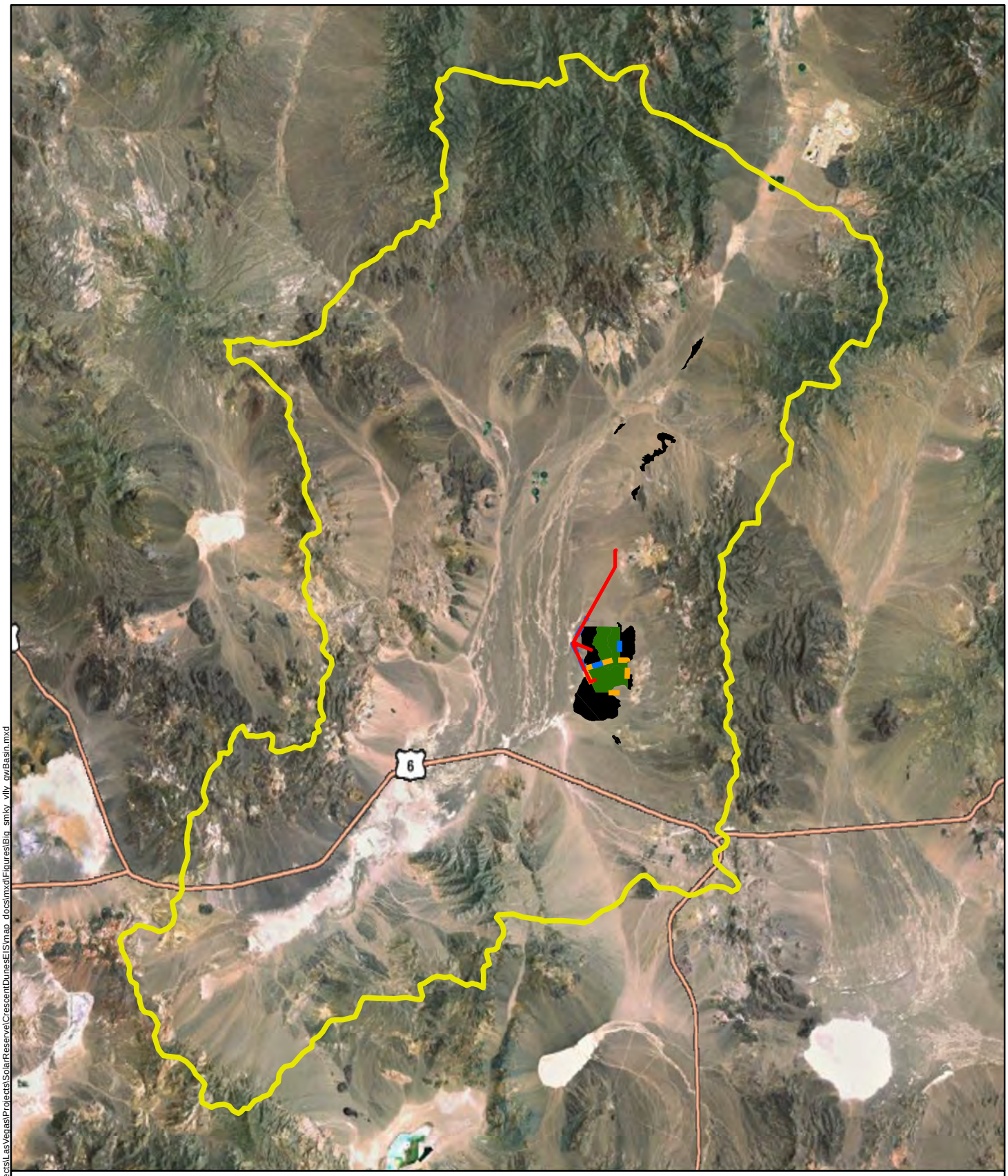
3.4.2.3.3 TL and Anaconda Moly Substation

Special status wildlife species composition is similar to the Proposed Area. Species that are dependent on habitat near or endemic to the Crescent Sand Dunes such as kangaroo mice and various beetle species area not likely to be found within the TL and Anaconda Moly Substation corridor because of the lack of appropriate habitat.

3.4.2.3.4 CESA

Special status wildlife species composition is similar to the Proposed Area. Pale kangaroo mice likely are found throughout the CESA. Approximately 29,343 acres of potential or suitable pale kangaroo mouse habitat were identified throughout the CESA (Figure 3-8).

Golden eagles are likely to nest within the CESA. During field surveys, biologists observed that one previously identified nest was occupied approximately 8 miles southeast of the proposed project area as well as an abandoned nest approximately 4 miles east of the proposed project area. Additionally, biologists recorded two incidental sightings of golden eagles. Biologist observed that the potential habitat within the CESA is limited. Rocky cliffs in the San Antonio Mountains and utility poles throughout the valley may provide roosting opportunities. Potential nesting habitat within the CESA is limited to the cliff and rocky outcrops (i.e. inter-mountain basins cliff and canyon GAP land cover type). Approximately 691 acres of potential nesting habitat exists within the San Antonio Mountains (Figure 3-9).



N

NEVADA

Project Site

0 5 10 Miles

Legend

Tonopah Flat sub area

Potential

Suitable

Planned Transmission Line

Alternative Area

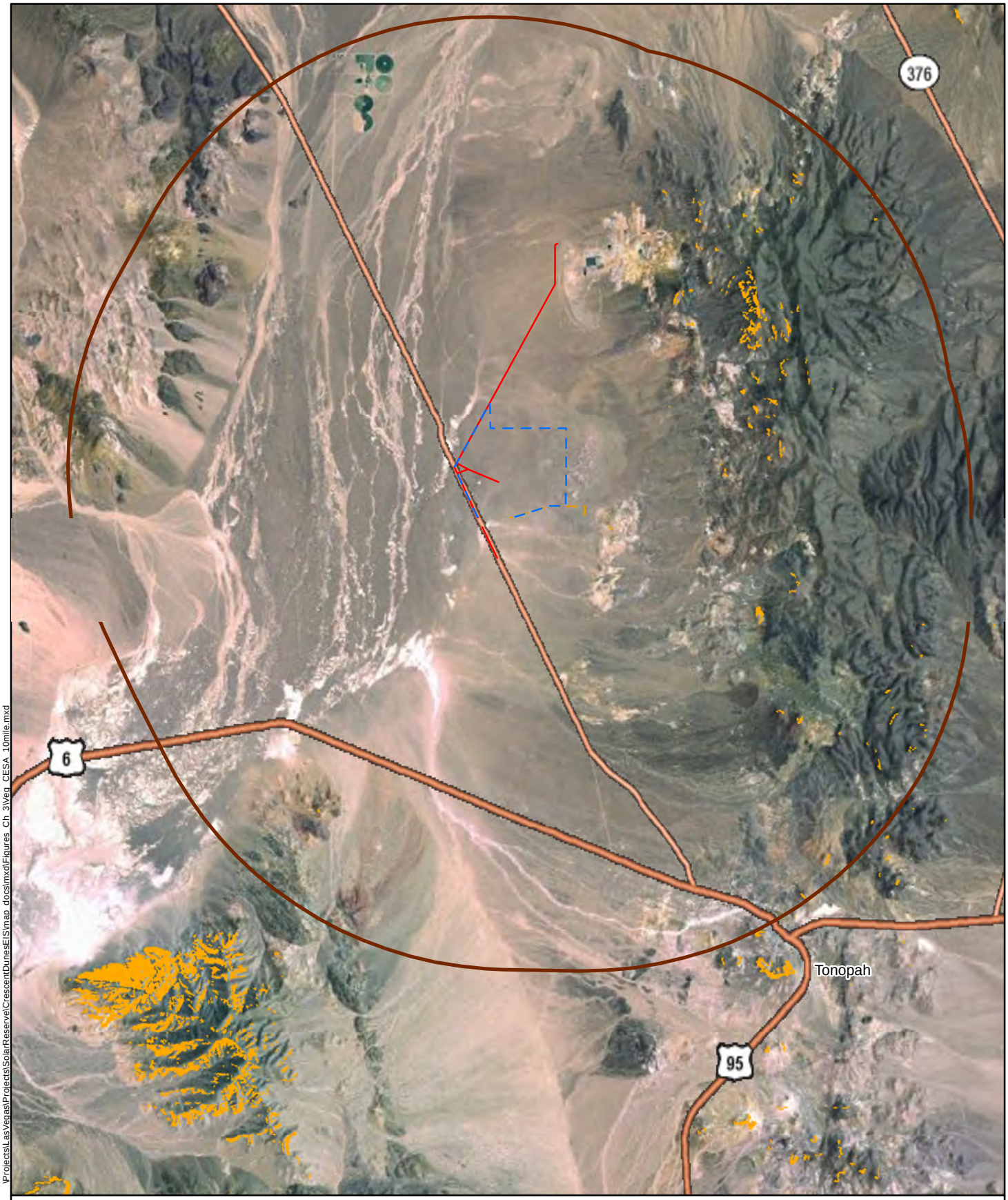
Proposed Area

Figure 3-8 Pale Kangaroo Mouse Habitat throughout the CESA

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures\Big_smky_vly_awBasin.mxd



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Veg_CESA_10mile.mxd

N

NEVADA

Project Site

0 2.5 5 Miles

Legend

Alternative Area

Planned

Proposed Site

Inter-Mountain Basins Cliff and Canyon (i.e. potential golden eagle habitat)

Figure 3-9. Potential Golden Eagle Nesting Habitat Throughout the CESA.

Crescent Dunes Solar Energy Project

Source: USGS

3.5 Water Quality and Quantity

3.5.1 Area of Analysis and Methodology

The area of analysis for water quality and quantity includes the Project Area, Alternative Area, borrow pit, and the TL and Anaconda Moly Substation corridor. In addition, there are two CESAs:

- Groundwater CESA – The 1-foot, 53-year draw down contour for the proposed groundwater well (Figure 3-10). The CESA for groundwater resources was developed using a numerical model developed by WorleyParsons (WorleyParsons 2010c) in cooperation with the BLM Nevada State Office. The full report is available at the BLM TFO for review.
- Surface water and stormwater drainage CESA – The subbasin within the Tonopah Flat (137A) hydrographic basin of the Big Smoky Valley watershed (see Figure 2-15). A subbasin has been delineated to define the CESA. The subbasin encompasses the northeastern quarter within hydrologic basin 137A. This subbasin accounts for the drainage area upstream of the project location bound by the San Antonio Range to the east, the Toiyabe Range to the north, and the valley downstream to the southwest where Peavine Creek drains. Aerial photography and USGS 10-foot interval topographic mapping was used to determine the hydrologic limits of the subbasin. This subbasin is considered the CESA for water quality and quantity.

3.5.2 Regulatory Framework

BLM is authorized by Section 313 of the Clean Water Act as amended (33 U.S.C. 1323), Section 1447 of the Public Health Service Act, as amended by the Safe Drinking Water Act (42 U.S.C. 300j-6), Section 6001 of the Solid Waste Disposal Act, as amended (42 U.S.C. 6961) and Section 22 of the Toxic Substances Control Act and Section 301 of Title Three of the United States Code to insure Federal compliance with the applicable pollution control requirements.

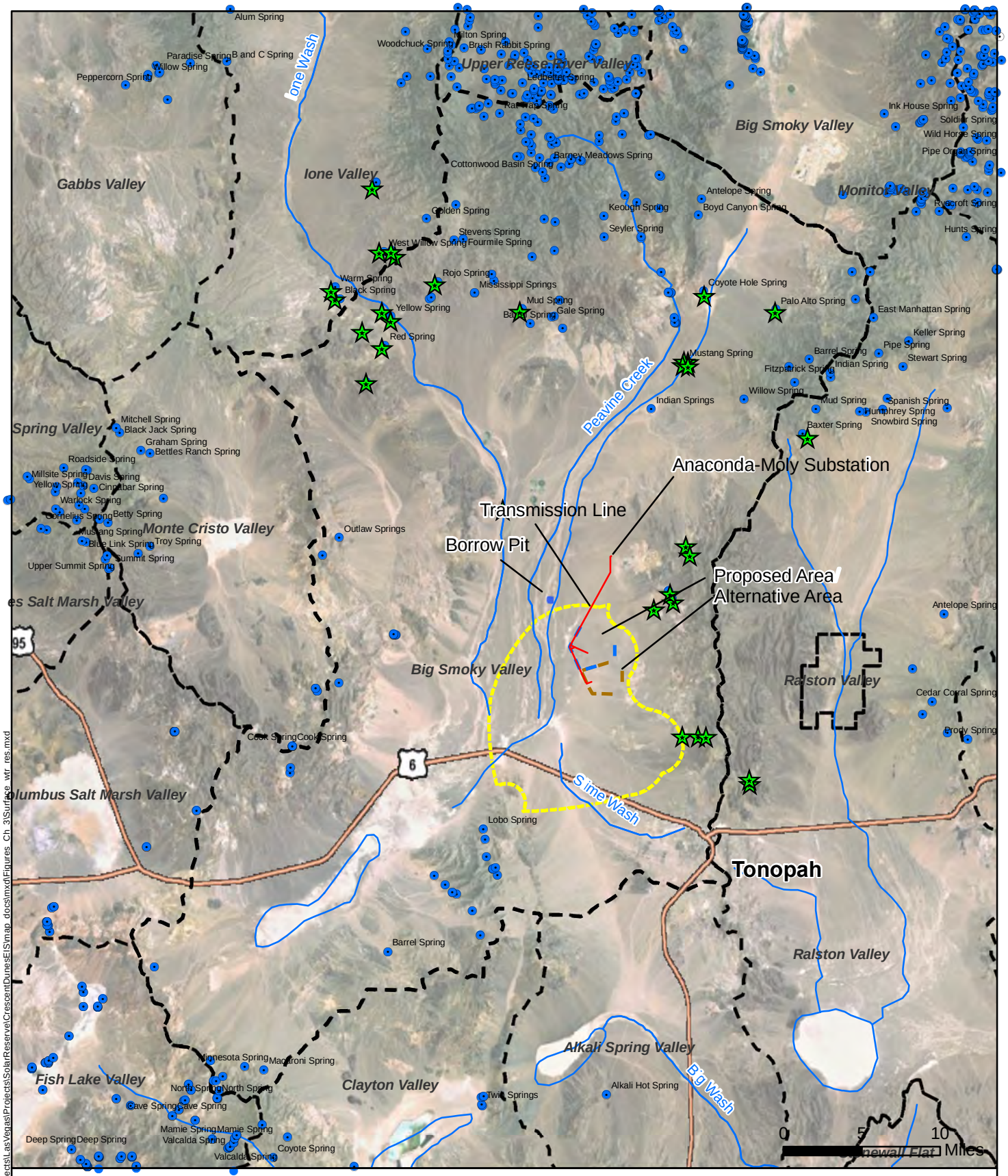
Nevada water law is based on prior appropriation and beneficial use. All water within the boundaries of the state, whether above or beneath the surface of the ground, belongs to the public and is subject to appropriation for beneficial use under the laws of the state (WorleyParsons 2010a).

An application with the State of Nevada has been filed by TSE for permission to retire active irrigation groundwater rights near the project area and to divert the rights approximately 10.6 miles southeast to the project area for industrial water use. The anticipated groundwater right quantity (consumptive use) to be granted to TSE and available for transfer is 854 AFY. It is estimated that only 600 AFY would be needed for facility operations.

3.5.3 Affected Environment

3.5.3.1 Groundwater

The project area is located in the Central Hydrographic Region and overlies the basin fill aquifer system that is composed primarily of alluvial, colluvial, and lacustrine deposits. Groundwater in the Tonopah Flat subarea flows horizontally from the mountains surrounding the subarea to the valley floor, reaching the water table through watercourse infiltration or percolation into rock fractures.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Surface_wtr_res.mxd

Figure 3-10 Surface Water Resources

Crescent Dunes Solar Energy Project

Source: ESRI 2010, USGS Seamless GIS Data Web Server

There are many springs and seeps within the Tonopah Flat (137A) hydrographic basin (Figure 3-11). Most springs are located in bedrock areas, and the closest springs to the project area are more than 10 miles away (WorleyParsons 2010a). A BLM database and a USGS National Hydrography Dataset both identify seeps, springs, and wells. An assessment of these databases indicates that no springs or seeps exist within the groundwater CESA.

The general depth to water in the Tonopah Flat subarea is typically greater than 100 feet bgs, and some central locations of the subarea have depths to groundwater ranging from 0–100 feet bgs (Figure 3-11). The test well drilled by TSE indicates that the depth to groundwater at the project area is approximately 172 feet bgs.

Historical groundwater consumption in the undeveloped Tonopah Flat subarea is attributed to agriculture water use. This includes irrigation of crop and pasture land and stock watering. Current groundwater consumption is summarized in Table 3-15.

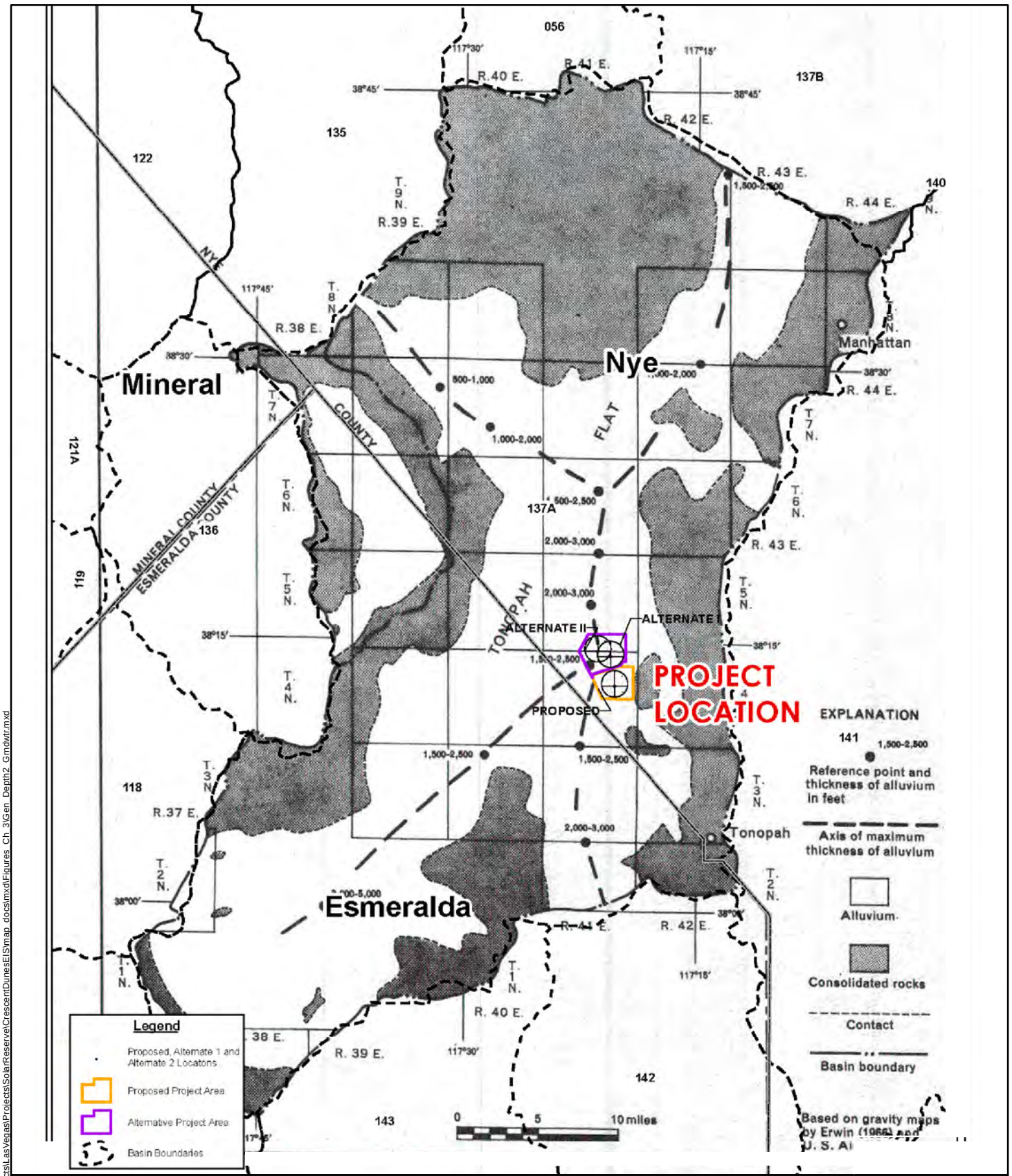
Table 3-15. Current groundwater consumption in the Tonopah Flat subarea

Manner of Use	Nevada Division of Water Resources (2010)	Nye County Water Resources Plan (Buqo 2004)
	acre-feet per year	acre-feet per year
Irrigation	10,204.69	11,797.00
Mining and Milling	8,330.76	12,683
Municipal	58.95	1,507
Quasi-Municipal	20.84	14
Stockwater	916.31	864
Total	**19,531.55**	**26,865.00**

Source: WorleyParsons 2010

The Tonopah subarea reportedly has 12,000 acre-feet (AF) of annual recharge, 2,000 AF of annual inflow, 6,000 AF of annual evapotranspiration, and 8,000 AF of annual outflow (Buqo 2004). The perennial yield (safe yield) is estimated at 6,000 AF per year (Buqo 2004). The total water rights demand through March 1999 was reportedly at 26,724 AF per year (AFY). However, these are the estimated committed water rights in the subarea and do not represent the actual groundwater withdrawal and consumption, which are significantly less (Buqo 2004). The majority of the water rights are committed to irrigation, mining, and milling.

Total dissolved solids (TDS) are very low in surface water as precipitation enters the Tonopah Flat subarea hydrologic system. TDS increases as surface water flows from the mountains to the valley. Similarly, groundwater TDS is lowest in the mountains and highest in the valley where water is evaporated or vegetation is present. In general, the groundwater quality in the subarea is suitable to marginally suitable, but groundwater in portions of the subarea where groundwater is shallow exceeds state and/or federal drinking water standards for TDS (WorleyParsons 2010a).



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Gen_Depth2_Gmdwtr.mxd

Figure 3-11 Generalized Depth to Groundwater

Crescent Dunes Solar Energy Project

Source: Worley Parsons, 2010

According to the Nevada State Engineer well log database, there are 173 logged wells within the Tonopah Flat subarea, and they are shown on Figure 3-12 (State of Nevada Department of Conservation and Natural Resources Division of Water Resources 2010). Several of the wells closest to the project location are summarized in Table 3-16, based on data (WorleyParsons 2010a) tabulated from the Nevada State Engineers well log.

Table 3-16. Summary of wells within the project CESA

Well Number	Well Depth (feet below ground surface)	Water Level (feet below ground surface)	Water Quality	Use/Notes
11	280	50	Good	Municipal
12	350	36	Not available	Quasi-municipal
13	100	40	Not available	Mining
16	312	9	Not available	Domestic
21	30	15	Not available	Unknown
22	30	No water	Not available	Unknown
23	400	Dry	Not available	Abandoned stock
24	179	20	Not available	Domestic
43	200	Not available	Not available	Abandoned, cemented
44	220	104	Good	Stock, replacement well
45	255	68	Not available	Stock

3.5.3.1.1 Proposed Area

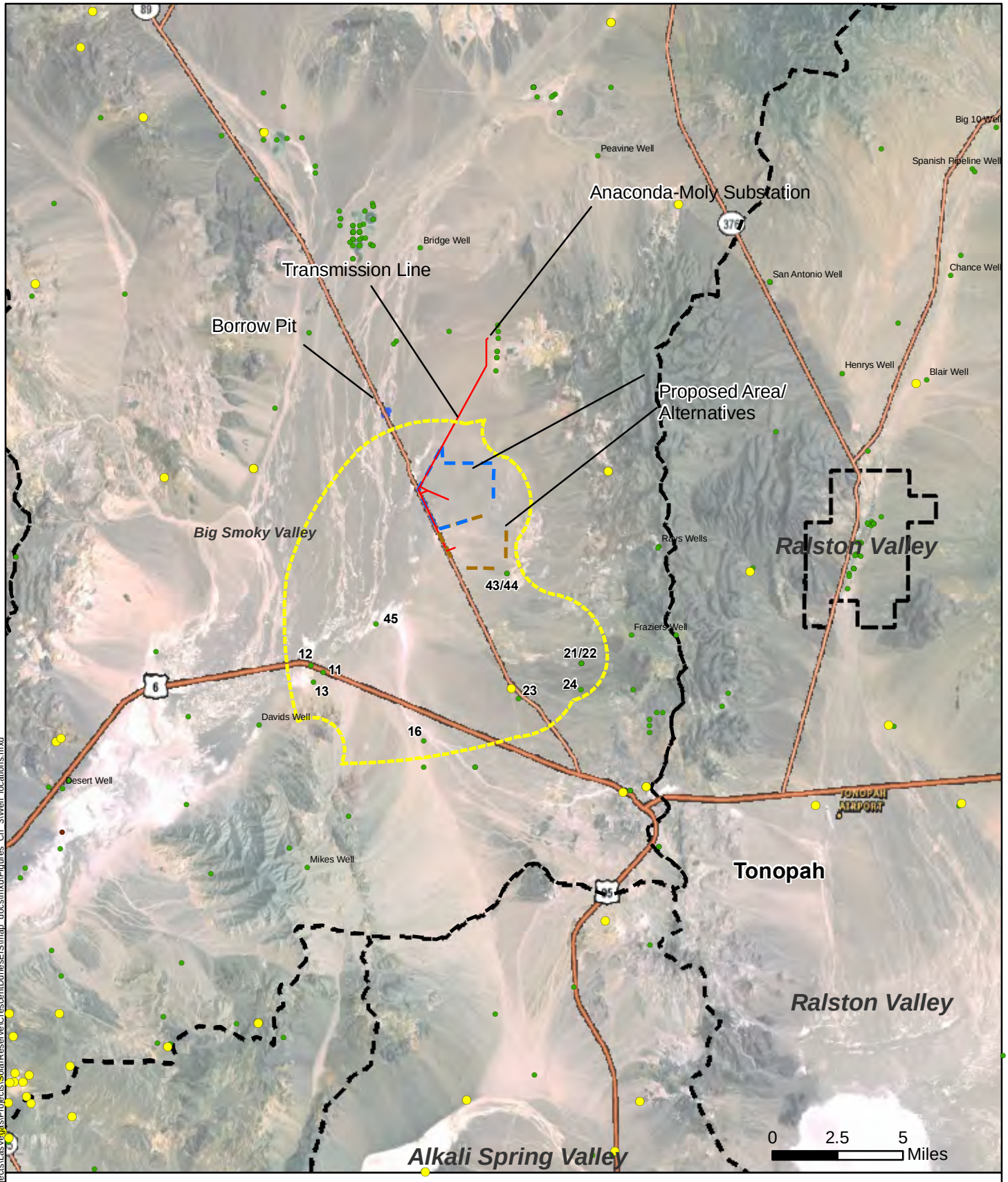
The Proposed Area is located in the region where the depth to groundwater is greater than 100 feet bgs. A TSE test well has been drilled and installed near the northern boundary of the area. Groundwater wells numbers 43 and 44 are located outside of the southeastern corner of the Proposed Area boundary (State of Nevada Department of conservation and Natural Resources Division of Water Resources 2010). Rogers Well (USGS 2010) is located within 1 mile of the western boundary of the Proposed Area. No seeps or springs are located within the Proposed Area boundary.

3.5.3.1.2 Alternative Area

The Alternative Area is located in the region where the depth to groundwater is greater than 100 feet bgs. There are no existing wells located within the boundary of the Alternative Area, but the TSE test well will be drilled and installed near the southern boundary of the area. No seeps or springs are located within the Alternative Area boundary.

3.5.3.1.3 Borrow Pit

The borrow pit is located in the region where the depth to groundwater ranges from 50–100 feet bgs. No seeps, springs, or existing wells are located in the vicinity of the borrow pit.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Well_locations.mxd

Figure 3-12 Well Locations
Crescent Dunes
Solar Energy Project

Source: ESRI 2010, USGS Seamless GIS Data Web Server

3.5.3.1.4 TL and Anaconda Moly Substation

The TL corridor and the Anaconda Moly Substation are located in the region where the depth to groundwater is greater than 100 feet bgs. No seeps, springs, or existing wells are located within the TL corridor or at the Anaconda Moly Substation. Seven sink/rise locations have been identified within a 1-mile buffer of the TL corridor (USGS 2010).

3.5.3.1.5 CESA

Nine existing groundwater wells are located within the CESA. Well numbers 11, 12, 13, 16, 21, 22, and 23 are located between the 1- and 1.5-foot draw down contours. Well numbers 43 and 44 are located at the 2-foot draw down contour, see Figure 3-12 (WorleyParsons 2010a).

3.5.3.2 Surface Water

Hydrographic basin 137A of the Big Smoky Valley (Tonopah Flat subarea) is a semiarid to arid desert climate that has a season of winter cold fronts and a season of summer monsoons. Most precipitation falls in the winter, with an annual average precipitation of 4–8 inches per year over the basin (WorleyParsons 2010a). Because most of the precipitation in the area falls in the mountains, the primary source of surface water is generated from runoff in short watercourses in the surrounding mountain ranges. These watercourses drain steeply to the adjacent valleys, where they seep into the sediments and evaporate.

Within the Tonopah Flat subarea, the majority of the basin alluvial valley is undeveloped desert rangeland, with patches of agriculture, surrounded by rocky mountain ranges. The basin's primary source of surface water is stormwater runoff in intermittent streams originating in the Toiyabe Range and stormwater flowing southeast into Tonopah Flat from Ione Valley, including Knickerbocker, Cloverdale, Cottonwood, and Peavine creeks (WorleyParsons 2010a). Peavine Creek, the largest drainage from Toiyabe Range to Tonopah Flat, passes approximately 2 miles west and downgrade of the project location, terminating as it loses flow on the alluvial apron of the valley floor. Figure 3-10 shows the surface water resources in the basin.

Approximately 30 springs and seeps were identified around the boundary of the Tonopah Flat subarea. Most springs identified by WorleyParsons are located in bedrock areas, with the closest springs and seeps located more than 10 miles from the project area (WorleyParsons 2010a).

Within this subbasin, one watercourse has a mapped floodplain. Peavine Creek is a Federal Emergency Management Agency (FEMA) mapped effective Zone A floodplain (FEMA FIRM 32023C4450E, February 17, 2010). A Zone A floodplain has a 1 percent annual chance of flooding. It should be noted that a detailed analysis has not been performed for the area, so no depth or base flood elevation is given.

Aerial photographs and USGS maps of the area show several ephemeral drainage paths that drain west from the San Antonio Range and pass through the CESA. JBR conducted a field visit in the area and concluded that these ephemeral drainage paths lose definition and do not reach Peavine Creek (JBR 2009). Based on preliminary field surveys, JBR recommended to the USACE that Peavine Creek and

its tributaries are isolated intrastate waters with no apparent interstate or foreign commerce connection and would, therefore, not be considered subject to jurisdiction under the Clean Water Act (JBR 2009).

Federal reserved water rights are primarily limited to Public Water Reserves (PWRs) for the BLM in Nevada. In 1926, an EO created "Public Water Reserves No. 107," which ended the site-specific system of reserving springs and water holes. Prior to PWR 107, federal agencies identified springs and public water holes to be reserved as chronologically numbered PWRs. PWR 107 was created to reserve public water holes and natural springs yielding amounts in excess of homesteading requirements. This order states that "legal subdivision(s) of public land surveys which is vacant, unappropriated, unreserved public land and contains a spring or water hole, and all land within one quarter of a mile of every spring or water be reserved for public use" (BLM 2010b). PWR 107 was not intended to reserve the entire yield of each public spring or water hole. All waters from these sources in excess of the minimum amount necessary for domestic human consumption and stock watering purposes are available for appropriation through state water law.

3.5.3.2.1 Proposed Area

The Proposed Area is located primarily in undeveloped desert rangeland and is set at the foothills of the San Antonio Range. There are a few existing ephemeral surface water drainage paths that meander across the Proposed Area boundary, draining to the west from the San Antonio Mountains and Crescent Dunes (Figure 3-10). Ephemeral washes show the path that surface water runoff typically takes during intense storms. The Proposed Area has very low vegetation density, which is common with ephemeral wash conditions.

There is a culvert crossing under SH 89, but a field visit conducted by JBR revealed that the ephemeral drainage paths that cross the Proposed Area lose definition before reaching the culvert at the highway (JBR 2009).

Off-area stormwater sheet flow may be allowed to follow its present drainage paths and continue to flow through the project area where the solar field would be constructed. If it is decided that the off-area storm flows will be routed around the area (after detailed design and consultation with Nye County), flows would discharge to historic flow paths downstream of the area. If detention basins are required for storm flows from the solar field, they will be sized to meet current stormwater requirements.

No PWR 107 waters are located within the limits of the Proposed Area.

3.5.3.2.2 Alternative Area

Located directly north of the Proposed Area, the Alternative Area is also located at the foothills of the San Antonio Range where the land is primarily undeveloped desert rangeland. There is one potential existing ephemeral drainage path crossing into the Alternative Area at the eastern boundary.

No PWR 107 waters are located within the limits of the Alternative Area.

3.5.3.2.3 Borrow Pit

The borrow pit is located northwest of the project area location and just southeast of the intersection of Peavine Creek and SH 89. A culvert crossing under SH 89 conveys Peavine Creek's intermittent flow. An ephemeral reach branches from Peavine Creek upstream of SH 89 and passes through the borrow pit area.

No PWR 107 waters are located within the limits of the proposed borrow pit.

3.5.3.2.4 TL and Anaconda Moly Substation

Several existing ephemeral drainage paths from the San Antonio Range cross the proposed TL corridor. The ephemeral drainages cross in various locations starting at a point where the corridor turns east from SH 89 and continues along the existing TL to the Anaconda Moly Substation. None of these ephemeral washes reach Peavine Creek.

No PWR 107 waters are located within the limits of the proposed TL and substation corridor.

3.5.3.2.5 CESA

The ephemeral washes discussed above continue through the CESA, ending at the ephemeral Peavine Creek. No seeps and springs are located within the defined CESA.

Several PWR 107 waters are located within the surface water CESA. The closest PWR 107 is located approximately 4.5 miles northeast of the northeastern corner of the Alternative Area. Three are located just outside of the surface water CESA limits, approximately 6 miles southeast from the southeastern corner of the proposed site.

3.6 Air Quality

3.6.1 Area of Analysis

The area of analysis for air quality includes hydrographic subbasins 53, 139, and 153, which encompasses all of the Proposed Area, Alternative Area, borrow pit, and TL and Anaconda Moly Substation corridor. The CESA includes the same area.

3.6.2 Regulatory Framework

3.6.2.1 Federal Air Quality Regulations

The federal Clean Air Act of 1970 was the first comprehensive legislation aimed at reducing levels of air pollution throughout the country. The 1970 law required the EPA to establish National Ambient Air Quality Standards (NAAQS), which set maximum allowable concentrations for six criteria pollutants: carbon monoxide, nitrogen dioxide, ozone, particulate matter, sulfur dioxide, and lead, as shown in Table 3-17 and briefly described below.

Table 3-17. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon monoxide (CO)	1-hour	35 ppm[a]	NS[b]
	8-hour	9 ppm	NS
Nitrogen dioxide (NO_2)	1-hour	0.100 ppm[c]	NS
	Annual	0.053 ppm	0.053 ppm
Ozone (O_3)	8-hour (1997 standard)	0.08 ppm[d]	0.08 ppm
	8-hour (2008 standard)	0.075 ppm[d]	0.075 ppm
Particulate matter (PM_{10})	24-hour	150 µg/m^3 [e]	150 µg/m^3
Fine particulate matter ($PM_{2.5}$)	24-hour	35 µg/m^3	35 µg/m^3
	Annual	15 µg/m^3	15 µg/m^3
Sulfur dioxide (SO_2)	3-hour	NS	0.5 ppm
	24-hour	0.14 ppm	NS
	Annual	0.03 ppm	NS
Lead	Rolling 3-month average	0.15 µg/m^3	0.15 µg/m^3
	Quarterly	1.5 µg/m^3	1.5 µg/m^3

Source: 40 Code of Federal Regulations § 50

[a] parts per million

[b] no standard

[c] based on a 3-year average of the 98th percentile of the daily maximum 1-hour average

[d] based on a 3-year average of the 4th highest concentration

[e] micrograms per cubic meter

Carbon monoxide (CO) is a colorless, odorless gas resulting from the incomplete combustion of carbon-based fuels, including petroleum products. In most areas, vehicle emissions are the primary source of CO.

Nitrogen dioxide (NO_2) is a yellowish-orange to reddish-brown gas resulting from high temperature combustion. Diesel vehicles and power plants are major sources of NO_2.

Ozone (O_3) is produced through a complex chemical reaction in which precursor compounds, such as hydrocarbons and nitrogen oxides, are transformed by sunlight into O_3 molecules, which consist of three oxygen atoms. The primary sources for O_3 precursors are vehicle and industrial emissions.

Particulate matter (PM_{10} and $PM_{2.5}$) consists of suspended dust, fibers, combustion ash, and other fine particles. The major source is industrial emissions, but it also results from diesel vehicle emissions, unpaved roadways, agricultural activity, and mechanical resuspension on paved roads from vehicle activity.

Sulfur dioxide (SO_2) is a colorless gas with a rotten egg odor that results from the combustion of fuels containing sulfur. Primary sources are coal-fired power plants, industrial plants, and metals smelters, with some emissions from diesel vehicles burning low-grade fuels.

Lead in the atmosphere results primarily from the burning of leaded fuels; this type of pollution has been drastically reduced in the United States in recent years with the ban on leaded automobile fuels.

Amendments to the Clean Air Act were passed in 1977 and 1990. Among many revisions included in the amendments are requirements for nonattainment areas and State Implementation Plans for areas that do not meet the standards.

For most of the criteria pollutants, two standards have been established: a primary standard and a secondary standard. The primary standard was established with the goal of protecting public health, while the secondary standard is intended for the protection of the public welfare.

3.6.2.1.1 Class I Federal Lands

Class I federal lands consist of 156 national parks and wilderness areas across the country for which pristine air quality and visibility are protected. Regulations pertaining to Class I areas affect major projects within 100 kilometers (about 60 miles) of designated lands.

The nearest Class I areas to the project area are a series of national parks and wilderness areas in the Sierra Nevada of California, including Yosemite National Park, Kings Canyon National Park, John Muir Wilderness, and Ansel Adams Wilderness. The closest of these areas is approximately 90 miles (150 kilometers) from the project area, which is outside of the 100-kilometer regulatory threshold.

3.6.2.2 State Air Quality Regulations

Nevada has established state-specific ambient air quality standards, which are maintained by the NDEP. With a few exceptions, the Nevada standards mirror the NAAQS (NDEP 2010a). Notable differences in the two sets of standards, with the Nevada standard being more stringent than the NAAQS, are:

- hydrogen sulfide (0.08 parts per million [ppm], 1-hour average)
- a separate CO standard for elevations at or above 5,000 feet above sea level (6 ppm, 8-hour average)
- an 0_3 standard specific to the Lake Tahoe Basin (0.10 ppm, 1-hour average)

Recent changes in the NAAQS have made them more stringent than the state standards for several of the pollutants, specifically NO_2, O_3, lead, and $PM_{2.5}$.

3.6.2.3 Local Air Quality Regulations

The project area is located in the northwestern portion of Nye County, which regulates air quality in terms of dust control for construction areas; however, those regulations apply only in the Pahrump Regional Planning District in the southern portion of the county. There are no local air quality regulations applicable to the project area.

3.6.2.4 Potential Permits

The NDEP Bureau of Air Pollution Control issues several types of permits for construction and operation of projects (NDEP 2010a). The type of permit required depends on the project size and quantity of

pollutant emissions expected from the project. Major sources—those generating more than 100 tons per year of any one regulated pollutant—require a Class 1 permit, while minor sources—those generating less than 100 tons per year of any one regulated pollutant—require a Class 2 permit. A third classification, a Class 3 permit, is available for small sources generating less than 5 tons per year in total regulated air pollutants. For construction activities, a Surface Area Disturbance permit is required if the total surface area disturbance is greater than 5 acres.

For the proposed project, a Surface Area Disturbance permit would be required for construction and either a Class 2 or Class 3 permit would be required for facility operation. The actual class of permit needed would be determined through modeling and dispersion of project-generated emissions.

3.6.3 Climate Change

Ongoing scientific research as identified the potential impacts of anthropogenic (i.e., man-made) greenhouse gas (GHG) emissions and changes in biological carbon dequestration due to land management activities on global climate. Through complex interactions on a regional and global scale, these GHG emissions and net losses of biological carbon sinks cause a net warming effect of the atmosphere, primarily by decreasing the amount of heat energy radiated by the earth back into spacel Although GHG levels have varied for millennia, recent industrialization and burning of fossil carbon sources have caused CO_2 concentrations to increase dramatically, and are likely to contribute to overall global climatic changes. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that "warming of the climate system in unequivocal" and "most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."

Global mean surface temperatures have increased nearly 1.8°F from 1890 to 2006. Models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Northern latitudes (above 24°N) have exhibited temperature increases of nearly 2.1°F since 1900, with nearly a 1.8°F increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHGs are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 2.5 to 10.4°F above 1990 levels. The National Academy of Sciences has confirmed these findings, but also has indicated thare are uncertainties regarding how climate changes may affect different regions. Computer model predictions indicate that increases in temperature would not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be greater than during the summer, and increases in daily minimum temperatures is more likely than increases in daily maximum temperatures. Increases in temperatures would increase water vapor in the atmosphere, and reduce soil moisture, increasing generalized drought conditions, while at the same time enhancing heavy storm events. Although large-scale spatial shifes in precipitation distribution may occur, these changes are more uncertain and difficult to predict.

As with any field of scientific study, there are uncertainties associated with the science of climate change. This does not imply that scientists do not have confidence in many aspects of climate change science. Some aspects of the science are known with virtual certainty, because they are based on well-known physical laws and documents trends (USEPA 2008).

Several activities contribute to the phenomena of climate change, including emissions of GHGs (especially CO_2 and methane) from fossil fuel development, large wildfires, and activities using combustion engines; changes to the natural carbon cycle; and changes to radiative forces and reflectivity (albedo). It is important to note that GHGs would have a sustained climatic impact over different temporal scales. For example, recent emissions of CO_2 can influence climate for 100 years.

It may be difficult to discern whether glocal climate change is already affecting resources in the proposed project area. In most cases, there is more information about potential or projected effects of global blimate change on resources. It is important to note that projected changes are likely to occur over several decades to a century. Therefore, many of the projected changes associated with climate change may not be measurably discernible within the reasonably foreseeable future.

3.6.4 Affected Environment

3.6.4.1 Regional Climate

The project area is located in the northwestern portion of Nye County in southwestern Nevada. The project area is situated at an elevation of approximately 5,000 feet above sea level and lies within a portion of the Great Basin Desert. Climate in the Great Basin Desert is characterized by hot summers, cold winters, and very low precipitation.

The nearest weather station to the project area is at the Tonopah Airport, approximately 15 miles southeast of the project area. Average daily maximum temperatures recorded at this station during the summer months range between 84°F and 91°F. Average minimum daily temperatures in the winter months range between 19°F and 24°F. Annual precipitation averages just less than 6 inches and is distributed throughout the year. Total annual snowfall averages about 13 inches, but accumulation is uncommon, as monthly snow depth averages 0 inches. A summary of average temperature and precipitation is presented in Table 3-18.

Table 3-18. Climate data for Tonopah Airport, Nevada (1971–2000)

Month	Average Daily Temperature (°F)[a]	Average Daily Maximum Temperature (°F)	Average Daily Minimum Temperature (°F)	Average Precipitation (inches)
January	32.1	44.4	19.8	0.47
February	37.1	49.8	24.3	0.56
March	42.4	56.1	28.7	0.62
April	49.0	63.8	34.1	0.46
May	57.8	73.3	42.3	0.62
June	67.4	84.2	50.5	0.33
July	73.6	91.0	56.2	0.47
August	71.5	88.5	54.5	0.68
September	63.8	80.1	47.4	0.51
October	52.5	68.0	37.0	0.40
November	38.5	51.7	25.3	0.43
December	32.2	44.9	19.5	0.35
Annual	51.6	66.5	36.7	5.90

Source: Western Regional Climate Center 2010b

[a] in degrees Fahrenheit

3.6.4.2 Proposed Area

The NDEP Bureau of Air Quality Planning maintains a network of air monitoring sites throughout most of Nevada, although Washoe and Clark counties conduct their own air quality monitoring. Monitoring sites vary in the extent and number of pollutants monitored, with some sites monitoring one pollutant and others monitoring several pollutants. Some of the monitoring sites operate for the entire year, while others operate for the peak pollutant season only.

There are no monitoring sites near the project area. The nearest monitoring sites to the project area are the Fallon Site, located at West End Elementary School in Fallon, approximately 110 miles northwest of the project area, and four sites located around Pahrump, approximately 155 miles southeast of the project area. The Fallon monitoring site collects data on O_3 only, while the Pahrump monitoring sites collect data on PM_{10} only. The Fallon site recorded 1 day above the 8-hour O_3 standard, and the Pahrump-Wilson Road site recorded 2 days above the 24-hour PM_{10} standard. Exceedances, however, are based on longer-term trends. For O_3, the standard is based on a 3-year average of the fourth-highest daily maximum 8-hour average concentration. For PM_{10}, the standard is not to be exceeded more than once per year on average over a 3-year period. There were no exceedances of either the 8-hour O_3 or the 24-hour PM_{10} standard at the Fallon or Pahrump monitoring sites. A summary of the concentrations monitored at these locations is presented in Table 3-19.

Table 3-19. 2008 air quality monitoring data

Monitoring Site	Pollutant	Averaging Time	Concentration		Number of Days Above Standard[a]	Number of Exceedances[a]
			Maximum	Fourth Highest		
Fallon[b]	O_3	8-hour	0.078 ppm[c]	0.068 ppm	1	0
Pahrump – Linda Street[d]	PM_{10}	24-hour	63 µg/m^3 [e]	57 µg/m^3	0	0
Pahrump – Red Butte[f]	PM_{10}	24-hour	126 µg/m^3	75 µg/m^3	0	0
Pahrump - Gamebird[g]	PM_{10}	24-hour	94 µg/m^3	74 µg/m^3	0	0
Pahrump – Wilson Road[h]	PM_{10}	24-hour	223 µg/m^3	119 µg/m^3	2	0

Source: U.S. Environmental Protection Agency 2010

[a] The National Ambient Air Quality Standards for ozone (O_3) and particulate matter (PM_{10}) are based on 3-year averages. The number of days above the standard column is for information only, because these data alone do not result in a violation. The number of exceedances column show violations of the standard.

[b] West End Elementary School, 280 South Russell Street, EPA Area ID 32-001-0002

[c] parts per million

[d] 8825 North Linda Street, EPA Area ID 32-023-0011

[e] micrograms per cubic meter

[f] 1500 Red Butte, EPA Area ID 32-023-0012

[g] 781 East Gamebird, EPA Area ID 32-023-0013

[h] 1020 East Wilson Road, EPA Area ID 32-023-0014

The Clean Air Act amendments of 1977 and 1990 authorized the EPA to designate areas that have not met the NAAQS as being in nonattainment and to classify the severity of the nonattainment. Each nonattainment area requires a State Implementation Plan that outlines the actions that will be taken to reduce air pollution to levels that achieve compliance with the NAAQS. This proposed project lies within an area that is designated as being in attainment for all of the NAAQS.

3.6.4.3 Alternative Area

Conditions for the Alternative Area are the same as for the Proposed Area.

3.6.4.4 Borrow Pit

Conditions for the borrow pit are the same as for the Proposed Area.

3.6.4.5 TL and Anaconda Moly Substation

Conditions for the TL and Anaconda Moly Substation are the same as for the Proposed Area.

3.6.4.6 CESA

Conditions for the CESA are the same as for the Proposed Area.

3.7 Cultural Resources

3.7.1 Area of Analysis and Methodology

The area of analysis, hereafter referred to as the area of potential effect (APE), includes the Proposed Area, Alternative Area, borrow pit, the TL, the Anaconda Moly Substation, and a 1-mile radius. Figure 3-1 shows the project area. A Class I cultural resource inventory was performed for the APE; a Class III survey was performed within the project area (proposed area, alternative area, TL, substation, and borrow pit).

The APE for Native American values includes the proposed project area, as well as the CESA, defined as the project viewshed. Steward (1938) documented that the *Wiyumahunovi* (buffalo berry water valley; Big Smoky Valley) was home to a Western Shoshone band called the *Wiymbitükanü* (buffalo berry eaters). The valley was a favored gathering area of the *Wiymbitükanü* and other Western Shoshone bands for seeds from the *hukümbi* and *töpoi* roots (both plants were unidentified by Steward). Big Smoky Valley is still home to descendents of the *Wiymbitükanü*, who are organized into a group called the Western Shoshone Descendents of the Big Smoky Valley.

The following is a brief description of the methods used to conduct the literature review and Class III cultural resources survey.

3.7.1.1 Literature Review

Information regarding previously documented cultural resources was obtained from the BLM TFO in Tonopah, Nevada; the online Nevada Cultural Resources Information System; BLM General Land Office plat maps and historic topographic and other maps accessed at the University of Nevada, Reno; Mary B. Ansari Map Library; and on the Nevada Bureau of Mining and Geology Web site. Data included previous cultural resource investigations and documented cultural resources. The literature review covered the area of analysis.

3.7.1.2 Survey

Intensive Class III cultural resource surveys were conducted within the project area , the results of which are reported in *A Cultural Resources Inventory for a Solar Development near Crescent Dunes, Nye County, Nevada* (Malinky and Harmon 2009) and *Crescent Dunes Extensions, Nye County, Nevada* (Risse 2010). The Malinky and Harmon (2009) survey encompassed the Proposed Area, borrow pit, TL, and Anaconda Moly Substation corridor; the Risse (2010) survey covered the Alternative Area. The purpose of fieldwork was to identify historic properties that might be adversely affected by this project. The surveys were conducted with 100 percent ground surface coverage within the area of analysis because of sparse vegetation. Survey crews employed parallel pedestrian transects spaced no more than 30 meters (100 feet) apart, except when expectations of finding cultural resources were high or ground surface visibility was compromised, in which case transects were spaced 15 meters (50 feet) apart. The cultural resource surveys were undertaken in June 2009 and February 2010.

Sites were documented using Intermountain Antiquities Computer System site forms and Nevada Short Forms, drawings, 35 mm photographs, and a portable Thales global positioning system receiver. Areas of cultural activity were intensively surveyed in transects spaced no more than 2 meters (6 feet) apart. Sites recorded over 10 years prior were revisited and the site forms updated.

3.7.1.3 Consultation

A Class III Cultural Survey Report was submitted to the Nevada State Historic Preservation Office (SHPO) in April 2010. On May 17, 2010, the SHPO concurred with the BLM determination regarding the eligibility of the historic properties within the proposed project area (Nevada SHPO 2010).

3.7.2 Definition of the Resource

A cultural resource is any definable location of past human activity identifiable through field survey, historical documentation, or oral evidence. Cultural resources include archaeological or architectural sites, structures, or places, and places of traditional cultural or religious importance to specified groups whether or not represented by physical remains.

For management purposes, cultural resources can be subdivided into prehistoric archaeological resources, historic resources, and traditional cultural properties (TCPs). Prehistoric archaeological resources are material remains of human activity that predate the written record, and are generally identified as artifacts, features, loci, sites, and districts. Historic resources consist of objects, artifacts, structures, buildings, and/or districts that can be associated with some aspect of history. A TCP is defined as:

> "a property eligible for inclusion in the National Register of Historic Places (National Register) for its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history and (b) are important in maintaining the continuing cultural identity of the community." (Parker and King 1998)

A historic property is any prehistoric or historic district, site, building, structure, or object, included in, or eligible for inclusion in, the National Register maintained by the Secretary of the Interior. The term can also apply to TCPs.

3.7.3 Regulatory Framework

Because the proposed undertaking would involve public lands administered by BLM, it is subject to compliance with federal regulatory guidelines. Environmental laws applicable to this undertaking and involving cultural resources include NEPA, the National Historic Preservation Act, the American Indian Religious Freedom Act, and Executive Order 13007. The following is a brief overview of each legal authority.

3.7.3.1 NEPA

NEPA, as amended (42 USC 4371 et seq.), requires agencies to analyze the impacts of any federal undertaking on the environment, including both natural and cultural resources. With regard to cultural resources, NEPA stipulates that:

1) federal agencies must work to preserve important historical and cultural aspects of our national heritage [Section 101(b)(4)]
2) compliance studies involving historic properties require coordination with other preservation laws such as the National Historic Preservation Act

3.7.3.2 National Historic Preservation Act

The National Historic Preservation Act of 1966, most recently amended in 2006, specifically addresses the need to protect cultural resources. In particular, Section 106 requires that federal undertakings, defined as projects on federal land, receiving federal funding, or requiring federal approval, license, or permit, must identify, manage, and take into consideration the potential effects an undertaking may have on historic properties. Federal agencies also must allow the Advisory Council on Historic Preservation an opportunity to comment on such actions.

To be eligible for inclusion in the National Register, properties must be important in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association, and meet at least one of the following four criteria:

- Criterion A – are associated with events that have made a significant contribution to the broad patterns of our history
- Criterion B – are associated with the lives of persons significant in our past
- Criterion C – embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master; or possess high artistic values; or represent a significant distinguishable entity whose components may lack individual distinction
- Criterion D – have yielded, or may be likely to yield, information important in prehistory or history

Properties may be of local, state, or national importance. Typically, historic properties are at least 50 years old, but younger properties may be considered for listing if they are of exceptional importance.

In accordance with Section 106 regulations, the lead federal agency is required to initiate the Section 106 review process and consult with all interested parties, such as the SHPO, the Advisory Council on Historic Preservation, and Native American tribes. Because the Nevada BLM has been designated the lead agency, it is responsible for identification, evaluation, and provision of management recommendations for historic resources within the project area of potential effects; determination of the project's effect(s) on those historic resources; and determination and subsequent implementation of mitigation measures, if applicable.

3.7.3.3 American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978 is a joint resolution passed by Congress (Public Law 95-341) to protect and preserve Native Americans' inherent right of freedom to believe, express, and exercise their traditional religions, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonies and traditional rites. The American Indian Religious Freedom Act requires that agencies consider impacts on Native American religious places and practices through consultation with tribes see Chapter 3.8 Native American Religious Concerns for consultation information and results.

3.7.3.4 Executive Order 13007

Alternately referred to as "Indian Sacred Sites," this EO requires that federal agencies: (1) accommodate access to and ceremonial use of Indian sacred sites (as long as access does not compromise federal law or essential agency functions); (2) avoid adverse effects to the physical integrity of sacred sites; (3) as appropriate, maintain confidentiality of the location of such sites; and (4) implement procedures to execute the order (such as consultation).

3.7.4 Affected Environment

3.7.4.1 Environmental Setting

The project is in Big Smoky Valley in south central Nevada. This region is part of the Great Basin, which falls within the larger basin and range physiographic province that extends from southeastern California through Nevada, into western Utah, southern Arizona, and northwestern Mexico. Elevations within the project area range from 4,760 to 5,380 feet above mean sea level. Average annual precipitation in Big Smoky Valley is less than 10 inches.

Geological formations within the APE can be characterized as Quaternary and Tertiary alluvial, colluvial, and talus deposits predominantly consisting of fluviate gravels in the bajada areas grading into fluviate and lacustrine sand and silt in the valleys, and including eolian (wind-blown) and playa deposits (Kleinhampl 1985). Soils generally consist of coarse-textured loamy fine sand, fine sandy loam, and gravelly sand.

The APE flora mostly consists of a mixed desert salt shrub vegetation community dominated by shadscale and other *Atriplex* spp. Other vegetation in the area may include Bailey's greasewood, winter fat, bud sage, Nevada joint-fir, Indian rice grass, bottlebrush squirreltail, and galleta (see Section 3.2, Vegetation). Fauna include waterfowl such as grebes, cormorants, herons, and egrets, which exploit the wetlands of Mud Lake; falconiform birds such as vultures, hawks, falcons, and eagles; and game birds like the Gambel's quail, which occupy the uplands. Mammals include the coyote, kit fox, gray fox, ring-tailed cats, badger, striped skunk, bobcat, deer, pronghorn, bighorn sheep, and lagomorphs and rodents (rabbits, mice, gophers) (see Sections 3.3, Wildlife, and 3.4.2, Special Status Wildlife Species).

3.7.4.2 Cultural Setting

Past occupation in this region can be subdivided into four distinct periods: Pre-Archaic (9000–6000 BC), Early Archaic (6000–2500 BC), Middle Archaic (2500 BC–AD 700), and Late Archaic (AD 700–1850). Following are brief descriptions of each period.

3.7.4.2.1 Pre-Archaic

Two lithic traditions developed during the late Pleistocene/Early Holocene period: the Fluted Point Tradition (Clovis and Folsom) and the Stemmed Point or Western Pluvial Lakes Tradition. The Fluted Point Tradition consists of lanceolate projectile points with longitudinal flake scars, termed "fluting." In the Great Basin, these sites are often located around extinct Pluvial lakes (Faught and Freeman 1998). These types of points are most commonly found in isolated contexts or in surficial scatters consisting of multiple temporal components. Fluted points have been documented in the southern end of Big Smoky Valley, as well as Lake Tonopah, Mud Lake, and in Long and Jake's Valleys. The ephemeral contexts of these sites suggest that the Fluted Point Tradition represented a more nomadic lifestyle.

Stemmed Point artifact assemblages consist of edge-ground, stemmed, and non-notched lanceolate projectile points, lanceolate knives, and scrapers, crescents, and possibly core-blades and burins. Stemmed points have been recorded in the Sunshine Locality in Long Valley and Lake Tonopah at the southern end of Big Smoky Valley (Beck and Jones 1997; Grayson 1993). Unlike the Fluted Point Tradition, Stemmed Point Tradition sites indicate more long-term occupation of the region.

3.7.4.2.2 Early Archaic

This period is characterized by large side-notched projectile points, large concave-based Triple-T and Humboldt Series points, and Pinto Series points. During the Early Archaic, ground stone tools are more commonplace, suggesting an increase in reliance on wild plant foods. Changes in the Middle Holocene paleoclimate, which experienced a warming trend accompanied by drier conditions, likely influenced a migration of populations to areas outside the region.

3.7.4.2.3 Middle Archaic

During the Late Holocene, however, sites increased significantly, as did the general population in the Great Basin region (Mabry 1998). Site types representing more varied activities are found, such as assaying stations, kill and butchering sites, plant gathering, food processing, and rock art sites. Point types that date to this period include Gatecliff, Humboldt, Pinto, and Elko Series. A more diversified ground stone tool assemblage, including manos, metates, mortars, and pestles, is found during the Middle Archaic. By AD 500, the appearance of pit houses, surface masonry structures, and ceramics indicates regional occupation in southern and far eastern Nevada by the Fremont culture.

3.7.4.2.4 Late Archaic

Prehistoric occupation dating to the early part of the Late Archaic is most widely identified by the presence of Rosegate Series projectile points, including the Rose Springs and Eastgate varieties. This point type signifies the evolution of the hunting strategy from atlatl and dart to bow and arrow. Quarrying, butchering, shelter, and habitation sites are most common during the first half of this period.

From AD 1300 to 1850, pre-contact sites are characterized by Desert Series points and Intermountain Brownware pottery. Following European contact, sites generally contain Euroamerican or aboriginal artifacts, and often a combination of the two. Mining-related sites are probably most common in the Big Smoky Valley, although wagon trails, stage lines, farms or ranches, and homesteads are other site types found in the region.

3.7.4.3 Summary of Findings

The cultural resource inventories conducted by Malinky and Harmon (2009) and Risse (2010) resulted in the documentation of 142 sites (Table 3-20). The majority of the sites (78) are prehistoric, 59 are historic, and 5 are multicomponent (evidencing both prehistoric and historic use). The prehistoric sites generally can be characterized as small (less than 50 artifacts), surficial lithic scatters with no associated features. Historic sites consist of mining features—a prospecting pit and a claim post, small trash scatters, and one road segment. Only 13 sites—all prehistoric lithic scatters—qualify as historic properties. All are recommended National Register eligible under Criterion D for their potential to provide information regarding lithic technology and chronology in the Big Smoky Valley region. The prevailing site types suggest that both prehistoric and historic activity in this region can be characterized as short term, involving lithic reduction in the case of prehistoric peoples, and during the historic period, prospecting for mineral deposits.

Table 3-20. Summary of cultural resource site types, by area

Area	Site Types						Total Sites
	Prehistoric		Historic		Multicomponent		
	Eligible[a]	Not Eligible[a]	Eligible	Not Eligible	Eligible	Not Eligible	
Proposed Area	4	35	0	10	0	1	50
Alternative Area	9	30	0	49	0	4	92
Borrow pit	0	0	0	0	0	0	0
Transmission line and Anaconda Moly Substation	0	0	0	0	0	0	0
Total	**78**		**59**		**5**		**149**

[a] describes National Register of Historic Places status

3.7.4.4 Proposed Area

Refer to Table 3-20 for a summary of cultural resources in this area.

3.7.4.5 Alternative Area

Refer to Table 3-20 for a summary of cultural resources in this area.

3.7.4.6 Borrow Pit

Refer to Table 3-20 for a summary of cultural resources in this area.

3.7.4.7 TL and Anaconda Moly Substation

Refer to Table 3-20 for a summary of cultural resources in this area.

3.7.4.8 CESA

During the tribal consultations, no traditional cultural properties were identified in the CESA (Section 3.8).

3.8 Native American Religious Concerns

3.8.1 Area of Analysis and Methodology

The area of analysis, hereafter referred to as the project area, includes the Proposed Area, Alternative Area, borrow pit, and the TL and Anaconda-Moly Substation corridor as shown in Figure 3-1. Considering BLM has limited knowledge of any past or contemporary traditional or cultural uses, resources, or activities within the immediate and surrounding area, and considering that consultation is ongoing, a BLM-proposed CESA is defined as the Tonopah Flat (137A) Hydrographic Basin of the Big Smoky Valley watershed (see Figure 2-15). Given the limited water sources in the region, traditional/cultural activities most likely would have been concentrated around such locations.

Approximately 30 springs and seeps were identified around the boundary of the Tonopah Flat subarea. Most springs identified by WorleyParsons are located in bedrock areas, with the closest springs and seeps located more than 10 miles from the Project (WorleyParsons 2010a).

This BLM-proposed CESA boundary may be altered by participating tribal entities throughout the course of Native American consultation and as further input is received.

3.8.2 Definition of the Resource

Given past and present tribal participation in various projects and proposals throughout lands administered by BLM in Nevada, the following are examples of traditional or cultural resources, activities, and sites of concern considered sacred or detrimental to the continuation of family and community traditions, beliefs, and lifeways: prehistoric and historic habitation sites, sources of water (hot and cold springs), pine nut gathering locations, firewood harvesting locations, sites of ceremony and prayer, certain prehistoric and ethno-historic archaeological sites, gravesites, “rock art” sites, medicinal/edible plant gathering locations, areas and features associated with creation stories, tribally designated traditional cultural properties (TCPs), and tribal land acquisition efforts involving Congressional delegations.

3.8.3 Regulatory Framework

In accordance with the National Historic Preservation Act (P.L. 89-665), NEPA (P.L. 91-190), FLPMA (P.L. 94-579), the American Indian Religious Freedom Act (P.L. 95-341), the Native American Graves Protection and Repatriation Act (P.L. 101-601), and EO 13007, BLM must provide affected tribal governments, traditional leaders, and lineal descendants an opportunity to comment and consult on the proposed project.

These laws and other mandates and directives, such as BLM’s Manual Handbook H-8120-1, need to be considered when identifying and evaluating the significance of, considering impacts to, and developing

treatment plans for specific sites, activities, or resources of traditional or cultural importance within the Native American Religious Concerns area of analysis and CESA boundary.

3.8.4 Affected Environment

3.8.4.1 Environmental Setting

Although a significant distance from the project area, known locations (to BLM) of cultural or traditional significance within the general region are: Darrough's Hotspring, Blue Spring, and other spring complexes in central Big Smoky Valley; Peavine Canyon in the Southern Toiyabe Range; Indian Allotment lands throughout central and northern Big Smoky Valley; cemeteries; Toiyabe and Toquima Range pine nut harvesting sites; "Wiam" or "Buffalo Berry Trees" of central Big Smoky Valley; and Toquima Cave.

Steward (1938) documented that the *Wiyumahunovi* (buffalo berry water valley; Big Smoky Valley) was home to a Western Shoshone band called the *Wiymbitükanü* (buffalo berry eaters). The valley was a favored gathering area of the *Wiymbitükanü* and other Western Shoshone bands for seeds from the *hukümbi* and *töpoi* roots (both plants were unidentified by Steward). Big Smoky Valley is still home to descendents of the *Wiymbitükanü,* with many having organized into a group called the Western Shoshone Descendents of the Big Smoky Valley.

3.8.4.2 Summary of Findings

BLM's TFO initiated consultation by providing the project proposal description and location (with attached maps) by mail on March 8, 2010, to the Timbisha Shoshone Tribe, Duckwater Shoshone Tribe, Yomba Shoshone Tribe, Descendants of Big Smoky Valley, and various other family members known to have interests in the Tonopah and/or Big Smoky Valley areas. Following the initial mailing, multiple communications or coordination occurred (e-mails, telephone calls, meetings, and site visits), with BLM requesting input and extending field visit and meeting invitations. Of the tribal entities contacted, the Timbisha Shoshone Tribe, Descendants of Big Smoky Valley, and, more recently, the Yomba Shoshone Tribe have expressed the most interest and have requested further participation.

On April 7, 2010, the TFO and Timbisha Shoshone Tribe participated in a field visit to the project site. On June 8, 2010, the TFO conducted a status update meeting with the Timbisha Shoshone Tribe in Beatty, Nevada. In addition the BLM conducted a field tour and meeting with representatives of the Yomba Shoshone Tribe, no special concerns were raised by the tribe. BLM continues to provide opportunities for tribal participation through the EIS analysis.

As a result of recent communications and coordination, the following are issues and concerns given to date by participating tribal entities: potential impacts to water sources and avoidance of identified cultural resources, further tribal participation (monitor or observer opportunities) during implementation of a cultural resources treatment plan (data recovery) and/or during new surface disturbance associated with construction activities, general concerns about possible impacts to older sites along the "old lakeshore" or sites that might exist within the dunes (Crescent Dunes), maintenance of existing access routes, possibly damage to solar panels from vandalism, and cultural resource site inspections to ensure construction employees avoid known sites.

3.8.4.3 CESA

It is believed that cultural resources—including tribal resources and sites of cultural, traditional, and spiritual use and associated activities—are increasingly in danger of losing their physical and spiritual integrity. As populations grow and technology advances, public interest in using lands administered by BLM increases and, thus, the potential for the decline of culturally sensitive areas also increases. Different world views and social and spiritual practices and beliefs often conflict with each other.

As told by previous tribal participants, perhaps the leading contributors affecting cultural properties and traditional resources have been historic and modern mining, livestock grazing, cheat grass invasion, catastrophic wildfires, impacts to water sources, drought, and the general growth of populations and public use or interest in areas once considered remote.

Considering BLM has limited knowledge of any past or contemporary traditional or cultural uses, resources, or activities within and adjacent to the project boundary, a CESA has been defined as the Tonopah Flat (137A) Hydrographic Basin of the Big Smoky Valley watershed (see Figure 2-15). Given the limited water sources in the Tonopah area, traditional or cultural activities most likely would have been concentrated near water sources. This tentative BLM determination has been presented to tribal participants for concurrence, further analysis, and identification of any specific inclusions.

As stated earlier, known locations (to BLM) of any cultural or traditional significance within the general region are: Darrough's Hotspring, Blue Spring, and other spring complexes in central Big Smoky Valley; Peavine Canyon; cemeteries; Indian Allotment lands throughout central and northern Big Smoky Valley; Toiyabe and Toquima Range pine nut harvesting locations; "Wiam" or "Buffalo Berry Trees" of central Big Smoky Valley; and Toquima Cave. Because of significant distances, project activities are not expected to affect the properties noted above.

In addition to all the existing, growing, and developing uses of the public lands, renewable energy development (geothermal, wind, and solar) may contribute to the regional decline of cultural or traditional use sites, resources, and associated activities. However, contributions of this specific Proposed Action are expected to be minimal because most of the proposed activities currently appear to be located within an area of little past or contemporary use or significant usable resources.

3.9 Land Use and Access

This section provides an overview of the existing and future land use and public access in the project area. It includes a description of the area of analysis and methodology and analyzes the project in relation to property ownership, land use plans, policies, authorizations, and access issues.

3.9.1 Area of Analysis and Methodology

The area of analysis for land use and access of the proposed project includes the Proposed Area, Alternative Area, borrow pit, and TL and Anaconda Moly Substation corridor (Figure 3-1). The CESA varies by resource area within this EIS. For land use and access, it includes a 1-mile buffer surrounding each of these four identified areas (also see Figure 3-13). The land use and access evaluation methodology involved a review of related data of county, state, and federal land use plans, as well as

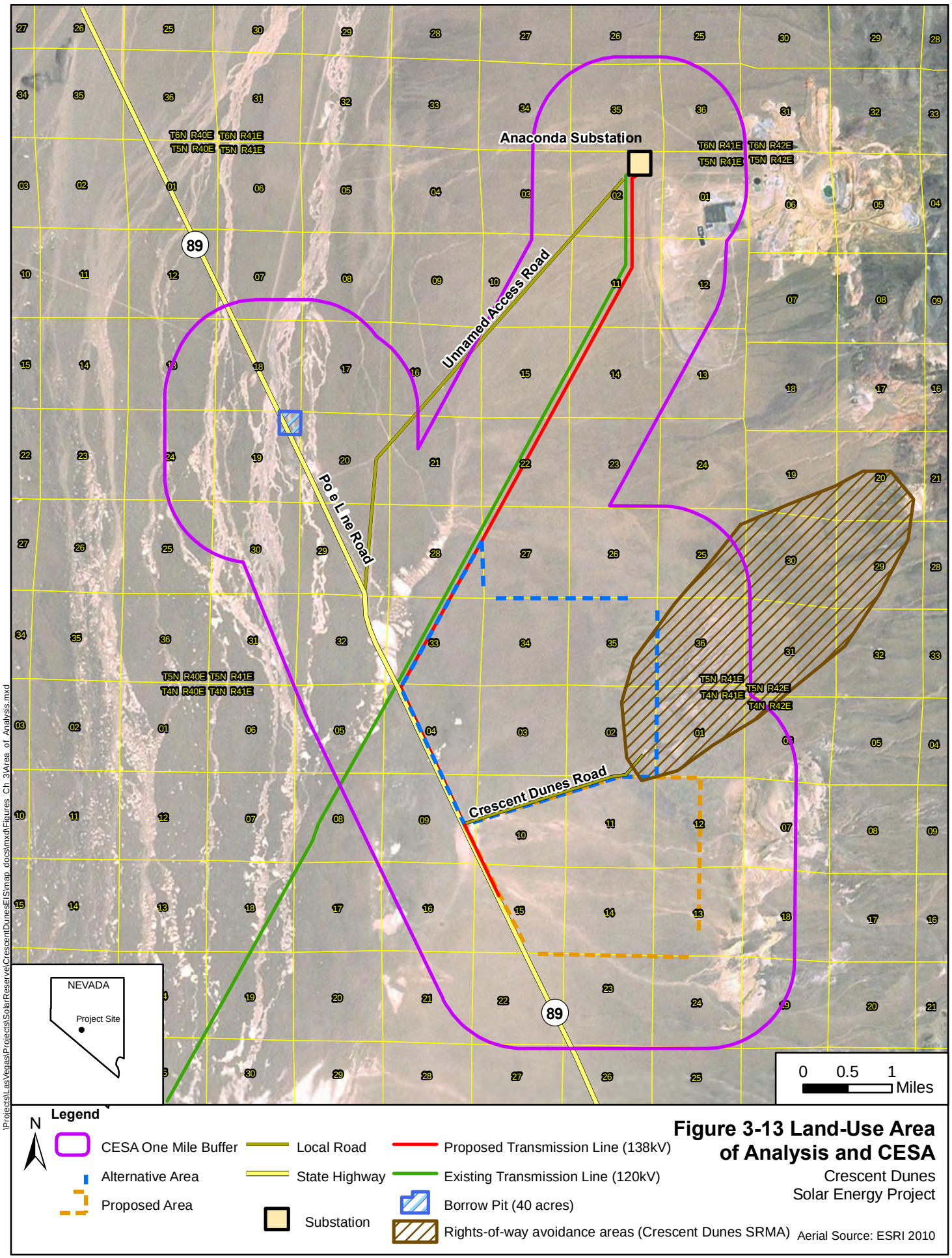
master title plats, geothermal plats, oil and gas plats, land use plats, and other land records available at BLM's Nevada State Office in Reno and the Carson City Field Office. Data were also collected through analysis of aerial photography, field verification, and coordination with County staff. Individuals from BLM were contacted, and the BLM Legacy Rehost (LR2000) database was used to verify land use and ROW resources on BLM land within the area of analysis. The data were compiled to assess potential land use impacts from the construction, operation, and maintenance of the proposed project.

3.9.2 Regulatory Framework

The primary legal basis for granting a land-use authorization for this proposed project on BLM land is Section 501 of the FLPMA. Under the FLPMA, the Secretary of the Interior is authorized to grant, issue, or renew ROWs over, upon, or through such land for utility corridors, roads, trails, highways, railroads, canals, etc (43 CFR 2800). The FLPMA provides BLM with authority to issue leases and permits for the use, occupancy, and development of public land. The regulations establishing procedures for processing these leases and permits are found in 43 CFR 2920. Relevant federal, state, regional, and local land use plans, goals, policies, and objectives are discussed below.

3.9.2.1 BLM Tonopah RMP and ROD (1997)

The BLM Tonopah RMP provides a comprehensive framework for managing approximately 6.1 million acres of public lands administered by the Tonopah Field Station of the BLM Battle Mountain District (BLM 1997). The RMP lands and ROWs objective is to make lands available for community expansion and private economic development and to increase the potential for economic diversity. Lands within the Tonopah Planning Area will be open to consideration for linear or areal ROWs, leases, and land use permits where there are no unresolvable conflicts with other resource values. Any such grants, leases, or permits will include appropriate stipulations to protect the area's special values. Land use lease or permit applications are addressed on a case-by-case basis, where consistent with other resource management objectives and local land uses.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Area_of_Analysis.mxd

Figure 3-13 Land-Use Area of Analysis and CESA

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

3.9.2.2 Nye County Comprehensive Plan

Use of privately owned lands in the project area is planned and regulated by Nye County. The *Nye County Comprehensive Plan* (Nye County Board of Commissioners 1994, amended 2010) was developed to act as a guide to the Nye County Board of Commissioners on all matters of growth and development. This guidance is accomplished by establishing goals and objectives that address countywide issues and concerns and implementing policies and programs to accomplish the objectives. The plan also serves as a framework for local land use plans and other growth management mechanisms. The federal government owns and manages certain parcels of land within Nye County and has the ability to acquire additional lands pursuant to Article I, Section 8, Clause 17 of the U.S. Constitution and Chapter 328 of the NRS. Nye County is in the process of creating a Federal Lands Element of the Comprehensive Plan to develop goals, objectives, and policies for federal lands within Nye County.

It is Nye County's objective to:

- protect the health, safety, and welfare of its residents
- enhance their economic opportunities
- preserve their quality of life

3.9.3 Affected Environment

3.9.3.1 Land Ownership Status and Existing Land Use

Two major categories of land ownership were identified: federal lands administered by BLM and privately held land (Figure 3-13).

Existing land use conditions in the area of analysis are characterized primarily by open desert, utility corridors and facilities, grazing allotment, recreation, and transportation and access. BLM administers the vast majority of land in the proposed project area through the TFO. BLM grants land use authorizations that allow private entities to use public lands for specific purposes. According to the Tonopah RMP (BLM 1997), the area of analysis for the proposed project is subject to the following authorizations or restrictions (Figure 3-13):

- San Antone grazing allotment (covers entire area of analysis) (for additional information see Section 3.14, Range Resources)
- a ROW avoidance area (Classification 2—other),
- off-highway vehicle restriction (limited to existing roads and trails and closed to competitive events)
- visual resource management (Class 4) (covers entire area of analysis)
- a utility corridor
- mineral leasing restrictions (no surface occupancy)
- avoidance of Crescent Sand Dunes (Special Resource Management Area [SRMA])

In addition, based on a data search within BLM's GeoCommunicator (BLM 2010b), the area of analysis and the CESA are all contained within a DOD Airspace Consultation Area. This is an important BLM

coordination requirement for wind, solar, and communication development projects. Since the proposed project is within this area, consultation with the DOD would be required. The U.S. Air Force is a Cooperating Agency on the EIS, and consultation with DOD has occurred throughout the process (see Chapter 5).

Based on a data search within BLM's LR2000 (BLM 2010c) and Mining Claim Geographic Report (BLM 2010d), a variety of leases, easements, and ROWs have been granted by BLM within the area of analysis (Table 3-21).

3.9.3.1.1 Proposed Area

This area consists entirely of lands administered by BLM. In addition to the universal land use authorizations mentioned previously that cover this entire area, Table 3-21 lists specific land uses authorized by BLM.

Table 3-21. Authorized and pending BLM ROWs within the Proposed Area, Borrow Pit, and TL Corridor

Area of Analysis	U.S. Bureau of Land Management Serial Number	Status	Description
Proposed Area	N-086292	Pending	Crescent Dunes Solar Energy Project, by Tonopah Solar Energy, LLC
Proposed Area	N-88207	Authorized	Section 302 FLPMA permit, by Tonopah Solar Energy, LLC (meteorological tower)
TL Corridor	N-87933	Pending	Crescent Dunes Solar Energy Project, by Tonopah Solar Energy, LLC, 230 kV TL
TL Corridor	N-33242	Authorized	Sierra Pacific Power Company, 120 kV TL, Expires 12/29/2011
TL Corridor	N-043264	Authorized	Sierra Pacific Power Company, 55 kV TL, in perpetuity
Borrow Pit	N-88525	Authorized	Crescent Dunes Solar Energy Project, by Tonopah Solar Energy, LLC, Temporary Geotechnical Studies Permit

3.9.3.1.2 Alternative Area

This area consists entirely of lands administered by BLM. In addition to the universal land use authorizations mentioned previously that cover this entire area, Table 3-22 lists specific land uses authorized by BLM.

Table 3-22. Authorized and pending BLM ROWS within the Alternative Area

Area of Analysis	U.S. Bureau of Land Management Serial Number	Status	Description
Alternative Area	N-086292	Pending	Crescent Dunes Solar Energy Project, by Tonopah Solar Energy, LLC
Alternative Area	N-033242	Authorized	Right-of-way (ROW) – power transmission, by Sierra Pacific Power Company (now NV Energy)
Alternative Area	N-040052	Authorized	ROW – water facility, by federal government
Alternative Area	N-88177	Authorized	ROW – test well for Crescent Dunes Solar Energy Project, by Tonopah Solar Energy, LLC

3.9.3.1.3 Borrow Pit

This area consists of lands administered by BLM. In addition to the universal land use authorizations mentioned previously that cover this entire area, Table 3-23 lists specific land uses authorized by BLM.

Table 3-23. Authorized and pending BLM ROWs and mining claims within the borrow pit area

Area of Analysis	U.S. Bureau of Land Management Serial Number	Status	Description
Borrow pit	NVN 059045	Expired	Mineral materials (negotiated all), by Larson Construction
Borrow pit	NVN 077836	Authorized	Government free use mineral (all), by Nye County Road Department
Borrow pit	NMC1010435 (MW-13)	Active	Mining claim – Chris Gibson, Fredrick Gibson, Jan Lamb, Sue Latta, John Rud, Rod Sipes, Lorin Stieff, and Jeff Summerer
Borrow pit	NMC1010433 (MW-11)	Active	Mining claim – Chris Gibson, Fredrick Gibson, Jan Lamb, Sue Latta, John Rud, Rod Sipes, Lorin Stieff, and Jeff Summerer

3.9.3.1.4 TL and Anaconda Moly Substation

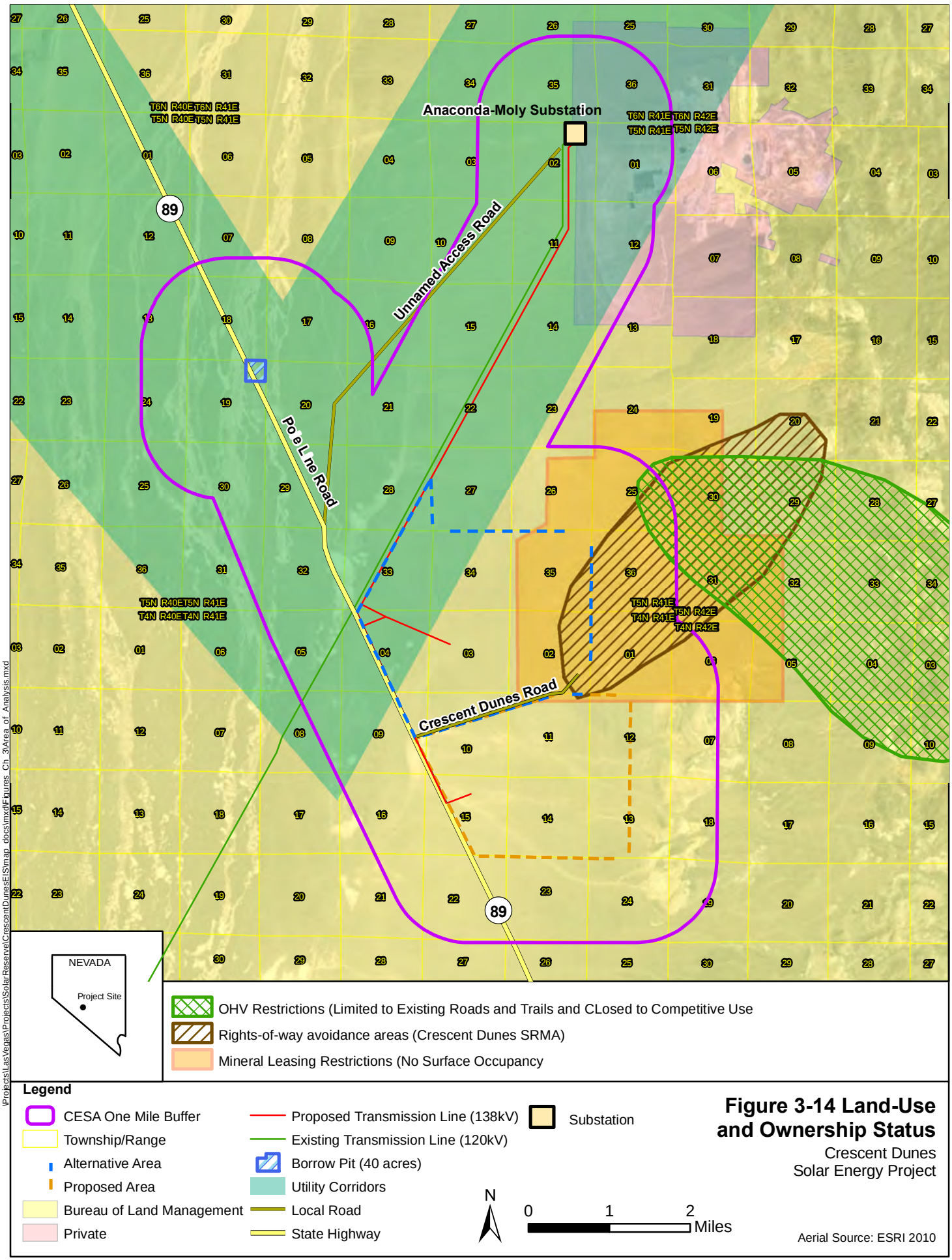
The area proposed as a TL corridor is located on lands administered by BLM (Figure 3-13). However, this area is immediately adjacent to an authorized power/transmission ROW grant to NV Energy by BLM (ROW number NVN 033242).

The area proposed for the Anaconda Moly Substation area is located on lands owned by Sierra Pacific Power Company (now doing business as NV Energy) and is classified as Nye County Planning Department land use code 700, Centrally Assessed Public Utility (Nye County Board of Commissioners 1994). This area is currently used for a power conversion facility.

3.9.3.1.5 CESA

This area includes a 1-mile buffer surrounding the area of analysis (each of the four previously identified areas). Therefore, it includes both public (BLM-administered) and private (NV Energy) lands (Figure 3-14).

In addition, a 3,000-acre natural dune area (Crescent Sand Dunes) is located just east of the Proposed and Alternative Area boundaries. These dunes have been designated by BLM as an SRMA, and any new or amended ROW within this area would have to be compatible with the special values of this area. This area is also closed to competitive recreational events to protect sensitive resources such as threatened and endangered species and cultural resources.


Anaconda-Moly Substation
Unnamed Access Road
Po e L ne Road
Crescent Dunes Road
89
T6N R40E T6N R41E
T5N R40E T5N R41E
T6N R41E T6N R42E
T5N R41E T5N R42E
T5N R40E T5N R41E
T4N R40E T4N R41E
T5N R41E T5N R42E
T4N R41E T4N R42E
NEVADA
Project Site
OHV Restrictions (Limited to Existing Roads and Trails and CLosed to Competitive Use
Rights-of-way avoidance areas (Crescent Dunes SRMA)
Mineral Leasing Restrictions (No Surface Occupancy
Legend
CESA One Mile Buffer
Township/Range
Alternative Area
Proposed Area
Bureau of Land Management
Private
Proposed Transmission Line (138kV)
Existing Transmission Line (120kV)
Borrow Pit (40 acres)
Utility Corridors
Local Road
State Highway
Substation
N
0
1
2
Miles
Figure 3-14 Land-Use and Ownership Status
Crescent Dunes Solar Energy Project
Aerial Source: ESRI 2010
\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Area_of_Analysis.mxd

3.9.3.2 Access

Access to the proposed project would be provided from SH 89 (Pole Line Road) (Figure 3-14). Pole Line Road is a Nye County owned and maintained road near the proposed project and is asphalt surfaced from its intersection with US 6/95 and continues north of the proposed project area. A short section of Pole Line Road from its intersection with US 6/95 to a location south of the proposed project area is in Esmeralda County. This section of Pole Line Road, although located in Esmeralda County, is maintained by Nye County through the terms of a formal agreement. According to Nye County representatives, the existing paved surface of Pole Line Road is between 24 and 28 feet wide.

3.9.3.2.1 Proposed Area

Access to the project site would be along a new access road that would be created from Pole Line Road. It would be a paved, two-lane road constructed with adequate width for two directions of travel and shoulders. Access to the new road would be restricted to authorized project personnel during construction and operation. Additionally, unpaved roads would be constructed from the power block to the edges of the solar field.

The main access road to Crescent Dunes is Crescent Dunes Road. This road currently exists along the northern border of the Proposed Area. This unpaved road provides vehicle and recreational access to the Crescent Sand Dunes SRMA. No other trails or roads are present within the Proposed Area.

3.9.3.2.2 Alternative Area

Access to each of the project sites would be along new access roads that would be created from Pole Line Road. The roads would be paved, two-lane roads constructed with adequate width for two directions of travel and shoulders. Access to the new road would be restricted to authorized project personnel during construction and operation. Additionally, unpaved roads would be constructed from the power block to the edges of the solar field.

Crescent Dunes Road currently exists along the southern border of the Alternative Area. This unpaved road provides vehicle and recreational access to the Crescent Sand Dunes SRMA. No other trails or roads are present within the Alternative Area.

3.9.3.2.3 Borrow Pit

Access to the borrow pit is directly provided from Pole Line Road, and no changes to this access are anticipated.

3.9.3.2.4 TL and Anaconda Moly Substation

Primary access to the TL would be from Pole Line Road and from an existing maintenance road along an existing TL corridor. Direct access to TL towers would occur along short spurs off of the main road. Access to the Anaconda Moly Substation would originate from Pole Line Road and head north-northeast on an unnamed paved TL access road as indicated in Figure 3-14. Public access to these roads would not change.

3.10 Soils

3.10.1 Area of Analysis and Methodology

The areas of analysis for soils are the Proposed Area, Alternative Area, borrow pit, and TL and Anaconda Moly Substation corridor (Figure 3-1). Soils were identified and mapped for the areas of analysis as stipulated by the data adequacy standards. The CESA for soils consists of the area within a 5-mile radius of the project areas and proposed facilities. Identification and mapping of soils for the CESA was not stipulated by the data adequacy standards and was not performed.

The primary source of information for soils was obtained from the NRCS online Web Soil Survey, which was accessed to obtain the soils data presented herein (NRCS 2009). The specific soil survey represented by the soil data obtained through the Web Soil Survey is the Soil Survey of the Big Smoky Valley Area, Nevada, Part of Nye County. Information related to the principal soil orders and dominant suborders as provided by BLM in the data adequacy standards is also used.

As used in this section of the EIS document, the term "soil" refers to the naturally weathered geologic sediments existing in layers or horizons of minerals and/or organic constituents of variable thickness, which differ from the geologic parent material (rock) in their morphological, physical, chemical, and mineralogical properties as well as their biological characteristics.

NRCS identifies and delineates soils into units with the objective of separating the landscape into segments with similar use and management requirements. This provides information sufficient for the development of resource plans. On-site investigations are required to precisely define and locate soils and evaluate their various physical, chemical, and engineering characteristics. Soils within the areas of analysis are described based on ten factors stipulated by the data adequacy standards, including soil series name, texture, permeability, pH, available water capacity, hydrologic group, wind and water erosion hazard, landscape position, depth to bedrock, and suitability as topsoil for reclamation. This information is presented separately for each detailed study area below.

3.10.2 Regulatory Framework

3.10.2.1 NPDES

NDEP administers EPA regulations (55 CFR 47990) that require permitting of stormwater-generated pollution under the NPDES. Pursuant to these EPA regulations, a General Permit under the NPDES Stormwater Program must be obtained for all construction activities affecting areas of 5 acres or greater. The General Permit requires implementation of Best Management Practices (BMPs) to reduce pollutant loads into the waters of the state.

3.10.2.2 Nevada BMPs

Use of BMPs in Nevada is addressed in the Handbook of Best Management Practices published by the State of Nevada Environmental Commission (1994), which references two definitions of BMPs—the EPA definition and the NAC definition. EPA defines BMPs as "methods, measures, or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation

and maintenance procedures and scheduling and distribution of activities." NAC 445.200 defines "Best Practices" as "measures, methods, or operation or practice that are reasonably designed to prevent, eliminate, or reduce water pollution from diffuse sources and that are consistent with the best practices in the particular field under the conditions applicable" and states that this term is intended to be equivalent to the term "best management practices" as used in federal laws and regulations.

Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

3.10.3 Affected Environment

3.10.3.1 Geologic Overview

A brief summary of geologic information is provided here.

The areas of analysis are located in the southern portion of Big Smoky Valley known as the Tonopah Flat Subarea in northern Nye County, Nevada. This area is located near the center of the Great Basin Section of the basin and range physiographic province. The valley is surrounded to the north by the Toiyabe and Shoshone ranges, to the south by Lone Mountain and the Silver Peak Range, to the east by the San Antonio Range, and to the west by the Royston Hills and Monte Cristo Range. Uplift exhibited by the present-day mountain ranges was caused by Cenozoic Era basin-and-range faulting that reached great magnitude during the middle to late Tertiary Period and continues to the present. The floor of Big Smoky Valley consists of alluvial sediments derived from the surrounding mountains and is internally drained. Margins of the valley include alluvial fans, talus slopes, and pediments. Wind action has affected the intermontane valleys and resulted in deflation basins (blowouts) and sand accumulations in the form of solitary dunes and dune fields.

Geologic materials present in the project region vary greatly and include Paleozoic to Tertiary rocks and Tertiary to Quaternary sediments. These geologic materials are briefly summarized below.

- Paleozoic Sedimentary and Metamorphic Rocks
- Cretaceous Granitic Rocks
- Tertiary Intrusive and Extrusive Rocks
- Tertiary Sedimentary Rocks
- Quaternary and Tertiary Sediments

Based on the geologic map covering the project area and surrounding areas, geologic material exposed at the surface of all four areas of analysis consists of Alluvium, Colluvium, and Talus described as Quaternary and Tertiary deposits predominantly consisting of fluviate gravels flanking mountains, grading into fluviate and lacustrine sand and silt in valleys, and including eolian (wind-blown) and playa deposits. The estimated thickness of alluvium is about 1,500 to 3,000 feet beneath western portions of the areas of analysis (WorleyParsons 2010a). The thickness of alluvium is expected to thin to the east where the areas of analysis approach the foothills and flanks of the San Antonio Mountains.

3.10.3.2 Soil Characteristics

Entisols are the principal soil order and psamments are the dominant soil suborder at the proposed project area. Soils are dominated by relatively coarse-textured soils including loamy fine sand, fine sandy loam, fine sand, and gravelly sand, which support important vegetation communities adapted to the arid climate. The potential for soil displacement by water is low, but by wind action is high. These soils are easily displaced by wind if vegetative cover is removed. If there is an increase in soil movement because of a loss of vegetation, resultant cumulative impacts on adjoining vegetation communities and modification in the structure and productivity of the soils can occur, including short- and long-term, direct and indirect effects.

Specific NRCS soil types present at each area of analysis and their respective characteristics, including soil series name, texture, permeability, pH, available water capacity, hydrologic group, wind and water erosion hazard, landscape position, depth to bedrock, and suitability as topsoil for reclamation, are presented in Tables 3-24 through 3-27 and illustrated in Figures 3-15 through 3-18, by area of analysis.

Table 3-24. NRCS soil types and evaluation criteria for the Proposed Area

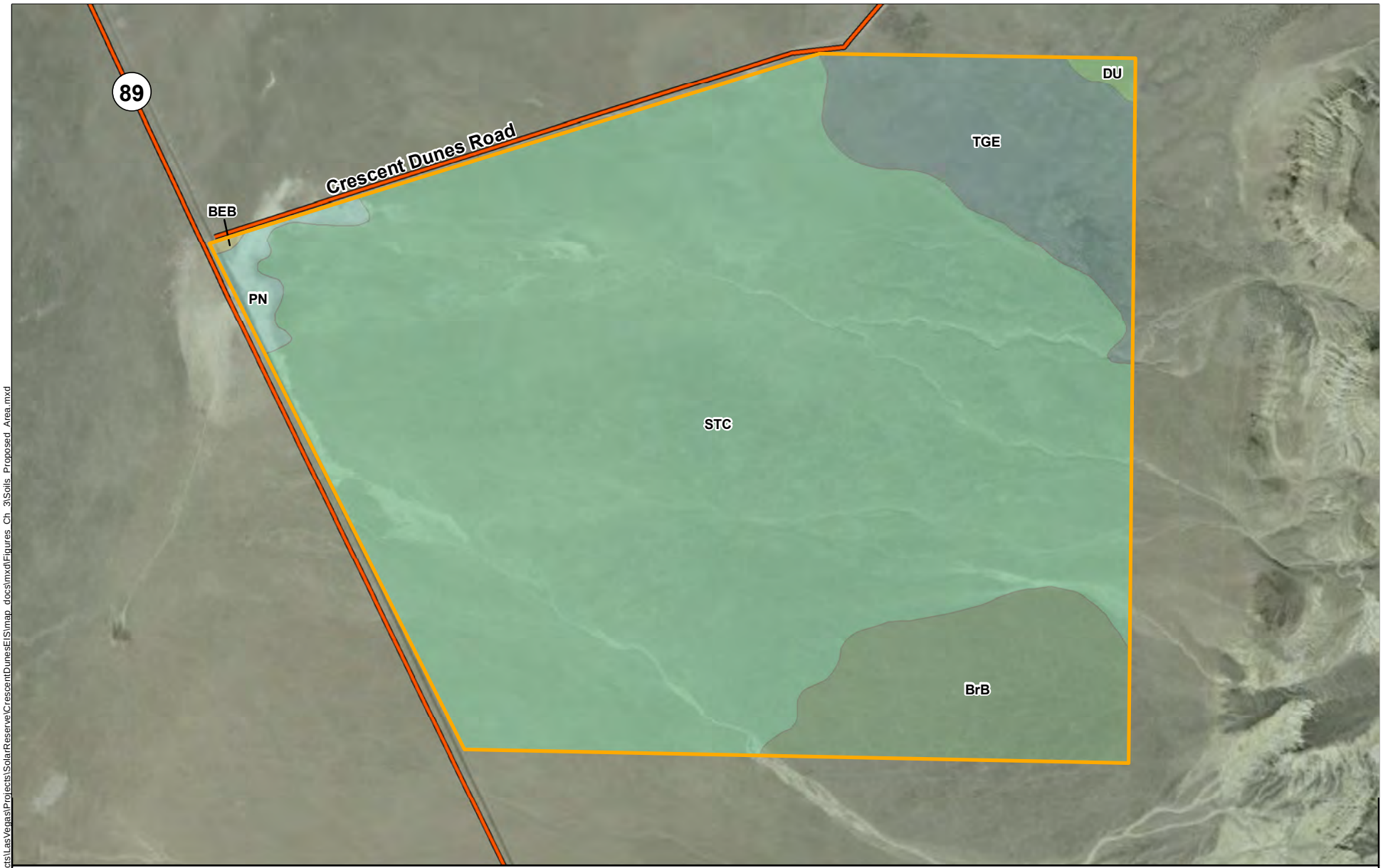
NRCS Soil Series (NRCS Symbol)	Approx. Percentage of Study Area	Natural Resources Conservation Service (NRCS) Evaluation Criteria									
		USDA Surface Texture Rating	Permeability Standard Class Rating (K_{sat} in µm/sec) and Class Limit[a]	pH	Available Water Capacity (in/in)	Hydrologic Group	Wind Erosion Hazard (Erodibility Group/Index)[b]	Water Erosion Hazard (K Factor Rating) (K_w/K_f)[c]	Landscape Position[d]	Depth to Bedrock	Suitability as Topsoil for Reclamation
Broyles fine sandy loam, 2 to 4 percent slopes (BrB)	8.1%	Fine sandy loam	28.0000 High	7.9–9.6	0.09–0.15	B	3/86	.32/.32	VS AF	>60 inches	Poor
Dune land (DU)	0.3%	Fine sand	92.0000 High	7.4–8.4	0.03–0.05	A	1/250	.15/.20	DU VS	>60 inches	Poor
Playas (PN)	0.6%	Silty clay	0.2150 Moderately Low	8.5–9.6	0.02–0.04	D	4/86	.37/.37	PL VF BZ	>60 inches	Poor
Stumble loamy fine sand, 0 to 8 percent slopes (STC)	81.5%	Loamy fine sand	92.0000 High	6.6–8.4	0.06–0.08	A	2/134	.17/.20	VS VF AF	>60 inches	Poor
Tipperary fine sand, 4 to 30 percent slopes (TGE)	9.5%	Fine sand	423.0000 Very High	8.5–9.6	0.05–0.07	A	1/250	.15/.15	VS AF	>60 inches	Poor

[a] Permeability is expressed as the representative saturated hydraulic conductivity (Ksat) rating in micrometers per second (µm/sec), which corresponds to various NRCS classes based on Ksat range as follows: Very Low (0.00–0.01), Low (0.01–0.1), Moderately Low (0.01–1.0), Moderately High (1–10), High (10–100), and Very High (100–705).

[b] Wind erodibility groups (Groups 1 through 8) are made up of soils with similar properties affecting their susceptibility to wind erosion; Group 1 soils are most susceptible, Group 8 soils are least susceptible. Wind erodibility index is a numerical value indicating the soil susceptibility to wind erosion in tons per year per acre that can be expected to be lost to wind erosion.

[c] K Factor Rating indicates the susceptibility of a soil to sheet and rill erosion by water and is one of the factors used in the Universal Soil Loss Equation. Values of K can range from 0.02 to 0.69 and other factors being equal, the higher the value the more susceptible the soil is to sheet and rill erosion by water. K_w is the value for the whole soil; K_f is the value for the fine fraction of the soil (material less than 2.0 millimeters in size).

[d] NRCS Geomorphic Description System Category (Landscape) Symbols: AF = alluvial fan, BZ = braided stream, DU = dune, PL = playa, VF = valley floor, VS = valley side (NRCS 2009)



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Soils_Proposed_Area.mxd

N

NEVADA
Project Site

Legend

Proposed Area

BEB (Belcher gravelly sand, 0 to 4 percent slopes)

BrB (Broyles fine sandy loam, 2 to 4 percent slopes)

DU (Dune land)

PN (Playas)

STC (Stumble loamy fine sand, 0 to 8 percent slopes)

TGE (Tipperary fine sand, 4 to 30 percent slopes)

0 0.1 0.2 0.3 0.4 0.5
Miles

Figure 3-15 Soils Within Proposed Area

Crescent Dunes
Solar Energy Project

Sources: National Resources Conservation Service; Photo: ESRI 2010

Table 3-25. NRCS soil types and evaluation criteria for the Alternative Area

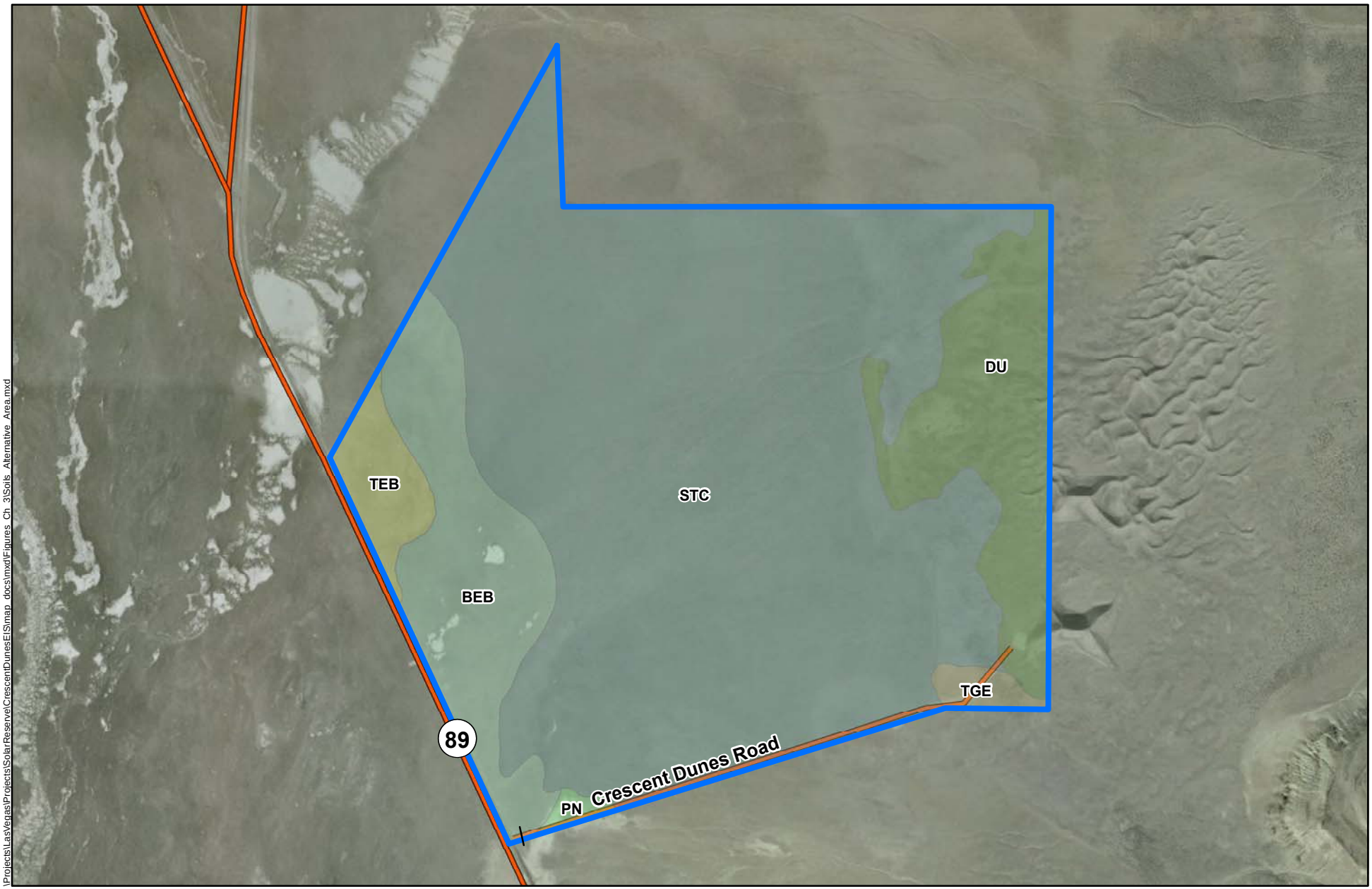
NRCS Soil Series (NRCS Symbol)	Approx. Percentage of Study Area	Natural Resources Conservation Service (NRCS) Evaluation Criteria									
		USDA Surface Texture Rating	Permeability Standard Class Rating (K_{sat} in µm/sec) and Class Limit[a]	pH	Available Water Capacity (in/in)	Hydrologic Group	Wind Erosion Hazard (Erodibility Group/Index)[b]	Water Erosion Hazard (K Factor Rating) (K_w/K_f)[c]	Landscape Position[d]	Depth to Bedrock	Suitability as Topsoil for Reclamation
Timber gravelly sandy loam, 0 to 4 percent slopes (TEB)	3.0%	Gravelly sandy loam	74.5376 High	7.9–9.6	0.04–0.15	D	4/86	.17/.28	VF PL	>60 inches	Fair
Dune land (DU)	8.9%	Fine sand	92.0000 High	7.4–8.4	0.03–0.05	A	1/250	.15/.20	DU VS	>60 inches	Poor
Playas (PN)	0.4%	Silty clay	0.2150 Moderately Low	8.5–9.6	0.02–0.04	D	4/86	.37/.37	PL VF BZ	>60 inches	Poor
Stumble loamy fine sand, 0 to 8 percent slopes (STC)	75.1%	Loamy fine sand	92.0000 High	6.6–8.4	0.06–0.08	A	2/134	.17/.20	VS VF AF	>60 inches	Poor
Belcher gravelly sand, 0 to 4 percent slopes (BEB)	12.1%	Gravelly sand	14.9240 High	7.9–9.6	0.04–0.15	D	2/134	.32/.20	VF PL	19 inches	Poor
Tipperary fine sand, 4 to 30 percent slopes (TGE)	0.5	Fine sand	423.0000 Very High	8.5–9.6	0.05–0.07	A	1/250	.15/.15	VS AF	>60 inches	Poor

[a] Permeability is expressed as the representative saturated hydraulic conductivity (Ksat) rating in micrometers per second (µm/sec), which corresponds to various NRCS classes based on Ksat range as follows: Very Low (0.00–0.01), Low (0.01–0.1), Moderately Low (0.01–1.0), Moderately High (1–10), High (10–100), and Very High (100–705).

[b] Wind erodibility groups (Groups 1 through 8) are made up of soils with similar properties affecting their susceptibility to wind erosion; Group 1 soils are most susceptible, Group 8 soils are least susceptible. Wind erodibility index is a numerical value indicating the soil susceptibility to wind erosion in tons per year per acre that can be expected to be lost to wind erosion.

[c] K Factor Rating indicates the susceptibility of a soil to sheet and rill erosion by water and is one of the factors used in the Universal Soil Loss Equation. Values of K can range from 0.02 to 0.69 and other factors being equal, the higher the value the more susceptible the soil is to sheet and rill erosion by water. K_w is the value for the whole soil; K_f is the value for the fine fraction of the soil (material less than 2.0 millimeters in size).

[d] NRCS Geomorphic Description System Category (Landscape) Symbols: AF = alluvial fan, BZ = braided stream, DU = dune, PL = playa, VF = valley floor, VS = valley side (NRCS 2008)



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Soils_Alternative_Area.mxd

N

NEVADA
Project Site

0 0.1 0.2 0.3 0.4 0.5
Miles

Legend

- Alternative Area
- BEB (Belcher gravelly sand, 0 to 4 percent slopes)
- DU (Dune land)
- PN (Playas)
- STC (Stumble loamy fine sand, 0 to 8 percent slopes)
- TEB (Timper gravelly sand loam, 0 to 4 percent slopes)
- TGE (Tipperary fine sand, 4 to 30 percent slopes)

Figure 3-16 Soils Within the Alternative Area
Crescent Dunes
Solar Energy Project

Sources: National Resources Conservation Service; Photo: ESRI 2010

Table 3-26. NRCS soil types and evaluation criteria for the borrow pit

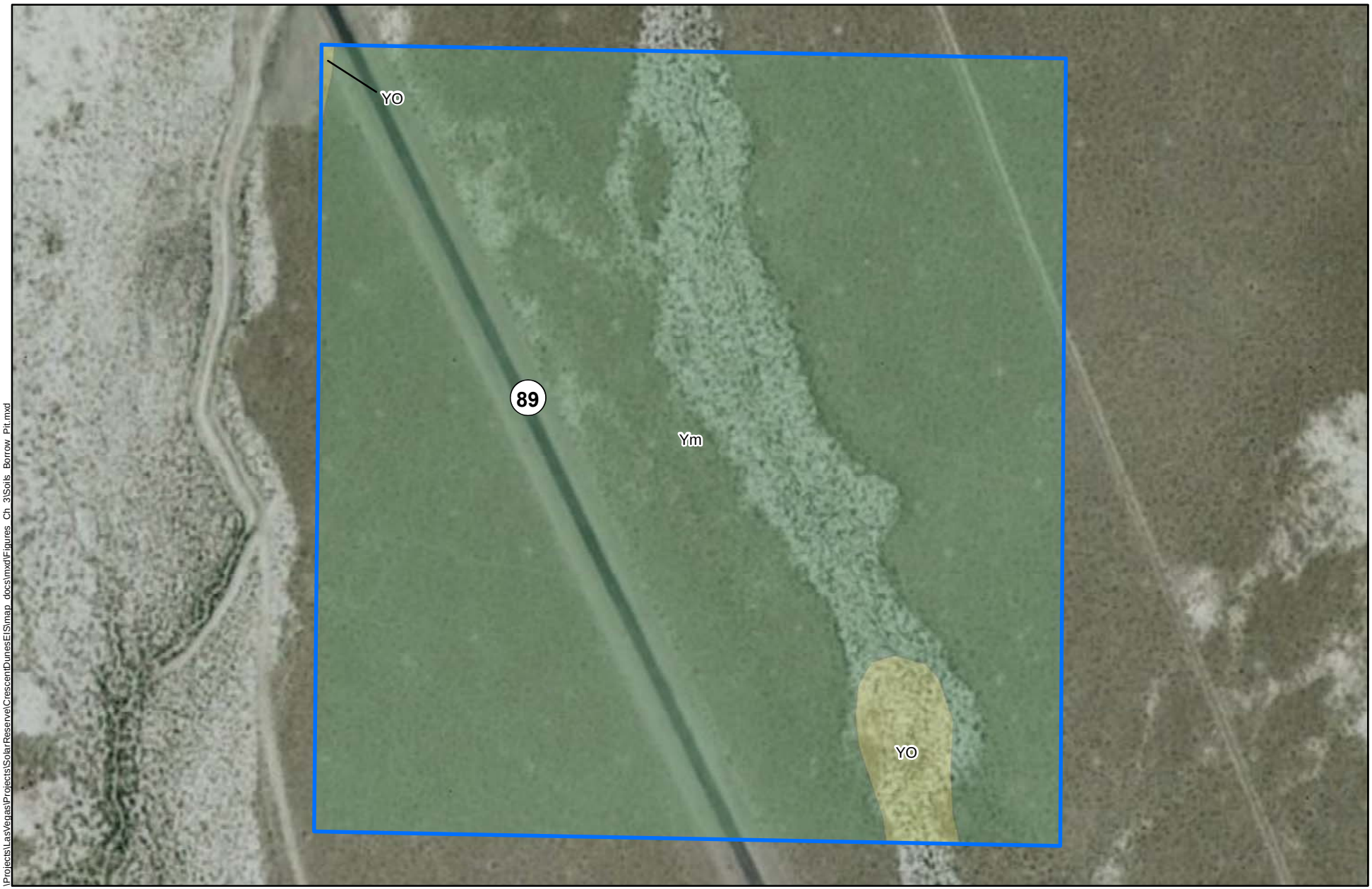
NRCS Soil Series (NRCS Symbol)	Approx. Percentage of Study Area	Natural Resources Conservation Service (NRCS) Evaluation Criteria									
		USDA Surface Texture Rating	Permeability Standard Class Rating (K_{sat} in µm/sec) and Class Limit[a]	pH	Available Water Capacity (in/in)	Hydrologic Group	Wind Erosion Hazard (Erodibility Group/Index)[b]	Water Erosion Hazard (K Factor Rating) (K_w/K_f)[c]	Landscape Position[d]	Depth to Bedrock	Suitability as Topsoil for Reclamation
Yomba gravelly sand (Ym)	55.9%	Gravelly sand	71.4868 High	7.4–9.0	0.04–0.18	B	2/134	.20/.37	BZ VF PL	>60 inches	Poor
Yomba-Playas complex (YO)	44.1%	Gravelly sand	71.4868 High	7.4–9.6	0.03–0.18	B	2/134	.20/.37	BZ VF PL	>60 inches	Poor

[a] Permeability is expressed as the representative saturated hydraulic conductivity (Ksat) rating in micrometers per second (µm/sec), which corresponds to various NRCS classes based on Ksat range as follows: Very Low (0.00–0.01), Low (0.01–0.1), Moderately Low (0.01–1.0), Moderately High (1–10), High (10–100), and Very High (100–705).

[b] Wind erodibility groups (Groups 1 through 8) are made up of soils with similar properties affecting their susceptibility to wind erosion; Group 1 soils are most susceptible, Group 8 soils are least susceptible. Wind erodibility index is a numerical value indicating the soil susceptibility to wind erosion in tons per year per acre that can be expected to be lost to wind erosion.

[c] K Factor Rating indicates the susceptibility of a soil to sheet and rill erosion by water and is one of the factors used in the Universal Soil Loss Equation. Values of K can range from 0.02 to 0.69 and other factors being equal, the higher the value the more susceptible the soil is to sheet and rill erosion by water. K_w is the value for the whole soil; K_f is the value for the fine fraction of the soil (material less than 2.0 millimeters in size).

[d] NRCS Geomorphic Description System Category (Landscape) Symbols: AF = alluvial fan, BZ = braided stream, DU = dune, PL = playa, VF = valley floor, VS = valley side (NRCS 2008)



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Soils_Borrow_Pit.mxd

N

NEVADA
Project Site

0 100 200 300 400 500
Feet

Legend

- Borrow Pit (40 acre)
- YO (Yomba-Playas complex)
- Ym (Yomba gravelly sand)

Figure 3-17 Soils Within the Borrow Pit Area
Crescent Dunes
Solar Energy Project

Sources: National Resources Conservation Service; Photo: ESRI 2010

Table 3-27. NRCS soil types and evaluation criteria for the TL and Anaconda Moly Substation corridor

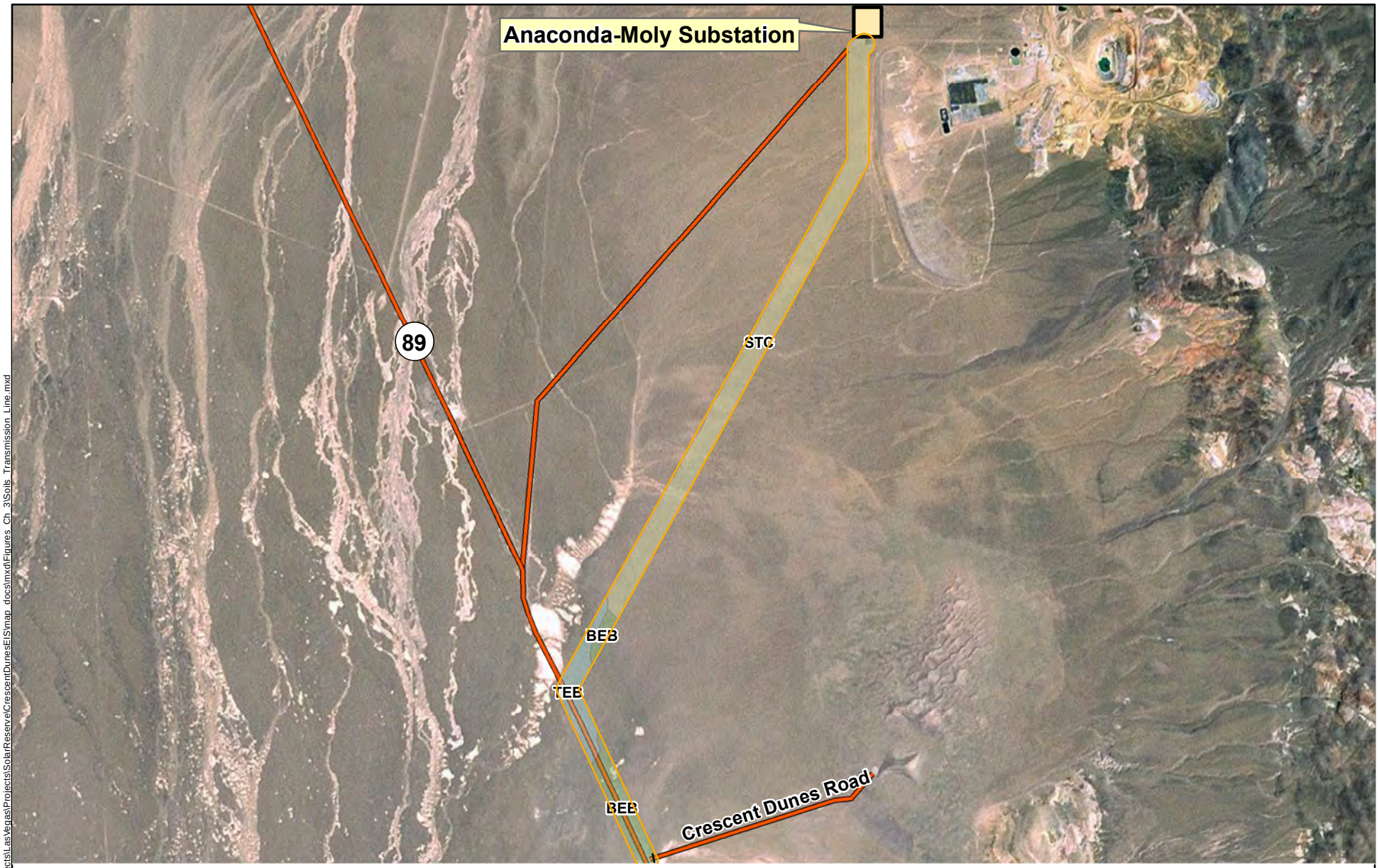
NRCS Soil Series (NRCS Symbol)	Approx. Percentage of Study Area	Natural Resources Conservation Service (NRCS) Evaluation Criteria									
		USDA Surface Texture Rating	Permeability Standard Class Rating (K_{sat} in µm/sec) and Class Limit[a]	pH	Available Water Capacity (in/in)	Hydrologic Group	Wind Erosion Hazard (Erodibility Group/Index)[b]	Water Erosion Hazard (K Factor Rating) (K_w/K_f)[c]	Landscape Position[d]	Depth to Bedrock	Suitability as Topsoil for Reclamation
Timber gravelly sandy loam, 0 to 4 percent slopes (TEB)	14.2%	Gravelly sandy loam	74.5376 High	7.9–9.6	0.04–0.15	D	4/86	.17/.28	VF PL	>60 inches	Fair
Playas (PN)	0.4%	Silty clay	0.2150 Moderately Low	8.5–9.6	0.02–0.04	D	4/86	.37/.37	PL VF BZ	>60 inches	Poor
Stumble loamy fine sand, 0 to 8 percent slopes (STC)	68.9%	Loamy fine sand	92.0000 High	6.6–8.4	0.06–0.08	A	2/134	.17/.20	VS VF AF	>60 inches	Poor
Belcher gravelly sand, 0 to 4 percent slopes (BEB)	16.5%	Gravelly sand	14.9240 High	7.9–9.6	0.04–0.15	D	2/134	.32/.20	VF PL	19 inches	Poor

[a] Permeability is expressed as the representative saturated hydraulic conductivity (Ksat) rating in micrometers per second (µm/sec), which corresponds to various NRCS classes based on Ksat range as follows: Very Low (0.00–0.01), Low (0.01–0.1), Moderately Low (0.01–1.0), Moderately High (1–10), High (10–100), and Very High (100–705).

[b] Wind erodibility groups (Groups 1 through 8) are made up of soils with similar properties affecting their susceptibility to wind erosion; Group 1 soils are most susceptible, Group 8 soils are least susceptible. Wind erodibility index is a numerical value indicating the soil susceptibility to wind erosion in tons per year per acre that can be expected to be lost to wind erosion.

[c] K Factor Rating indicates the susceptibility of a soil to sheet and rill erosion by water and is one of the factors used in the Universal Soil Loss Equation. Values of K can range from 0.02 to 0.69 and other factors being equal, the higher the value the more susceptible the soil is to sheet and rill erosion by water. K_w is the value for the whole soil; K_f is the value for the fine fraction of the soil (material less than 2.0 millimeters in size).

[d] NRCS Geomorphic Description System Category (Landscape) Symbols: AF = alluvial fan, BZ = braided stream, DU = dune, PL = playa, VF = valley floor, VS = valley side (NRCS 2008)



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Soils_Transmission_Line.mxd

Figure 3-18 Soils Within the Transmission Line Corridor
Crescent Dunes Solar Energy Project

Sources: National Resources Conservation Service; Photo: ESRI 2010

3.11 Social and Economics

3.11.1 Area of Analysis and Methodology

The proposed project area is located approximately 13 miles northwest of Tonopah in Nye County, Nevada. The area of analysis for social and economic conditions includes the Proposed Area, Alternative Area, borrow pit, and TL and Anaconda Moly Substation corridor. The CESA includes Nye and Esmeralda counties, with emphasis on communities closest to the project area, such as Tonopah, Round Mountain, Silver Peak, and Goldfield. In many cases there are limited or no comparative data for these towns because of their small populations (i.e., less than 20,000). State- and county-level data were used to set the proposed project in a regional context.

3.11.2 Regulatory Framework

Under NEPA, social and economic effects by themselves are not required in the preparation of an EIS. However, an EIS must include discussion of a proposed action's social and economic effects when they relate to the effects on the natural or physical environment. These effects were examined to determine the impacts of the Proposed Action, alternatives, and the No Action Alternative on local and regional social and economic conditions.

3.11.3 Affected Environment

3.11.3.1 Proposed Area

3.11.3.1.1 Social Conditions

Social conditions result from interactions of humans with one another, over time, and from observable patterns and characteristics that they create in their surroundings. Social conditions include demographic characteristics, community character, and pubic facilities related to societal activities.

Key demographic characteristics of the project area include race, income, employment, housing, and population growth. Population growth is an important socioeconomic factor because of its direct influence on housing and employment growth and on existing and planned infrastructure. Population growth influences the demand for energy and catalyzes construction of energy-generating facilities.

Populations

The project area is located in Nye County, approximately 13 miles northwest of the unincorporated town of Tonopah. In 2000, the population of Nye County was 32,978 (Table 3-28). In 2008, the Nevada State Demographer's Office projected that the 2009 population of Nye County would be 46,360, an increase of approximately 40.6 percent. Tonopah is the Nye County seat. In 2000, Tonopah's population was 2,833. The 2009 projections anticipated an 8.9 percent decline in population. The unincorporated community of Round Mountain, approximately 70

miles northeast of the project area, was also projected to experience a decline in population (19 percent).

The Esmeralda County line is located approximately 2 miles west of the project area. The current population of Esmeralda County is 1,187, an 11.9 percent increase from the 2000 population of 1,061. The county seat is Goldfield, located approximately 35 miles south of the project area. It has experienced a 4 percent increase in population between 2000 and 2009, from 424 to 441. Silver Peak, located approximately 35 miles southwest of the project area, was projected to experience a 12 percent decline in population during the same period, from 161 to 141.

Table 3-28. Population estimates for Nye and Esmeralda counties and Nevada, 2000–2009

Geographic Area	Population (2000)	Population (2009[a])	Percentage Change
Nevada	1,998,257	2,711,206	34.0
Nye County	32,485	46,360	40.6
Tonopah	2,721	2,580	–8.9
Round Mountain	1,039	837	–19.4
Esmeralda County	971	1,187	11.9
Silver Peak	161	141	–12.4
Goldfield	424	441	4.0

Source: Nevada State Demographer's Office 2008
[a] 2009 population as projected in 2008

For the last 23 years, Nevada has been among the four fastest-growing states in the country. In 2008 and 2009, Nevada dropped to eighth place and lost population across the majority of towns in the project area (Table 3-29). This decline is attributable to a slowdown in the construction industry and the slowing of migration across the nation as current economic conditions make it more difficult for people to change jobs, sell their homes, and move to Nevada.

Furthermore, Nye County's economy has historically revolved around the mining sector and activities at the U.S. Department of Energy's Nevada Test Area, resulting in unstable population growth rates from 1970 to 2002, indicating the need for economic diversification in the county (EDEN 2009).

Table 3-29. Population estimates for Nye and Esmeralda counties and Nevada, 2008–2009

Geographic area	Population (2008)	Population (2009[a])	Percentage change
Nevada	2,738,733	2,711,206	–1.0
Nye County	47,370	46,360	–2.1
Tonopah	2,628	2,580	–1.8
Round Mountain	850	837	–1.5
Esmeralda County	1,240	1,187	–4.3
Silver Peak	182	141	–2.2
Goldfield	415	441	6.4

Source: Nevada State Demographer's Office 2008
[a] 2009 population as projected in 2008

According to the Nevada State Demographer's Office, the population of Nevada is projected to increase by 31 percent over the next 15 years (2010–2025). Additionally, both Nye and Esmeralda counties are anticipated to experience steady growth through 2025 (Table 3-30). Population projections derive from historical population trends and have not been modified to account for future probable and foreseeable developments and events such as the current economic downturn.

Table 3-30. Population projections for Nye and Esmeralda counties and Nevada

Year	State of Nevada		Nye County		Esmeralda County	
	Projected Population	Percentage Change	Projected Population	Percentage Change	Projected Population	Percentage Change
2010	2,963,812	—	55,028	—	1,280	—
2015	3,321,189	12.0	66,292	20.5	1,321	3.2
2020	3,619,563	9.0	75,240	13.5	1,373	3.9
2025	3,872,937	7.0	81,852	8.8	1,457	6.1

Source: Nevada State Demographer's Office 2008.

Nye County is approximately 18,159 square miles (11.6 million acres). For a county of this size, it has a sparse population, partially attributable to the lack of available private land for development. Over 97 percent of the county's land area is managed by federal agencies (Table 3-31) as compared with 87 percent in the state of Nevada. Additionally, 19,000 acres are under state management, leaving only approximately 249,000 acres of private land in the county.

Table 3-31. Federal agencies managing lands in Nye County

Agency	Acreage
U.S. Bureau of Land Management (BLM)	6,500,000
U.S. Forest Service	1,900,000
U.S. Department of Defense	1,800,000
U.S. Department of Energy	863,000
National Park Service	107,000
U.S. Fish and Wildlife Service (USFWS)	13,700
BLM/USFWS jointly managed	8,400
U.S. Bureau of Indian Affairs	8,000
Total	**11,200,100**

Housing

Tables 3-32 and 3-33 summarize the housing characteristics of the population centers in the area of analysis. Housing data were obtained from the U.S. Census Bureau. Because of the small population in most towns in the project area, data gaps were present.

Between 2000 and 2008, the U.S. Census Bureau estimated that Nye County would have a 4.1 percent increase in available housing. In 2000, the towns near the project area in both Esmeralda and Nye counties had vacancy rates greater than 29 percent. Although more recent data are unavailable, with the current state of the economy and the decline in population (Table 3-30), it is likely that vacancy rates will continue to maintain this high rate.

Table 3-32. Housing characteristics

Area	2000 Number of Units	2000 Vacant Units	2000 Percentage Vacant	2006–2008 Number of Units	2006–2008 Vacant Units	2006–2008 Percentage Vacant
Nevada	827,457	76,292	9.2	1,098,307	151,160	13.8
Nye County	15,934	2,625	16.5	16,592	3,202	19.3
Tonopah	1,589	463	29.1	Not available	Not available	Not available
Round Mountain	872	203	23.3	Not available	Not available	Not available
Esmeralda County	833	378	45.4	Not available	Not available	Not available
Silver Peak	399	165	41.4	Not available	Not available	Not available
Goldfield	434	213	49.1	Not available	Not available	Not available

Source: U.S. Census Bureau 2009

Additional housing in the form of hotels and motels is also available near the project area. According to TravelNevada.com, in 2009 Tonopah had eight hotels/motels and Goldfield had one. Based on information from the Web site, the two towns had approximately 351 guest rooms among the nine hotels and motels. Additional accommodation is available in the form of recreational vehicle facilities, mobile home sites, and campgrounds.

The most recent data on housing conditions and mortgage costs indicate that median housing conditions in Nye County are generally about 60 percent less than for the state of Nevada as a whole (Table 3-34). Housing conditions in Tonopah and other communities near the project area are also lower than those for the state and for Nye County. Many areas of the country report today's housing values have declined to near 2000 housing values.

Table 3-33. Housing conditions and costs

Area	2000 Median Housing Conditions	2006–2008 Median Housing Conditions	2000 Average Monthly Mortgage Costs	2006–2008 Average Monthly Mortgage Costs	2000 Median Monthly Gross Rental Costs	2006–2008 Median Monthly Gross Rental Costs
Nevada	142,000[a]	296,200	1,190[a]	1,796	699	999
Nye County	122,100	187,100	866	1,239	541	848
Tonopah	78,200	Not available	869	Not available	478	Not available
Round Mountain	66,300	Not available	806	Not available	476	Not available
Esmeralda County	75,600	Not available	825	Not available	381	Not available
Silver Peak	87,000	Not available	550	Not available	336	Not available
Goldfield	71,300	Not available	950	Not available	389	Not available

Source: U.S. Census Bureau 2009
[a] figures are in nominal dollars

3.11.3.1.2 Economic Conditions

Historically, Nye County's economy revolved around mining, agriculture, federal defense research and development, and the railroad. Mining and agriculture have been the primary activities; however, the importance of these sectors has decreased over time. Nye County has also been subject to the "boom-and-bust" economy long associated with the cyclical mining industry; mirroring this are both high and low population growth rates. The nearest town to the project area, Tonopah, has seen its historic dependence on mining shift to tourist traffic through the community and traffic serving the nearby Tonopah Test Range.

In nearby Esmeralda County, the major employer is the government, primarily state government. Mining, trade, transportation, and utilities play a role. Like Nye County, Esmeralda County is restoring its mining ghost towns to attract more tourism.

Over a 20-year period, Nevada and Nye County showed an increase in employment, but also an increase in the unemployment rate. These rates include the current recession. Esmeralda County appears to show a decrease in jobs and a decrease in the unemployment rate (Table 3-34). The small size of Esmeralda County magnifies even small changes to the economy.

Table 3-34. Labor force characteristics of Esmeralda and Nye counties and Nevada, 1990–2010

Characteristic	Nevada		Esmeralda County		Nye County	
	1990	2010	1990	2010	1990	2010
Labor force	655,896	1,373,387	613	481	8,945	17,411
Employment	622,516	1,185,677	575	457	8,616	15,714
Unemployment	33,380	187,710	38	24	329	1,697
Unemployment rate	5.1%	13.7%	6.2%	5.0%	3.7%	9.7%

Source: Nevada Department of Employment, Training, and Rehabilitation – Research and Analysis Bureau 2010

Table 3-35 summarizes the number of people employed by all economic sectors in Nevada and in Nye and Esmeralda counties. Nye and Esmeralda counties have 89 percent and 68 percent, respectively, of their labor force employed by the private sector. Government is an important sector statewide and in each of the counties. This is particularly true in Esmeralda County, where 30 percent of the labor force holds government jobs.

Table 3-35. Employment by industry for Nye and Esmeralda counties and Nevada, 2007

Industry	State of Nevada	Esmeralda County	Nye County
Farm	4,835	53	255
Total Private	1,492,783	320	16,425
Forestry, fishing, etc.	1,886	(D)[a]	74
Mining	14,512	(D)	1,044
Utilities	4,680	0	131
Construction	156,837	(D)	1,571
Manufacturing	54,528	(D)	229
Wholesale trade	44,853	(D)	193
Retail trade	171,545	(D)	2,142
Transportation and warehousing	57,709	(D)	291
Information	20,518	(D)	137
Finance and insurance	75,034	11	478
Real estate	121,332	27	1,736
Professional, scientific, technical services	88,541	(D)	2,532
Management	19,447	(D)	34
Administrative and waste services	109,530	12	1,268
Educational services	11,393	0	(D)
Health care and social assistance	102,592	(L)[b]	(D)
Arts, entertainment, recreation	52,576	(L)	962
Accommodation and food services	318,494	(D)	1,614
Other services, except public administration	66,776	(D)	953
Total government	168,913	98	2,068
Federal, civilian	17,119	(L)	157
Military	14,672	(L)	115
State, local	137,122	91	1,796
State	33,329	(D)	167
Local	103,793	(D)	1,629
Total	1,666,531	471	18,748

Source: U.S. Department of Commerce, Bureau of Economic Analysis 2009

[a] (D) = not reported, confidential but included in total

[b] (L) = less than 10 jobs, but estimates for this item are included in the totals

Retail, professional, scientific, and technical services, along with government, are the largest employment sectors in Nye County. The largest sectors in Esmeralda County are farm, real estate, and government. Professional, scientific, and technical services, the largest sector in Nye County, accounts for 13.5 percent of employment, compared with only approximately 5 percent statewide.

Rural counties have a tendency to lose population in the 20–34 year age group because many members of this cohort move to more urban areas where there is greater opportunity to realize educational and career opportunities. Additionally, increased rates of retirees moving to rural areas raise concerns that more public services will be required, which would tax an economy with a shrinking revenue base. In Nye County, government payments to individuals for retirement and disability insurance benefits (primarily Medicare and Medicaid), income

maintenance benefits, and veteran's benefits accounted for 22.7 percent of the total personal income compared with 10.7 percent in the state of Nevada; an indicator of a relatively large retirement population in the county (U.S. Department of Commerce 2009).

Tables 3-36 and 3-37 list the largest employers in Nye and Esmeralda counties. It is unknown whether these employees reside in the county where they work or whether they commute. For instance, an employee may reside in Esmeralda County but commute to Nye County to work.

Table 3-36. Largest employers in Nye County

Employer	City	Industry	Number of Employees
Bechtel Nevada Corporation	—	Research and development	1,000–1,499
Nye County School District	Tonopah	Elementary and secondary schools	900–999
Smoky Valley Mining Division	—	Gold ore mining	700–799
Nye County	Tonopah	Tonopah executive and legislative offices combined	600–699

Source: NV Energy 2010

Table 3-37. Largest employers in Esmeralda County

Employer[a]	City	Industry	Number of employees
Esmeralda County	Goldfield	—	60–69
Chemetall Foote Corporation	Silver Peak	Lithium mining	50–59
Esmeralda County School district	Goldfield	Elementary school	30–39

Source: Esmeralda County 2010

[a] all other, greater than 20 employees

Income

Median household income and per capita income data were obtained from the U.S. Census Bureau's American Community Survey. The most recent data, 2008, indicate the median household income in the state was $56,432, Nye County's was $43,463, and Esmeralda County's was $40,299. U.S. Census Bureau data were not available for towns with less than 20,000 residents.

Law Enforcement and Emergency Services

Law enforcement in the project area is provided by the Nye County Sherriff's Department and the Nevada Highway Patrol. The Nye County Sheriff's Office North Area Command has headquarters in Tonopah. Emergency services, including fire and ambulance, in the surrounding area are provided by the town of Tonopah. The Nye Regional Medical Center is located in Tonopah. BLM is responsible for fire protection for wildland fires on public land.

Electricity and Natural Gas

The project area is served by NV Energy (formerly Sierra Pacific Power Company). NV Energy service covers 54,500 square miles, providing electricity to 2.4 million customers throughout Nevada and northeastern California (NV Energy 2010).

Public Water Supply and Wastewater

There are few public water supply systems in the project area. The majority of water users rely on individual wells. Tonopah Public Utilities manages public water supply systems near the project area (Economic Development Authority of Nye County 2010).

Solid Waste

NDEP, Bureau of Waste Management, oversees permitting of solid waste landfills and other waste management facilities within the state of Nevada. Tonopah has an operating Class II landfill.

Schools

The project area is located within the Nye County School District. Of the district's five public schools, none are within the project area. A summary of school information and enrollment is provided in Table 3-38.

Table 3-38. Summary of schools in the Nye County School District

Schools	Grade Levels	Number of Students for 2009–2010 School Year
Silver Rim Elementary (Tonopah)	K–2	87
Tonopah Elementary /Middle (Tonopah)	3–8	191
Tonopah High (Tonopah)	9–12	161
Round Mountain Elementary (Round Mountain)	K–5	145
Round Mountain Middle/High (Round Mountain)	6–12	177

Source: Nye County School District 2010

Fiscal Resources

The Nye County Finance Department describes County governmental revenues and expenditures within 5 major funds and approximately 67 nonmajor funds. The General Fund is the primary operating fund for Nye County (Nye County 2010). Tables 3-39 and 3-40 summarize the Nye County revenues and expenditures, respectively. Any tax (direct revenue) benefit of the proposed facility would go to Nye County; however, indirect revenue such as employment would benefit the region.

Table 3-39. Nye County revenues, 2008–2009

Revenue	General Fund	Education Endowment Fund	Special Project Fund	Endowment Capital Projects Fund	Repository Oversight Fund	Other Governmental Funds	Totals
Taxes	$16,049,402	$—[a]	$—	$—	$—	$6,118,385	$22,167,787
Licenses	128,395	—	—	—	—	1,233,861	1,362,256
Intergovernmental resources	14,756,343	—	8,651,700	—	4,467,271	9,448,981	37,324,295
Charges for services	2,370,025	—	—	—	—	2,111,922	4,481,947
Fines for forfeitures	354,485	—	—	—	—	1,133,408	1,487,893
Other	1,714,752	479,252	914,422	645,209	—	2,188,873	5,942,508
Total Revenues	**35,373,402**	**479,252**	**9,566,122**	**645,209**	**4,467,271**	**22,235,430**	**72,766,686**

Source: Information was taken directly from Nye County 2010; inconsistencies have been noted.

[a] Dashes indicate that the relevant revenue source did not contribute to the County fund or that the fund did not pay for the relevant expense in fiscal year 2008–2009.

Table 3-40. Nye County expenditures for fiscal year 2008–2009

Expenditure	General Fund	Education Endowment Fund	Special Project Fund	Endowment Capital Projects Fund	Repository Oversight Fund	Other Governmental Funds	Totals
General government	$12,520,443	$—	$321,648	$—	$4,467,271	$4,028,094	$21,337,456
Judicial	6,613,059	—	10,906	—	—	349,108	6,973,073
Public safety	16,358,654	—	50,071	—	—	3,585,514	19,994,239
Public works	99,432	—	108,100	—	—	6,472,230	6,679,762
Health and sanitation	315,963	—	—	—	—	983,838	1,299,801
Welfare	—	—	—	—	—	1,935,744	1,935,744
Culture and recreation	—	—	26,745	—	—	522,554	549,299
Community support	410,070	—	76,539	—	—	459,967	946,576
Inter-governmental	—	479,252	124,590	—	—	709,416	1,313,258
Capital projects	—	—	2,154,100	—	—	936,710	3,090,810
Debt service	—	—	—	—	—		
Principal	—	—	—	—	—	2,262,887	2,262,887
Interest	—	—	—	—	—	356,958	356,958
Total expenditures	**36,317,621**	**479,252**	**2,872,699**	—	**4,467,271**	**22,603,020**	**66,739,863**
Excess (deficiency) of revenues over expenditures	**(944,219)**	—	**6,693,423**	**645,209**	—	**(367,590)**	**6,026,823**

Source: Information was taken directly from Nye County 2010; inconsistencies have been noted.

[a] Blank cells indicate that the relevant revenue source did not contribute to the County fund or that the fund did not pay for the relevant expense in fiscal year 2008–2009.

3.11.3.2 Alternative Area

Existing conditions are the same as described previously for the Proposed Area.

3.11.3.3 Borrow Pit

Existing conditions are the same as described previously for the Proposed Area.

3.11.3.4 TL and Anaconda Moly Substation

Existing conditions are the same as described previously for the Proposed Area.

3.12 Visual

3.12.1 Area of Analysis and Methodology

The visual resources study area for the proposed project was defined as the area wherein potential undesirable visual effects from construction and maintenance of the proposed project may be observed. The methodology used for this visual analysis is based on the BLM *Visual*

Resource Inventory and Visual Resource Contrast Rating handbook (BLM 1986a,b). This BLM methodology establishes a baseline for visual characteristics. A viewshed delineation was prepared for the proposed and alternative areas using a digital elevation model (DEM) (HDR 2010). This delineation illustrates areas from which viewers would have a clear line-of-sight to the project area within 10 miles of the proposed and alternative areas (HDR 2010). Output from this DEM indicates areas in which the project would be "visible" and "not visible" to observers in the study area. The model takes into account topography, viewer height, and the height of project components mainly the central receiver tower (as this would be the most visible feature throughout the viewshed). This is important because changes in topography can block or expose views. During the field reconnaissance, six critical viewpoints or Key Observation Points (KOPs) were established within the visible portion of the viewshed delineation using BLM Visual Resource Management (VRM) guidance (Figure 3-19). KOPs were selected in populated or commonly utilized areas where people could possible have a view of the proposed project. These areas included the Crescent Dunes Special Recreation Management Area, commonly traveled roads, and residential communities.

According to the Tonopah RMP and Final EIS, the proposed and alternative areas as well as the surrounding land in the Big Smoky Valley are classified as Class C and managed according to VRM Class IV standards (BLM 1997). However, since the RMP and EIS were published in 1997, visual resource specialists completed a Scenic Quality Evaluation worksheet at each KOP. Additionally, Visual Contrast Rating worksheets were completed for each KOP and discussed in Chapter 4(HDR 2010).

Since the Proposed Area and the Alternative Area are adjacent to each other, the KOPs presented in this chapter illustrate the view from the KOP to the proposed project area. KOPs and visual simulations for the proposed action and alternatives are included in Chapter 4.

3.12.2 Regulatory Framework

The following section outlines all federal, state, and local laws, policies, and regulations that apply to the area of analysis and were considered in the development of this visual resources analysis.

3.12.2.1 Federal

The FLPMA requires BLM to protect the quality of scenic values on public lands (43 USC 1701). BLM has developed an analytical process that identifies, sets, and meets objectives for maintaining scenic values and visual quality. The VRM system functions in two ways: first, BLM conducts an inventory that evaluates visual resources on all lands under its jurisdiction; once inventoried and analyzed, lands are given relative visual ratings (i.e., VRM classifications). VRM classes describe the different degrees of modification allowable within the landscape. The BLM VRM classes are as follows:

- **Class I.** To preserve the existing character of the landscape. The level of change to the characteristic landscape should be very low and must not attract attention.
- **Class II.** To retain the existing character of the landscape. The level of change to the characteristic landscape should be low.
- **Class III.** To partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate.
- **Class IV.** To provide for management activities that require major modification of the existing character of the landscape. The level of change to the characteristic landscape can be high. The area of analysis for the proposed project is located on Class IV land.

The Tonopah RMP and ROD assign VRM classes ranging from Class I to IV to all BLM lands in the planning area. All future projects and actions must adhere to the objectives of the applicable VRM classes. The original VRM inventory was completed by BLM in 1997 and is included in the Tonopah RMP and ROD.

3.12.3 Affected Environment

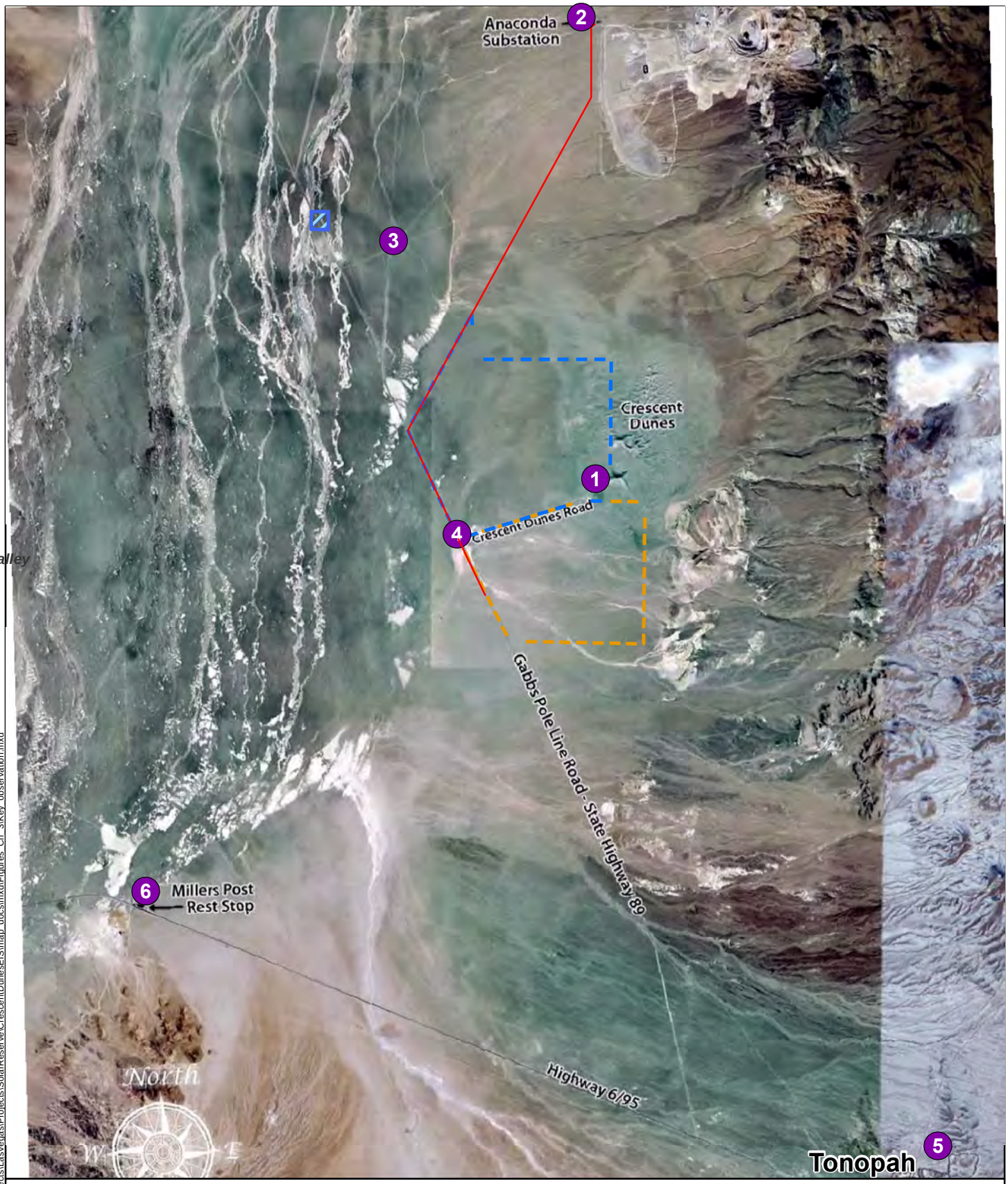
This section provides a detailed inventory of the existing visual landscape. The area of analysis for this visual resources assessment is defined as the area wherein potential undesirable visual effects from construction, operation, and decommissioning of the Proposed Action may be discerned.

3.12.3.1 Regional Setting

The proposed solar energy project is located in Nye County, Nevada, approximately 13 miles from the town of Tonopah, Nevada. The project area is located on unincorporated land administered by BLM. The project area is located in the basin and range physiographic province in the Great Basin Desert sub-province characterized by expansive flat desert valleys surrounded by high fault-block mountains. The region generally consists of wide valleys or basins bounded by alluvial slopes and mountain ranges. Views from travel routes (e.g., US 95) tend to be of broad, sweeping desert in a semiarid landscape.

Other nearby mountains include Lone Mountain to the south, Pilot Peak to the east, and the Shoshone and Toiyabe Ranges to the north.

Within the regional setting, the visual resources study area was defined by viewpoints from which the proposed facilities would be seen. The viewshed is extensive given the openness of the landscape and the availability of viewpoints from travel routes, recreational areas, and the nearby community of Tonopah.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_3\Key_observation.mxd

N

NEVADA

Project Site

0 0.8 1.6 Miles

Legend

Borrow Pit

Alternative Area

Proposed Area

Figure 3-19 Key Observation Points for Visual Resource Analysis

Crescent Dunes Solar Energy Project

Source: ESRI 2010, USGS Seamless GIS Data Web Server

3.12.3.2 Project Setting

The project area is located in northeastern Esmeralda County and southwestern Nye County and lies in Gabb's Valley Range north of SR 95 and south of the Humboldt-Toiyabe National Forest. The topography of the area is flat, with steeply sloping elevations ranging between 9,100 and 11,000 feet in the background distances. The project area is accessible via SR 95 and Pole Line Road. Access into the landscape is open due to the flat expanses of land.

The majority of land in the study area is administered by BLM and has been classified as a VRM Class IV landscape. BLM has defined the objectives for development on Class IV landscapes as having "to provide for management activities which 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."

Development within the area of analysis is minimal and is limited to utility development such as "H" frame and monopole power lines, a power substation, and paved roads. Vegetation within the area of analysis is xeric shrub-steppe or sagebrush, which is typical of the region. No visible flowing water features are located within the project area, although ephemeral drainages may be present seasonally or during precipitation.

Tonopah has been designated as a premier stargazing destination. Dark sky conditions are a valuable asset to the town, and efforts to encourage the proper use of lighting and light shielding is included in the mitigation section of this assessment.

3.12.3.3 Proposed Area

The landscape in the Proposed Area is generally characterized by flat desert with low-lying desert scrub vegetation bounded by high-relief fault-block mountains in the seldom seen distance zone (over 15 miles away). Landscape in the region appears desolate, that is, devoid of any major cultural modification aside from a paved two-lane rural highway and a power line corridor (oriented northeast and southwest) that bisects the landscape approximately 3 miles north of the Proposed Area. The colors within the landscape are limited to bands of earth tone browns and tans, with few other distinguishing colors, creating a relatively homogenous appearance.

The most distinctive natural feature in the area is the Crescent Dunes SRMA. The Crescent Dunes are relatively unique as they are smooth, undulating sand dunes that are visible from over 5 miles away. According to the BLM, approximately 1,200 people/year visit the site (BLM 2010f)

The closest residences to the Proposed Area are approximately 10 miles away to the south. The residential area is on the outskirts of the town of Tonopah located off Radar Road. Most of the

residences in this area are single-family detached homes. Approximately 10 houses (located at a slightly higher elevation) currently have views of Crescent Dunes in the distance and, as such, would have views of the Proposed Area. Views from this area may be slightly obstructed by vegetation, topography, and distance.

The Proposed Area is located immediately adjacent to Pole Line Road, which is a paved two-lane highway. This road provides access to residences and farmland, as well as the existing Anaconda Moly Substation from SR 95. Pole Line Road has a very low level of daily traffic.

Given the special recreation designation of Crescent Dunes, the area supports some recreational activity, although no signs indicating recreational areas are apparent. Crescent Dunes and the surrounding landscape are used by off-highway vehicle recreationists, as evidenced by an extensive network of 4-wheel drive trails and staging areas located sporadically throughout the area.

3.12.3.3.1 KOP 1 – Crescent Dunes SRMA

KOP 1 is within the SRMA (the view faces north toward the Anaconda Moly Substation). From this vantage point, high-relief mountains are visible for nearly 180 degrees from north to south (Photograph 1). The landscape in the foreground and middleground is flat and sparsely vegetated. Background distances reveal high-relief fault-block mountains that form a distinct line along the horizon. The landscape in the area is very desolate and undeveloped. The area is unique to the region in that the series of smooth, sandy dunes form a distinctive and interesting visual feature that is visible from nearly 10 miles away in almost any direction.

Photograph 1. View from KOP 1 faces north toward the Anaconda Moly Substation

3.12.3.3.2 KOP 2 – Anaconda Moly Substation

KOP 2 is located at the western edge of the Anaconda Moly Substation (Photograph 2; view faces south toward the Crescent Dunes along the existing TL corridor). The landscape in this area is relatively flat, with a few hills in the middleground. The background distances reveal high-relief, fault-block mountains that form a distinct line along the horizon. Vegetation in this area is limited to low-lying desert scrub that creates a coarse texture in the foreground. There is an access road to the Anaconda Moly Substation off of Pole Line Road. Viewers from KOP 2 would likely be limited to those with access to the substation.

Photograph 2. View from KOP 2 faces south toward the Crescent Dunes along the existing TL corridor

3.12.3.3.3 KOP 3 – Anaconda Moly Substation

KOP 3 is approximately 1.5 miles southwest of the Anaconda Moly Substation. Facing southeast from the roadway, the existing TL corridor is evident (Photograph 3). The landscape in this area is relatively flat with some hills in the middleground. Vegetation is sparse and limited to desert scrub typical of the region. High-relief mountains are evident in the seldom seen distance zone.

Photograph 3. KOP 3 is the view facing southeast toward the project area from the Anaconda Moly Substation access road

3.12.3.3.4 KOP 4 – Pole Line Road

KOP 4 faces east toward the Crescent Dunes from the intersection of Pole Line Road and the unpaved access road to Crescent Dunes (Photograph 4). The landscape in this area is flat in the foreground and middleground with low-lying desert scrub vegetation. Exposed soil unpaved roads provide access to Crescent Dunes to the east. High-relief mountains are visually dominant in the background and form the horizon line. These mountains dominate the viewshed.

Photograph 4. KOP 4 faces east toward the Crescent Dunes from the intersection of Pole Line Road and the unpaved access road to Crescent Dunes

3.12.3.3.5 KOP 5 – Penstemon Court

KOP 5 is located slightly higher (on a hill) with views to the north toward the proposed project (Photograph 5). This area is characterized by panoramic views of expansive desert with low-lying desert scrub and some hills evident in the middleground. High-relief mountains are evident in the background and seldom seen distances form the horizon line. Because of the relatively flat nature of the landscape, unobstructed viewing conditions exist for over 15 miles. Additionally, with distance, the detail and texture within the landscape appears as horizontal striations in background distances. There are approximately 100 residences in this area; views from these residences are over 10 miles away.

Photograph 5. KOP 5 at Penstemon Court to the north

3.12.3.3.6 KOP 6 – Miller's Rest Stop

Miller's Rest Stop is located approximately 11 miles from the proposed project area (Photograph 6). The rest stop is located off Interstate 6, and the existing TL corridor is evident in this area. The landscape is characterized largely by bare earth and sparse vegetation. Views of the mountains are a dominant visual feature and form the horizon line. Crescent Dunes is evident in the background. Views from this area would largely be from travelers along Interstate 6.

Photograph 6. KOP 6 at Miller's Rest Stop to the east

3.12.3.4 Alternative Area

Located slightly north of the Proposed Area, the Alternative Area is in an aesthetic setting that is the same as the Proposed Area. The conceptual footprint of Alternative 1 is located on the cusp of the Crescent Dunes SRMA, and Alternative 2 is located closer to Pole Line Road (see Figure 3-1 for project layout). Residences located to the south are approximately 12 miles away from the Alternative Area. Additionally, this area is used by off-highway vehicle recreationists accessing the Crescent Dunes SRMA.

3.12.3.5 Borrow Pit

The borrow pit area is an existing industrial use located outside of the viewshed. None to very few sensitive viewers are likely to see this area.

3.12.3.6 TL and Anaconda Moly Substation

The proposed TL and substation would connect the existing Anaconda Moly substation to the proposed power block location at the project site. The majority of the proposed TL would follow the existing Miller's to Anaconda Moly TL corridor oriented northeast-to-southwest. The TL corridor would run perpendicular to Pole Line Road in the vicinity of the proposed project site, then parallel the road before connecting with the proposed power block.

The landscape in the area of the TL corridor is flat desert valley, bounded by high-relief, fault-block mountains in the seldom seen distance zone (beyond 15 miles). Views of the proposed TL would be evident from Pole Line Road but would likely be indiscernible from other areas. Recreationists using the Crescent Dunes SRMA would be able to see the proposed TL from some vantage points.

3.12.3.7 CESA

The CESA, or viewshed, is defined as the area where the project facilities, including the solar field and TLs, are visible. The viewshed has an approximate radius of 10 miles in any direction from the project site. The proposed project would not be a dominant visual feature beyond 5 miles, and views beyond 10 miles of the project would be very difficult to discern.

3.13 Hazardous Materials

3.13.1 Area of Analysis and Methodology

A Phase I Environmental Site Assessment (Phase I ESA) was performed by JBR (JBR 2010b). The areas assessed included the Proposed Area, the Alternative Area, the borrow pit, and the TL and substation corridor (see Figure 3-1), totaling approximately 7,050 acres. The Phase I ESA goal was to gather evidence of the use of hazardous materials and petroleum products on-site and off-site near the subject property that may have resulted in environmental hazards.

The analysis included an online data source review and interviews with relevant agency personnel.

3.13.2 Regulatory Framework

The Phase I ESA was conducted in accordance with the scope and limitations of American Society for Testing and Materials (ASTM) Standard Practice E 1527-05, and the standards for conducting all appropriate inquiries set forth by EPA in 40 CFR 312.

The use, storage, and disposal of hazardous materials are regulated by several local, state, and federal agencies. Table 3-43 summarizes the various regulations and regulatory agencies. Laws and regulations related to hazardous waste and regulated, non-hazardous waste are summarized in Table 3-46.

3.13.3 Affected Environment

3.13.3.1 Proposed Area

The Phase I ESA did not reveal any recognized environmental conditions (RECs) as defined by ASTM E 1527-05.

3.13.3.2 Alternative Area

The Phase I ESA did not reveal any RECs as defined by ASTM E 1527-05.

3.13.3.3 Borrow Pit

The Phase I ESA did not reveal any RECs as defined by ASTM E 1527-05.

3.13.3.4 TL and Anaconda Moly Substation

The Phase I ESA did not reveal any RECs as defined by ASTM E 1527-05.

Table 3-43. Summary of applicable regulations for the use, storage, and disposal of hazardous materials

Regulation	Requirements/Applicability
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA): 42 United States Code (USC) Section 9601 et seq., 40 Code of Federal Regulations (CFR) Part 302	Requires notification to various agencies when there is a release of hazardous substances from a facility.
Emergency Planning and Community Right to Know Act of 1986 (EPCRA), commonly known as SARA Title III: 42 USC Section 11001 et seq., 40 CFR Parts 350, 355 370, and 372	Requires inventory reporting, planning, and reporting for storage and release of hazardous and acutely hazardous materials.
EPCRA, Section 302 (Public Law 99–499), 42 USC 11022	Requires agency notification if extremely hazardous substances are stored in excess of Threshold Planning Quantities.
EPCRA, Section 311 (Public Law 99–499), 42 USC 11021	Requires that either material data safety sheets for all hazardous materials or a list of all hazardous materials be submitted to Nevada Emergency Response Commission and local fire department.
EPCRA, Section 313 (Public Law 99–499), 42 USC 11023	Requires annual reporting of releases of hazardous materials.
Occupation Safety and Health Administration, 29 USC Section 651 et seq., 29 CFR Part 1910, Safety and Health Regulations for Construction: 29 CFR Part 1926	Specifies standards for hazardous materials storage, handling, and worker protection in emergencies.
Oil Pollution Prevention: 40 CFR Part 112	Requires the preparation of a Spill Prevention Control and Countermeasure Plan if storage capacity exceeds certain volumes, and should there be a reasonable possibility that the tank(s) may discharge oil into navigable waters of the United States.
Hazardous Materials Transportation, 49 CFR 171–172	Requires transporters of hazardous materials to properly label, manifest, package, and ship hazardous materials.
Chemical Accident Prevention Provisions, 40 CFR Part 68	Requires the preparation of a Risk Management Plan if certain listed toxic or flammable substances are used in excess of the listed threshold quantity.
Chemical Facility Antiterrorism Standard, 6 CFR Part 27	Requires facilities that possess any “chemicals of interest” above threshold quantities must register and provide specified information to the U.S. Department of Homeland Security.
Hazard Communication (HAZCOM) Program, 29 CFR 1910.1200, Safety and Health for Construction, 29 CFR 1926.1 et seq.	Requires employers to implement HAZCOM Standard that gives workers the right to know the hazards and identities of chemicals in their workplaces (29 CFR 1910.1200). Requires written procedures and personnel protective equipment for employees working with hazardous materials.

Table 3-44. Summary of regulations applicable to hazardous and non-hazardous wastes

Regulation	Requirements/Applicability	Administering Agency
Resource Conservation and Recovery Act (RCRA), 42 United States Code (USC) 6901 et. seq. (1976), 40 Code of Federal Regulations (CFR) Parts 260, 261, 262, Hazardous Waste Management Applicable to Generators	Requires hazardous waste generators to obtain an Environmental Protection Agency Identification (EPA ID) number and annually register with the Nevada Division of Environmental Protection (NDEP) to accumulate and store hazardous waste for no more than 90 days and ship hazardous waste under a manifest to a licensed disposal site. Requires generator to identify and profile hazardous waste, store hazardous waste in appropriate containers, label containers stored on-site and transported to disposal site, and train operators in hazardous waste management.	EPA Region IX NDEP
RCRA; 42 USC 6901 et. seq. (1976), 40 CFR 263, Hazardous Waste Transportation, Nevada Revised Statutes (NRS) 459	Requires hazardous waste generator to use registered transporters of hazardous wastes that have an EPA ID number, use manifests to accompany waste shipments, and conduct proper cleanup of any hazardous waste discharges.	EPA Region IX NDEP Nevada Department of Transportation
Universal Waste, 60 Federal Register (FR) 25542, May 11, 1995, as amended at 64 FR 36488, July 6, 1999; 70 FR 45520, August 5, 2005, 40 CFR 273	Requires management, employee training, and proper disposal of universal waste that includes batteries, fluorescent lamps, mercury switches, and pesticides.	EPA Region IX NDEP
Used Oil Solid Waste Disposal Act, as amended [42 USC 6905, 6912(a), 6921 through 6927, 6930, 6934, and 6974]; and Comprehensive Environmental Response, Compensation, and Liability Act [42 USC 9601(37) and 9614(c)], 40 CFR 279, Nevada Administrative Code Chapter 444	Requires generators of used oil to prevent spills and correctly label, store, transport, and dispose of/recycle used oil.	NDEP EPA Region IX

3.13.4 CESA

The Phase I ESA did not reveal any RECs as defined by ASTM E 1527-05.

3.14 Range Resources

3.14.1 Area of Analysis and Methodology

This section addresses range resources, which include livestock grazing and wild horses, within the detailed area of analysis that includes the Proposed Area, Alternative Area, borrow pit, and the TL corridor. This section provides a discussion of the livestock grazing areas, class of livestock grazed, and existing grazing management. The proposed project is not within a Herd Management Area for wild horses or burros.

3.14.2 Regulatory Framework

3.14.2.1 BLM Standards and Guidelines for Livestock Grazing

BLM has established Standards and Guidelines by the Secretary of the Interior (43 CFR 4180). The purpose of these Standards and Guidelines is to ensure that the BLM administration of grazing helps preserve currently healthy conditions and restores healthy conditions of rangelands.

3.14.2.2 BLM RMPs

In addition, the BLM Tonopah RMP that covers the project area has developed rangeland programs that authorize livestock grazing on public lands [43 CFR 1601.0-5(b) and CFR 4100.08]. The regulations require that BLM manage livestock grazing on public lands under the principle of multiple use and sustained yield. To accomplish this, rangeland has been broken down into controllable allotments to manage short- and long-term objectives for livestock grazing. Allotments are leased to permittees for a defined period of time. Allotments are managed to increase availability of forage and develop improvements, and are evaluated periodically to determine whether management goals are being met.

3.14.2.3 Allotment Grazing Management Plan

A Grazing Management Plan has not been developed for the affected grazing allotment; therefore, management of grazing follows the guidelines provided in the RMP.

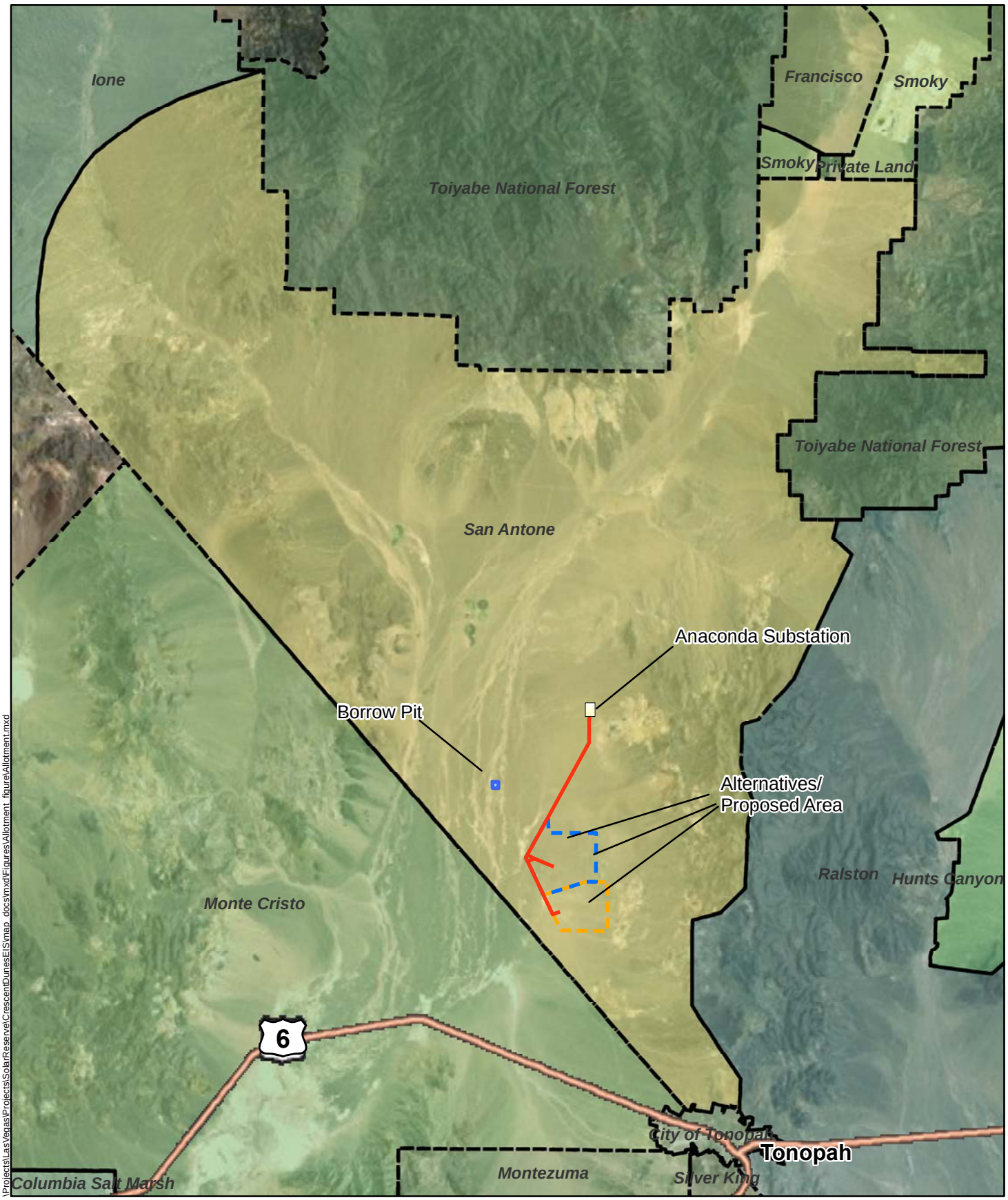
3.14.3 Affected Environment

3.14.3.1 Proposed Area

3.14.3.1.1 Livestock Grazing

The study area is open to livestock grazing as managed by BLM. The Proposed Area, the Alternative Area, the borrow pit, and the TL and Anaconda Moly Substation corridor are within the San Antone Grazing Allotment (Allotment Number 0073) based on BLM allotment maps (Figure 3-20). The San Antone Grazing Allotment covers 442,555 acres. One permittee is authorized to graze within this allotment, and the permittee is authorized to graze cattle at a stocking level of 13,505 animal unit months (32.7 acres per animal unit month). Access to the proposed project is along US 95, and then along SH 89 (Pole Line Road), which passes through the extreme northeastern edge of the Monte Cristo Grazing Allotment. However, because no construction would occur within this allotment, the area potentially affected is very small, and the same individual holds permits for grazing this allotment and the San Antone allotment and manages them as one—this evaluation does not address the Monte Cristo Allotment separately.

Grazing allotment management is guided by objectives and guidelines established in the RMP. Based on the RMP, the San Antone Allotment has been assigned an allotment management category of “Improve,” which indicates that the management of the allotment is to focus on improving the current unsatisfactory resource condition.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures\Allotment_figureAllotment.mxd

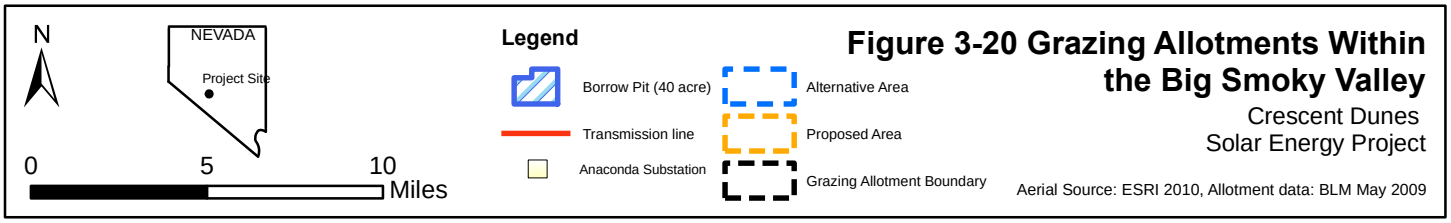


Figure 3-20 Grazing Allotments Within the Big Smoky Valley

Crescent Dunes
Solar Energy Project

Aerial Source: ESRI 2010, Allotment data: BLM May 2009

Important forage production plant species within this allotment include Indian ricegrass, winterfat, galleta grass, sand dropseed, shadscale, kochia, Nevada Ephedra, fourwing saltbush, and squirreltail (BLM 1997) (see Section 3.2, Vegetation) for MLRA ecological units within the project area, and forage species typically produced within these units include the species listed as important forage species.

No naturally occurring seeps or springs are present within or near the Proposed Area, the Alternative Area, the borrow pit, and the TL and Anaconda Moly Substation corridor. Also, no troughs, pipelines, or wells for cattle use have been developed near the Proposed Area or within the borrow pit or alignment for the TL corridor.

No fences, corrals, cattle guards, or other range improvements have been made in the vicinity of the proposed project, alternatives, or ancillary facilities.

3.14.3.2 Alternative Area

Existing conditions are the same as for the Proposed Area.

3.14.3.3 Borrow Pit

Existing conditions are the same as for the Proposed Area.

3.14.3.4 TL and Anaconda Moly Substation

Existing conditions are the same as for the Proposed Area.

3.14.3.5 CESA

Existing conditions are the same as for the Proposed Area.

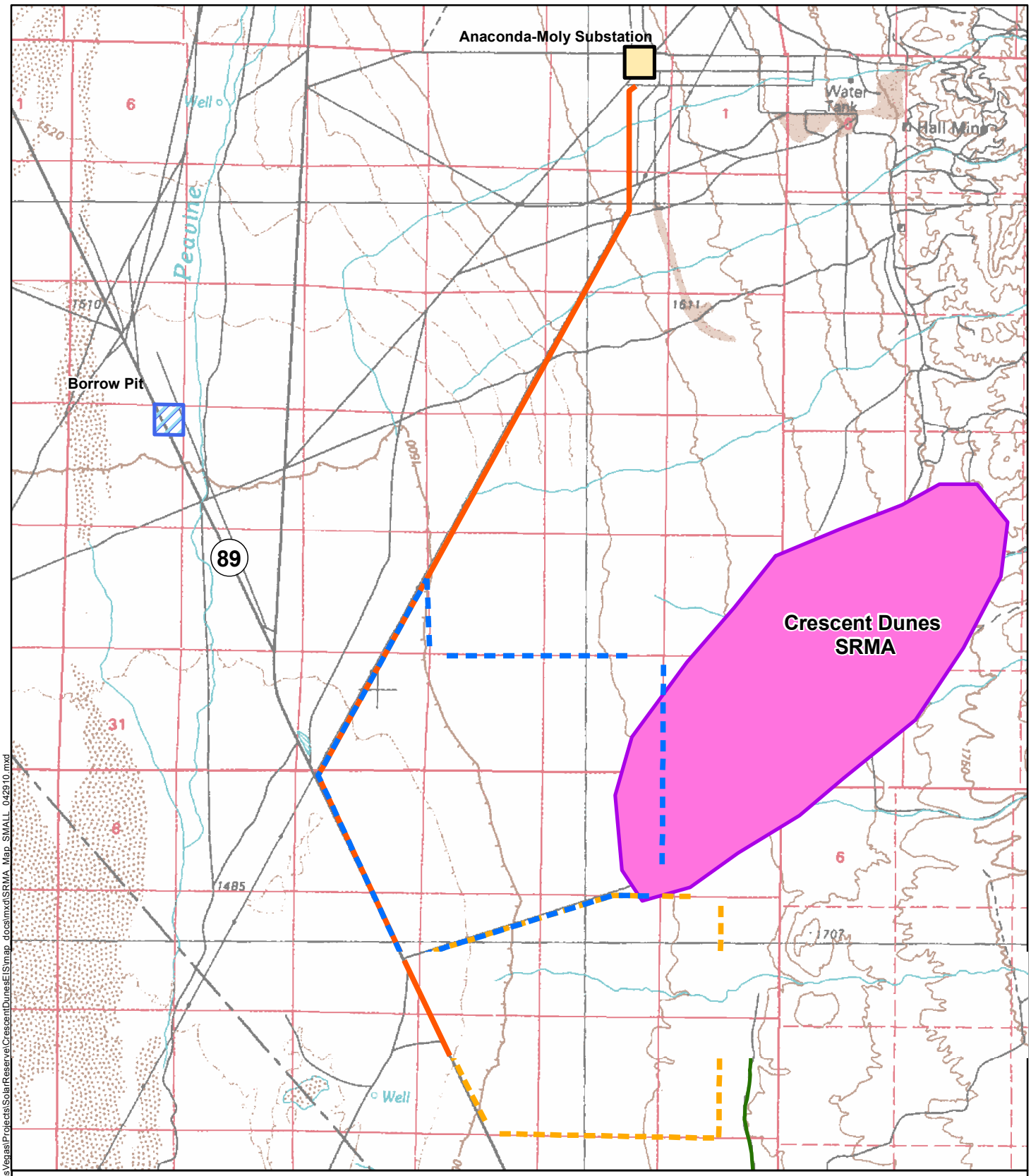
3.15 Recreation and Wilderness

This section describes recreational opportunities in the project area and provides a discussion of the relevant recreation plans and policies.

3.15.1 Area of Analysis and Methodology

The area of analysis for recreation and wilderness resources includes the Proposed Area, Alternative Area, borrow pit, and TL corridor. The CESA for recreation/wilderness resources includes all federal, state, local, and private recreational areas within 25 miles of the project area.

To assess the existing condition of recreation and wilderness, the locations of national forests, wilderness areas, wilderness study areas, hunting units, campgrounds, and SRMAs were reviewed and are illustrated on Figures 3-21 and 3-22. In addition, these resources were evaluated within a 10-mile radius of the project area to assess potential cumulative effects (Figure 3-22). Additionally, the Statewide Comprehensive Outdoor Recreational Plan, hunter information sheets, and NDOW Big Game Statistics were reviewed to identify recreational opportunities within the project area.



N

NEVADA

Project Site

Legend

- Transmission line
- Alternative Area
- Proposed Area
- Borrow Pit (40 acre)
- Rights-of-way avoidance areas (Crescent Dunes SRMA)
- Nevada Test and Training Range
- TRAC-ON Trail

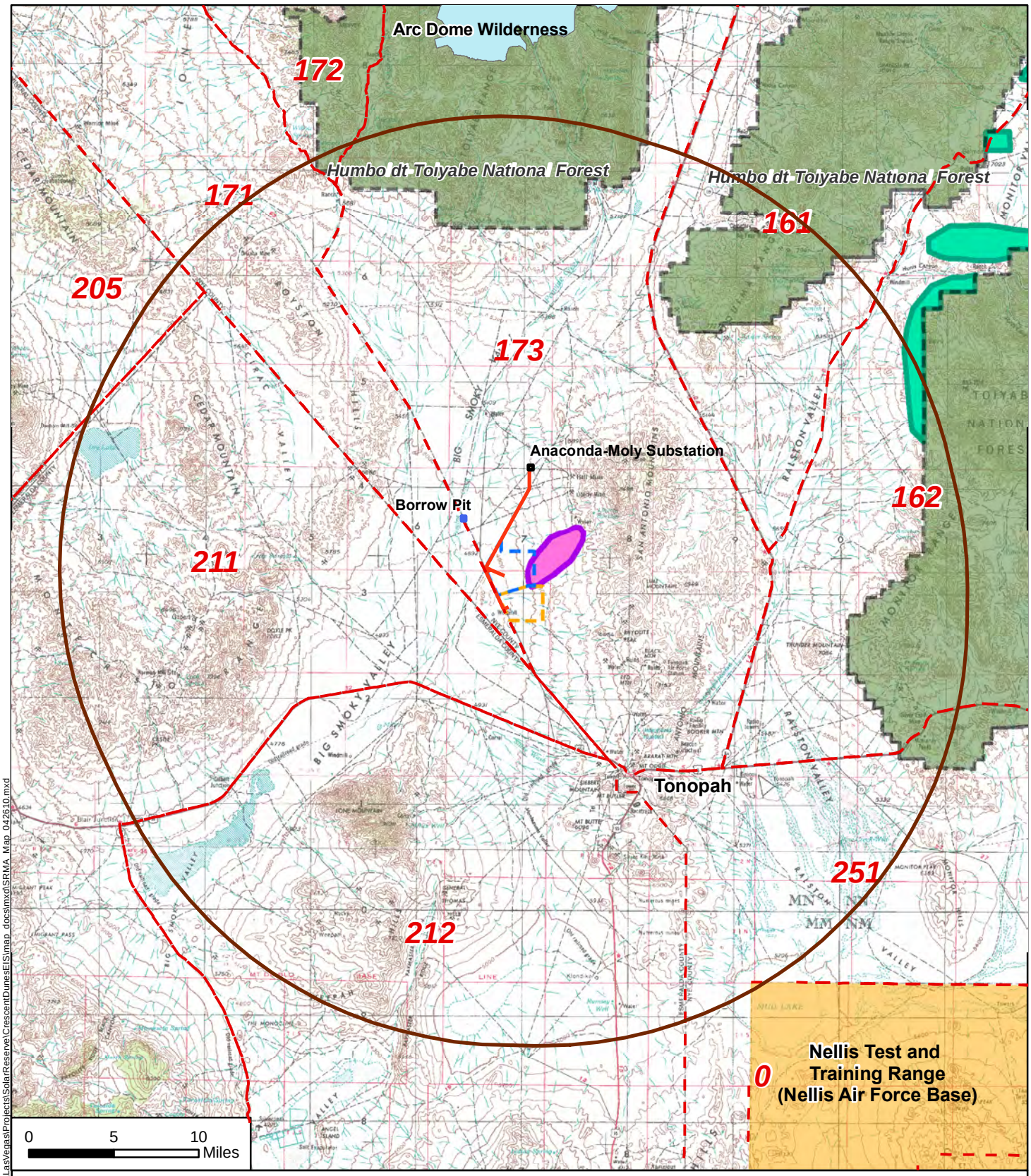
0 0.6 1.2 Miles

Figure 3-21 Recreational Management Areas within the Project Area

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\SRMA_Map_SMALL_042910.mxd



G:\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\SRMA_Map_042610.mxd

Figure 3-22 Recreation Management Areas Within the Cumulative Effects Study Area

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

3.15.2 Regulatory Framework

3.15.2.1 BLM and Tonopah RMP

The RMP provides the TFO with a comprehensive framework for managing 6.1 million acres of public land in Nye and Esmeralda counties. All public land within the planning area, unless otherwise classified as ROWs avoidance areas, is available for land use leases and permits under Section 302 of the FLPMA (43 CFR 2920). Regarding the ROWs avoidance areas, the RMP directs that ROWs and other discretionary land actions will be granted only if no feasible alternative routes are available. Any such leases, grants, or permits will include appropriate stipulations to protect the area's special values.

3.15.2.2 Nevada Hunting Statutes and Regulations

Hunting in the state of Nevada is governed by Nevada state law (NRS 503.005–503.660) and is implemented by NDOW in accordance with regulations NAC 503.141– 503.195.

3.15.3 Affected Environment

3.15.3.1 Proposed Area

3.15.3.1.1 Recreational Opportunities

The Crescent Dunes are unvegetated sand dunes that lie to the northeast of the Proposed Area. BLM manages Crescent Dunes as an SRMA that is approximately 3,000 acres (Figure 3-21). According to the RMP, vehicle use within the SRMA is limited to existing roads and trails. Off-highway vehicle use on unvegetated sand areas may be allowed provided that such vehicle use is compatible with the areas' values (BLM 1997). The BLM estimates that average annual visitation is 1,200 people (BLM 2010f). The RMP identifies this area as a ROW avoidance area. The Proposed Area does not overlap this SRMA ROW avoidance area. The only access to the dunes is an unnamed dirt road that diverges from Pole Line Road (Figure 3-21). This unnamed dirt road would be the same road that would lead to the Proposed Area. Currently, the Crescent Dunes SRMA is a semi-primitive recreational area with no established campground or facilities. Lack of any developed facilities may give recreationalists a sense of a remote recreational experience meaning that there is a lack of man-made structures and sounds.

Additionally, other recreational vehicle use may take place within the proposed project area. For example, TRAC-ON, a Las Vegas based recreation company, provides 3-5 day motorcycle and ORV tours of central Nevada; one of the routes passes through the Proposed area. TRAC-ON received a BLM Special Recreation Permit in August 2010 for the trail.

3.15.3.1.2 Hunting

The Proposed Area is completely within Hunting Unit 173. According to NDOW, mule deer, pronghorn antelope, and bighorn sheep are present within this hunting unit. However, it is unlikely that bighorn sheep would be found in the project area because this species prefers

higher elevation habitats and spend the majority of time at elevations above 11,000 feet (NDOW 2010a).

Although NDOW says that mule deer may be found throughout the hunt unit, during hunting season NDOW specifies that the highest deer densities can be found above the pinyon-juniper habitat at higher elevations (between 8,500 and 10,000 feet) in more open habitat (NDOW 2010b). Also, according to NDOW, pronghorn sheep are spread out throughout this hunting unit. However, during hunting season, NDOW specifies that pronghorn antelope are associated with water sources or alfalfa fields (NDOW 2010c).

3.15.3.1.3 Wilderness Areas and Wilderness Study Areas

No designated Wilderness Areas or Wilderness Study Areas were identified in within the proposed area.

3.15.3.2 Alternative Area

The existing condition of the Alternative Area is similar to the Proposed Area, except that the Alternative Area overlaps approximately 130 acres of the ROWs avoidance area that is identified as the Crescent Dunes SRMA (Figure 3-22).

3.15.3.3 Borrow Pit

No specific recreational opportunities were identified within the borrow pit area.

3.15.3.4 TL and Anaconda Moly Substation

No specific recreational opportunities were identified within the TL and Anaconda Moly Substation corridor.

3.15.3.5 CESA

In addition to the recreational opportunities within the detailed study area, BLM and U.S. Forest Service lands are public lands that provide a wide variety of dispersed outdoor recreational opportunities within the CESA (Figure 3-22).

USDA Forest Service

The Humboldt-Toiyabe National Forest, managed by the U.S. Forest Service, provides numerous recreational opportunities within 25 miles of the project area. No private outdoor recreational opportunities were identified within the CESA.

The Humboldt-Toiyabe National Forest is a 2.5-million-acre national forest that is the largest national forest outside of Alaska. Recreational opportunities include hiking, camping, hunting, wildlife viewing, fishing, snowmobiling, cross-country skiing, and other activities. The southern boundary of the Humboldt-Toiyabe National Forest is approximately 19 miles from the Proposed Area. Located within the Toiyabe-Humboldt National Forest is Peavine Creek Campground, which is approximately 30 miles from the area of analysis. Peavine Creek Campground and the southeastern portion of the Humboldt-Toiyabe National Forest are most easily accessible from a

unnamed dirt road that diverts from SH 376. The southern end of the range is most accessible by way of Pole Line Road and Peavine Creek Road. The southwestern portion of the Toiyabe Range is accessible by an unnamed dirt road that diverges from Pole Line Road.

ROW Avoidance Areas

An additional ROWs avoidance area was identified within the CESA on the western side of the Monitor Range (Figure 3-22), approximately 23 miles from the proposed project site. This area is identified as a sage-grouse hunting area, and must be avoided seasonally (February 15–May 15).

Hunting

Hunting is permitted on public land (BLM and U.S. Forest Service) within defined hunting seasons. NDOW manages hunting by hunt units (i.e., hunting management units throughout Nevada). A number of hunting units are within the CESA, including:

- southern portion of Units 161, 162, 171, 172, and 173
- eastern portion of Unit 205 and 211
- northern portion of Unit 212
- western portion of Unit 251

Species hunted within the CESA of the project area within these hunting units include mule deer, desert bighorn sheep, and pronghorn antelope. Within hunt units 161, 162, and 171, the Big Smoky Valley was identified as a good location to hunt pronghorn antelope. Unit 173 within the Arc Dome Wilderness Area of the Toiyabe Range was identified as good hunting grounds for mule deer. The Monte Cristo Range (unit 211) may have good hunting grounds for bighorn sheep, although NDOW claims that most animals are located in the more western portions of the units. Lastly, mule deer may be found in low densities throughout hunting units 212 and 251.

Wilderness Areas and Wilderness Study Areas

No Wilderness Areas or Wilderness Study Areas were identified within the CESA.

4.0 Environmental Consequences

This chapter discusses the environmental consequences that would result from construction and operation of the facility and associated components (TL, substation, borrow pit) of the Proposed Action, Alternative 1, Alternative 2, and the No Action Alternative. The impact analysis focuses on potential direct, indirect, and cumulative effects on each resource area described in Chapter 3.0, Affected Environment.

Direct Effects
Direct effects are the impacts caused by the construction and operation of the proposed project and alternatives and occur at the same time and place.

Indirect Effects
Indirect effects occur in the near and distant future and are caused by the proposed project and alternatives. The effects can be both short- and long-term effects.

Cumulative Effects
Cumulative effects are the sum of direct and indirect impacts of past, present, and reasonably foreseeable future projects in addition to the proposed project or alternatives in the CESA. As described in Chapter 3.0, Affected Environment, this area changes depending on the specific resource category.

The environmental consequences analysis has been prepared by imposing the Proposed Action, Alternative 1, Alternative 2, borrow pit, TL, and substation acreages onto data discussed in Chapter 3.0 for the Proposed Area, Alternative Area, borrow pit, TL, and substation. Table 4-1 lists the acreage used for the evaluations documented in this chapter.

Table 4-1. Estimated area (in acres) for each project component used in the assessment of impacts

	Right-of-Way (acreage)					
	Proposed Action		Alternative 1		Alternative 2	
Component	Temporary	Permanent	Temporary	Permanent	Temporary	Permanent
Project site	0	1,498	0	1,499	0	1,499
Access road	0	2	0	5	0	2
Transmission line and substation	173	173	136	136	127	127
Borrow pit	40	0	40	0	40	0
Total	**213**	**1,673**	**176**	**1,640**	**167**	**1,628**

4.1 Vegetation

4.1.1 Methods

Biologists analyzed the effects of the Proposed Action, Alternative 1, Alternative 2, borrow pit, and the TL and Anaconda-Moly Substation corridor on vegetation resources. To assess the direct effects on vegetation resources, biologists used GIS to overlay the footprints of the project components on the mapped vegetation communities and land cover types to identify those resources that would be directly affected by project construction. The biologists then used GIS and the same datasets to calculate the amount of those resources in the CESA to gain insight as to the regional abundance of the communities that would be affected.

As part of the analysis of effects to vegetation, a noxious weed assessment was conducted in accordance with BLM Manual 9015. The first step in this analysis was to assign a numerical rating for Factor 1, which is the likelihood of noxious weed species spreading to the project area. Factor 2, which is the consequence of noxious weed establishment in the project area, was also given a numerical rating. These two factors were then multiplied and that value used to identify a risk rating for the project. The risk rating then identified guidelines for noxious weed control in the project area.

4.1.2 Proposed Action

4.1.2.1 Construction

Direct Effects

Construction activities associated with the Proposed Action would result in direct effects, including the removal of topsoil and vegetation within the project areas during grading activities. Approximately 1,500 acres (including the access road) would be graded in order to construct the project facilities (i.e., heliostats, power block, evaporation ponds, and administrative buildings), and a paved access road (Table 4-2). Within these areas, the constructed facilities would be present for the life of project, which is anticipated to be 33 years. Revegetation and reclamation activities following decommissioning and removal of the project would result in eventual reestablishment of vegetative cover (a reclamation plan is being developed by BLM). Table 4-2 presents the amount of vegetation communities or land cover types that would be replaced with project facilities and the percentage of that vegetation community or land cover type affected within the CESA (Figure 4-1).

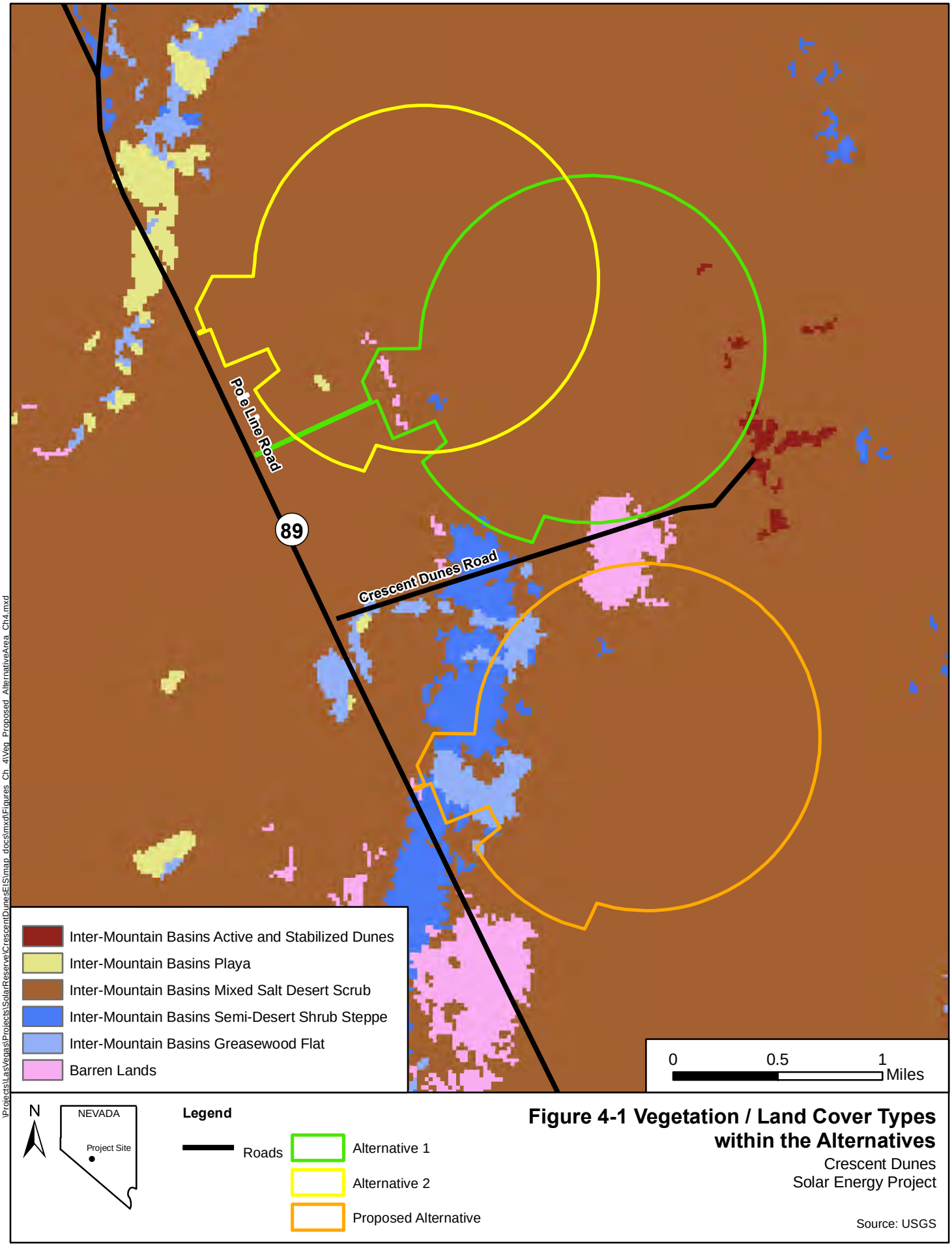


Figure 4-1 Vegetation / Land Cover Types within the Alternatives

Crescent Dunes
Solar Energy Project

Source: USGS

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\Veg_Proposed_AlternativeArea_Ch4.mxd

Table 4-2. Summary of effects to vegetation communities or land cover types for the Proposed Action in the project footprint and the CESA

Southwest Regional Gap Analysis Project Vegetation Community or Land Cover Type	Area Replaced by Project Facilities (acres)	Vegetation Community/ Land Cover in Project Area (%)	Vegetation Community/ Land Cover Affected in the CESA (%)
Inter-Mountain Basins Mixed Salt Desert Scrub	1,325	88.4%	1.61%
Inter-Mountain Basins Semi-Desert Shrub-Steppe	57	3.8%	2.02%
Inter-Mountain Basins Greasewood Flat	83	5.5%	2.68%
Barren Lands, Non-specific	35	2.3%	6.39%
Total	**1,500**	**100.0%**	**12.70%**

As illustrated in Table 4-2, the majority of the acreage that would be affected for the proposed project consists of Inter-Mountain Basins Mixed Salt Desert Scrub (1,325 acres), which is a small amount (1.61%) of the available salt desert scrub within the CESA (total area of 81,993 acres). This means that the majority of the vegetation that would be affected for the project is not unique habitat throughout the CESA. Similarly, only a small amount of Inter-Mountain Basins Semi-Desert Shrub Steppe (57 acres), Inter-Mountain Basins Greasewood Flat (83 acres), and Barren Lands (35 acres) would be affected compared with the available amount of these vegetation communities within the CESA.

Another direct effect of the proposed project is the potential for the introduction of noxious weeds into the project area. Noxious weed species were not found within the Proposed Area during field surveys, but were present in adjacent areas (i.e., near the borrow pit). The establishment of noxious weeds would have an effect on vegetation adjacent to the project area. Noxious weed species can displace native vegetation and diminish wildlife habitat quality. To determine the potential for noxious weeds in the project area, a Noxious Weed Risk Assessment was performed (see Section 4.1.1). Table 4-3 summarizes the results of the Noxious Weed Risk Assessment and the value assigned to the two risk factors.

Table 4-3. BLM noxious weed risk assessment factors and rating risk assessment factors worksheet (BLM 1992)

Factor	Rating for the Proposed Action	Value
Factor 1 – Likelihood of Noxious Weed Species Spreading to Project Area	Low: Noxious weed species present in areas adjacent to but not within the project area. Project activities can be implemented and prevent the spread of noxious weeds into the project area.	1
Factor 2 – Consequence of Noxious Weed Establishment in Project Area	Possible adverse effects on site and possible expansion of infestation within project area. Cumulative effects on native plant community are likely but limited.	5
Total Risk Rating (Factor 1 Rating Value * Factor 2 Rating Value)		**5**

As presented in Table 4-3, the total risk rating for the proposed project is less than 10, resulting in a low risk rating. For this rating, BLM recommends proceeding with the project as planned. The Proponent would be required to initiate control treatment on noxious weed populations if they become established in the project area.

In addition to noxious weeds, the Proposed Area may be more vulnerable to the introduction of invasive species such as cheatgrass, Russian thistle, and halogeton. These species are not currently included on the NDA's Noxious Weed List, but are considered aggressive and can potentially dominate areas after introduction. Russian thistle and halogeton were documented in the Proposed Area, and project activities could further the establishment of these species. Cheatgrass was not documented in the Proposed Area, but is widespread throughout the Great Basin and could be introduced because of increased traffic in the area.

Indirect Effects

Vegetation in the project area will be removed during construction activities; therefore, no indirect effects to vegetation are associated with construction of the Proposed Action.

4.1.2.2 Operation

Direct Effects

Vegetation within the project area would be removed during construction activities, so no direct effects to vegetation are likely to occur during operation of the Proposed Action. Ongoing maintenance activities within the heliostat field, particularly the use of water for cleaning mirrors, may increase the potential for the establishment of noxious and invasive weed species within the developed areas, which then could spread to adjacent areas. Weed control measures within the project area would minimize the likelihood of this occurring.

Indirect Effects

Vegetation in the project area would be removed during construction activities, so no indirect effects to vegetation are likely to occur with operation of the Proposed Action.

4.1.3 Alternative 1

4.1.3.1 Construction

Direct Effects

The direct effects for Alternative 1 are similar to those for the Proposed Action, only differing in the acreage of vegetation communities or land cover types that would be affected (1,504 acres including access road). Table 4-4 presents the acreage of each of the vegetation communities or land cover types that would be affected during grading activities (Figure 4-1).

Table 4-4. Summary of effects to vegetation communities or land cover type for Alternative 1 in the project footprint and the CESA

Southwest Regional Gap Analysis Project Vegetation Community or Land Cover Type	Area Replaced by Project Facilities (acres)	Vegetation Community/ Land Cover in Project Area (%)	Vegetation Community/ Land Cover Affected in the CESA (%)
Inter-Mountain Basins Mixed Salt Desert Scrub	1,473	98.0%	1.77%
Inter-Mountain Basins Semi-Desert Shrub-Steppe	3	0.2%	0.11%
Inter-Mountain Basins Active and Stabilized Dune	8	0.5%	16.23%
Barren Lands, Non-specific	20	1.3%	3.76%
Total	**1,503**	**100.0%**	**21.87%**

As presented in Table 4-4, most of the acreage that would be affected for Alternative 1 consists of Inter-Mountain Basins Mixed Salt Desert Scrub (1,473 acres), which is a small amount (1.77%) of the available salt desert scrub within the CESA (81,993 acres). This means that the majority of the vegetation that would be affected for the project is not unique habitat throughout the CESA. Similarly, only a small amount of Inter-Mountain Basins Semi-Desert Shrub Steppe (3 acres) and Barren Lands (20 acres) would be affected compared with the available amount of these vegetation communities within the CESA. However, approximately 8 acres of Inter-Mountain Basins Active and Stabilized Dunes would be affected by the proposed project, and this is a relatively high percentage (16.23%) of this unique land cover type available throughout the CESA.

No noxious weeds were observed within Alternative 1; therefore, the noxious weed assessment for Alternative 1 is the same as the Proposed Action (see Table 4-3). The total risk rating for Alternative 1 is less than 10, resulting in a low risk rating. For this rating, the BLM recommends proceeding with the project as planned. The Proponent would be required to initiate control treatment on noxious weed populations if they become established in the project area.

Indirect Effects

Vegetation in the project area would be removed during construction activities; therefore, no indirect effects to vegetation are associated with construction of the Alternative 1.

4.1.3.2 Operation

Direct Effects

Vegetation within the project area would be removed during construction activities, so no direct effects to vegetation are likely to occur during operation of the Alternative 1. Ongoing maintenance activities within the heliostat field, particularly the use of water for cleaning mirrors, may increase the potential for the establishment of noxious and invasive weed species within the developed areas, which then could spread to adjacent areas. Weed control measures within the project area would minimize the likelihood of this occurring.

Indirect Effects

Vegetation in the project area would be removed during construction activities, so no indirect effects to vegetation are likely to occur with operation of Alternative 1.

4.1.4 Alternative 2

4.1.4.1 Construction

Direct Effects

The direct effects for Alternative 2 are similar to those for the Proposed Action, only differing in the acreage of vegetation communities or land cover types that will be affected (1,401 acres including access road). Table 4-5 presents the acreage of the four vegetation communities or land cover types that would be affected during grading activities (Figure 4-1).

Table 4-5. Summary of effects to vegetation communities or land cover type for Alternative 2 in the project footprint and the CESA

Southwest Regional Gap Analysis Project Vegetation Community or Land Cover Type	Area Replaced by Project Facilities (acres)	Vegetation Community/ Land Cover in Project Area (%)	Vegetation Community/ Land Cover Affected in the CESA (%)
Inter-Mountain Basins Mixed Salt Desert Scrub	1,491	99.3%	1.80%
Inter-Mountain Basins Semi-Desert Shrub-Steppe	2	0.1%	0.08%
Inter-mountain Basins Playa	2	0.1%	1.55%
Barren Lands, Non-specific	6	0.4%	1.21%
Total	**1,501**	**100.0%**	**4.64%**

As shown in Table 4-5, most of the acreage that would be affected for Alternative 2 consists of Inter-Mountain Basins Mixed Salt Desert Scrub (1,491 acres), which is a small amount (1.80%) of the available salt desert scrub within the CESA (81,993 acres). This means that the majority of the vegetation that would be affected for the project is not unique habitat throughout the CESA. Similarly, only a small amount of Inter-Mountain Basins Semi-Desert Shrub Steppe (2 acres), Inter-Mountain Basins Playa (2 acres), and Barren Lands (6 acres) would be affected compared with the available amount of these vegetation communities within the CESA.

No noxious weeds were observed within Alternative 2; therefore, the noxious weed assessment for Alternative 2 is the same as for the Proposed Action (see Table 4-3). The total risk rating for Alternative 2 is less than 10, resulting in a low risk rating. For this rating, the BLM recommends proceeding with the project as planned. The Proponent would be required to initiate control treatment on noxious weed populations if they become established in the project area.

Indirect Effects

Vegetation in the project area would be removed during construction activities; therefore, no indirect effects to vegetation are associated with construction of Alternative 2.

4.1.4.2 Operation

Direct Effects

Vegetation within the project area would be removed during construction activities, so no direct effects to vegetation are likely to occur during operation of Alternative 2. Ongoing maintenance activities within the heliostat field, particularly the use of water for cleaning mirrors, may increase the potential for the establishment of noxious and invasive weed species within the developed areas, which then could spread to adjacent areas. Weed control measures within the project area would minimize the likelihood of this occurring.

Indirect Effects

Vegetation in the project area would be removed during construction activities, so no indirect effects to vegetation are likely to occur with operation of Alternative 2.

4.1.5 Borrow Pit

The following subsections summarize the impacts of the construction and operation of the borrow pit together because the borrow pit would be open only until completion of construction of the generation facility.

Direct Effects

Expansion of the borrow pit would result in the removal of vegetation and topsoil, as well as the underlying materials that would be used for construction activities. Approximately 40 acres of vegetation would be removed for the expansion of the pit, affecting only the Inter-mountain Basins Mixed Salt Desert Scrub vegetation communities (Table 4-6). All construction activities are anticipated to remain within the area proposed for the pit, therefore, no temporary direct effects are likely to occur.

Table 4-6. Summary of effects to vegetation communities or land cover type for the borrow pit

Southwest Regional Gap Analysis Project Vegetation Community or Land Cover Type	Area Replaced by Project Facilities (acres)	Vegetation Community/ Land Cover in Project Area (%)	Vegetation Community/ Land Cover Affected in the CESA (%)
Inter-Mountain Basins Mixed Salt Desert Scrub	40	100.0%	0.05%
Total	40	100.0%	0.05%

As mentioned under the Proposed Action, noxious weeds were found adjacent to the borrow pit. Although the BLM risk rating for noxious weeds in the area is low (see Table 4-3), construction activities particularly near the borrow pit may facilitate the spread of noxious weeds throughout the project area. Three tamarisk plants and tall whitetop were found in a nearby wash. However, because these species are dependent on moist environments like those associated with the wash, it is unlikely that these species would spread to other parts of the project area. The majority of the project area is a drier environment that would not support such species.

Indirect Effects

Vegetation in the project would be removed during construction activities; therefore, no indirect effects to vegetation are likely to occur with construction of the borrow pit.

4.1.6 TL and Anaconda-Moly Substation

4.1.6.1 Construction

Direct Effects

Construction activities associated with the TL would result in both temporary and permanent direct effects on vegetation. Direct effects would be the removal of approximately 173 acres of vegetation to install TL poles and associated spur roads (i.e., construction and maintenance access roads that branch from the existing Pole Line Road and the other access roads). The short spur road and an area at the base of each tower would be graded to remove vegetation, as well as topsoil for the base of the towers. These facilities and the associated impacts would remain for the life of the project. In addition to these effects, temporary disturbances are likely to occur with construction and installation of the TL. Although the TL corridor would not be graded, trucks and equipment may drive over and crush existing vegetation to allow for tensioning of the lines and other activities. This temporary disturbance area is expected to be minimal because the TL corridor is directly adjacent to the existing Pole Line Road until it converges with the existing Anaconda-Millers TL, where an existing two-track dirt road is present. By avoiding the grading and vegetation removal in these temporary disturbance areas, vegetation may recover rapidly. Although efforts would be made to avoid it, some construction activities would require vegetation removal for safety or quality reasons. In those cases, vegetation would be cut at the ground surface, allowing the plants to sprout from the remaining crown.

The TL and Anaconda-Moly Substation may be more vulnerable to the introduction of invasive species such as cheatgrass, Russian thistle, and halogeton. Seeds of these species are easily spread because their seeds can get caught in vehicle tires and, if deposited in disturbed areas, could proliferate. Cheatgrass was not documented in the proposed corridor, but is widespread throughout the Great Basin and could be introduced because of increased traffic and disturbances during construction. Washing vehicles prior to arrival on site can mitigate this potential effect.

Indirect Effects

Where needed, vegetation would be removed for construction of the TL and substation; therefore, no indirect effects to vegetation are likely to occur with construction of the TL and Anaconda-Moly Substation.

4.1.6.2 Operation

Direct Effects

Generally, direct effects on vegetation from the normal operation and maintenance of the TL and substation are anticipated to be minimal. Maintenance of the access spur roads and base of transmission towers may include periodic removal of vegetation to minimize fire risks; however, those activities would be minimal.

Indirect Effects

Vegetation within the project area would be removed during construction activities, so no direct effects to vegetation are likely to occur during operation of the TL or the Anaconda-Moly Substation.

4.1.7 No Action Alternative

Under the No Action Alternative, no project-related impacts to existing vegetation communities or land cover types would occur.

4.1.8 Summary of Impacts

Direct impacts would include the removal of vegetation within the project area as the result of grading and construction activities. Indirectly, the project may increase the likelihood for the introduction and proliferation of invasive weed species in the surrounding area; however, there is a low risk for the introduction of noxious weeds into the surrounding area.

4.1.9 Mitigation

Between 1,628 and 1,673 acres of natural vegetation would be removed as a result of the various components of this project. Cactus and yucca would be salvaged in coordination with BLM. In coordination with BLM, the Proponent is developing a reclamation plan to be implemented at the termination of the lease.

The Proponent has developed a Preliminary Weed Risk Assessment and will develop Weed Management Plan (WMP) for the project. The WMP will prescribe management actions for monitoring and eradicating specified species by BLM-approved methods. The WMP also will describe applicable regulations for the use of herbicides on federally managed lands in Nevada, and provide the basis for proper management and use of herbicides in the project area. A preemergent herbicide would be applied in the spring, and spot foliar applications would be used throughout the year to maintain the area free of vegetation. Typically, operations and maintenance requirements for native landscapes are low once established. The WMP will

include weeding, annual pruning, and soil monitoring, if necessary. Weeding should occur frequently, typically weekly, during the initial growth period to ensure that invasive plants do not mature and set seed. Weeding activities would follow the approved WMP. Once the native plant species are established, weeding frequency would drop to less frequent intervals.

4.2 Wildlife

4.2.1 Methods

Biologists analyzed the effects of the Proposed Action, Alternative 1, Alternative 2, borrow pit, and the TL and Anaconda-Moly Substation corridor on wildlife resources. Direct impacts to wildlife were assessed by taking into consideration how construction and operation of the facilities may directly kill, injure, harm, or harass wildlife, or affect wildlife behavior patterns. To assess the indirect effects on wildlife resources, biologists identified the type and quantity of terrestrial wildlife habitat affected as a result of project levels of surface disturbance in relation to the habitat available throughout the CESA (see Section 4.1).

4.2.2 Proposed Action

4.2.2.1 Construction

Direct Effects

Direct effects to wildlife may include injury or mortality during initial grading activities. Some wildlife such as game and bird species that are particularly mobile may be able to avoid injury or mortality by leaving the area. However, some wildlife such as smaller mammals and lizards, especially nocturnal species or species that utilize burrows, may be injured or killed during grading or clearing activities.

Increased traffic and newly established access roads in the area may result in an increase of vehicle-wildlife collisions, resulting in animal injury or death. This may be of particular concern for larger mammals (such as coyotes and kit foxes), game animals (such as deer and pronghorn), and smaller species that utilize roads as a heat source (such as snakes and lizards). The effect on birds is anticipated to be minimal given that birds are generally able to avoid vehicles traveling on roads.

Although temporary in nature, direct effects may occur as a result of increased noise levels associated with construction activities. Noise may cause wildlife to avoid the area, resulting in a disruption of normal behavioral patterns.

The proposed project also may directly affect wildlife species by removing approximately 1,500 acres of habitat. However, most of this habitat consists of Inter-mountain Basins Mixed Salt Desert Scrub (see Section 4.1). This is a relatively small proportion (less than 2 percent) of the available salt desert scrub habitat available throughout the CESA. The Proposed Action would not remove any specialized or unique habitat throughout the region.

Indirect Effects

Wildlife may be indirectly affected because of increased human activity in the area. This increased activity may cause wildlife to avoid the adjacent area, possibly affecting migration and other activities.

4.2.2.2 Operation

Direct Effects

One of the major direct effects to wildlife associated with operation of the Proposed Action would be the effect of the evaporation ponds on wildlife, particularly birds. Since most birds in the project area are considered migratory birds and effects to migratory birds and year-round resident birds are the same, evaporation pond effects on birds are discussed in Section 4.4.

The evaporation ponds could potentially attract other wildlife to the project site, although larger wildlife would be excluded from the area by a fence that surrounds the facility. The water in the evaporation ponds would be saturated with salt (making a brine solution). Wildlife that could breach the fence and access the ponds (such as mice, bats, and reptiles) may die or become ill by ingesting toxic levels of salt.

Indirect Effects

Wildlife may be indirectly affected because of increased human activity in the area. This increased activity may cause wildlife to avoid the adjacent area, possibly affecting migration and other activities.

4.2.3 Alternative 1

4.2.3.1 Construction

Direct Effects

Direct effects associated with Alternative 1 are similar to those for the Proposed Action, except that Alternative 1 would remove approximately 8 acres of Inter-Mountain Basins Active and Stabilized Dunes, which is a relatively large percentage (16.23 percent) of this habitat type available throughout the CESA (see Section 4.1). Removal of this type of habitat may affect species that specifically depend on this habitat, such as kangaroo rats and mice. Kangaroo mice are considered a special status species and are addressed in Section 4.4.

Indirect Effects

Indirect effects associated with the construction of Alternative 1 would be the same as those associated with the Proposed Action.

4.2.3.2 Operation

Direct Effects

Direct effects associated with the operation of Alternative 1 would be the same as those associated with the Proposed Action.

Indirect Effects

Indirect effects associated with the operation of Alternative 1 would be the same as those associated with the Proposed Action.

4.2.4 Alternative 2

4.2.4.1 Construction

Direct Effects

Direct effects on wildlife associated with the construction of Alternative 2 would be similar to those of the Proposed Action. Alternative 2 may indirectly affect wildlife species by removing approximately 1,501 acres of habitat. However, most of this habitat consists of Inter-mountain Basins Mixed Salt Desert Scrub (see Section 4.1). This is a relatively small proportion (less than 2 percent) of the available salt desert scrub habitat available throughout the CESA. Alternative 2 would not remove any specialized or unique habitat throughout the region.

Indirect Effects

Indirect effects associated with the construction of Alternative 2 would be the same as those associated with the Proposed Action.

4.2.4.2 Operation

Direct Effects

Direct effects on wildlife associated with the operation of Alternative 2 would be the same as those associated with the Proposed Action.

Indirect Effects

Indirect effects associated with the operation of Alternative 2 would be the same as those associated with the Proposed Action.

4.2.5 Borrow Pit

The following subsections summarize the impacts of the construction and operation of the borrow pit together because the borrow pit would be open only until completion of construction of the generation facility.

Direct Effects

Construction of the borrow pit may directly affect wildlife species by removing approximately 40 acres of habitat. However, all of this habitat consists of Inter-mountain Basins Mixed Salt

Desert Scrub (see Section 4.1). The vegetation communities affected would be relatively small proportions (less than 1 percent) of the available habitat throughout the CESA. Construction of the borrow pit would not remove any specialized or unique habitat throughout the region.

Indirect Effects

Indirect effects associated with the construction of the borrow pit would be the same as those associated with the Proposed Action.

4.2.6 TL and Anaconda-Moly Substation Corridor

4.2.6.1 Construction

Direct Effects

Direct effects on wildlife associated with construction of the TL and Anaconda-Moly Substation corridor would be similar to those of the Proposed Action; between approximately 127 and 173 acres (depending on the alternative chosen) of wildlife habitat would be removed to install TL poles and spur roads. The new TL would be located in an existing utility corridor, paralleling an existing TL (Anaconda-Millers), along Pole Line Road. The existing utility corridor includes an existing maintenance road (2-track dirt) for the Anaconda-Millers TL. Because the proposed TL would follow existing roads (ROW), no new barriers would impede wildlife movement throughout the lower Big Smoky Valley; therefore, impacts to wildlife would be minimal.

Indirect Effects

Indirect effects associated with the construction of the TL and Anaconda-Moly Substation would be the same as those associated with the Proposed Action.

4.2.6.2 Operation

Direct Impacts

The major direct effect on wildlife associated with the TL and Anaconda-Moly Substation corridor is the potential effect of power lines on birds. Since the effects to year-round resident birds would be the same as the effects to migratory birds, TL effects are discussed in Section 4.4.

Indirect Effects

Indirect effects associated with the operation of the TL and Anaconda-Moly Substation would be the same as those associated with the Proposed Action.

4.2.7 No Action Alternative

Under the No Action Alternative, no project-related impacts to wildlife would occur.

4.2.8 Summary of Impacts

Impacts to wildlife are likely to include the loss of habitat attributable to conversion to the generation facility, excavation of aggregate in the borrow pit, and construction of the TL. During these activities, wildlife that is unable to flee the area may be injured or killed by heavy

equipment. Additional injuries or deaths may occur as a result of vehicle collisions involving construction and operation vehicles, as well as those vehicles being driven by employees commuting to and from their residences and the project site. It is possible that some wildlife may be affected by the brine formed in the on-site evaporation ponds.

4.2.9 Mitigation

In addition to fencing that would exclude larger wildlife, the evaporations ponds would covered with a porous screen, which would allow evaporation but exclude wildlife (i.e. birds, mice and bats). Additional mitigation is described in Section 4.5.11. Mitigation would be further developed in coordination with NDOW as part of the Industrial Artificial Pond Permit.

4.3 Special Status Plant Species

4.3.1 Methods

Biologists analyzed the effects of the Proposed Action, Alternative 1, Alternative 2, borrow pit, and TL and Anaconda-Moly Substation corridor on special status plant species. To assess the direct effects on special status plant species, biologists used GIS to overlay the footprints of the project components on the mapped special status plant species to identify those resources that would be directly affected by project construction. Because of the lack of data on regional distribution of this species, the biologists then used GIS and the same datasets to calculate the percentage of special status plant species potential habitat that would be affected throughout the CESA. Figure 4-2 shows the Nevada oryctes habitat that would be affected by the Proposed Action, Alternative 1, and Alternative 2.

4.3.2 Proposed Action Alternative

4.3.2.1 Construction

Direct Effects

Construction activities associated with the Proposed Action would directly affect Nevada oryctes by removing plants and suitable habitat within the project areas during grading activities. Approximately 1,374 acres of suitable habitat for Nevada oryctes would be graded in order to construct the project facilities (i.e., heliostats, power block, evaporation ponds, and administrative buildings) and a paved access road. This is approximately 5.3 percent of the available suitable habitat identified within the CESA (25,880 acres).

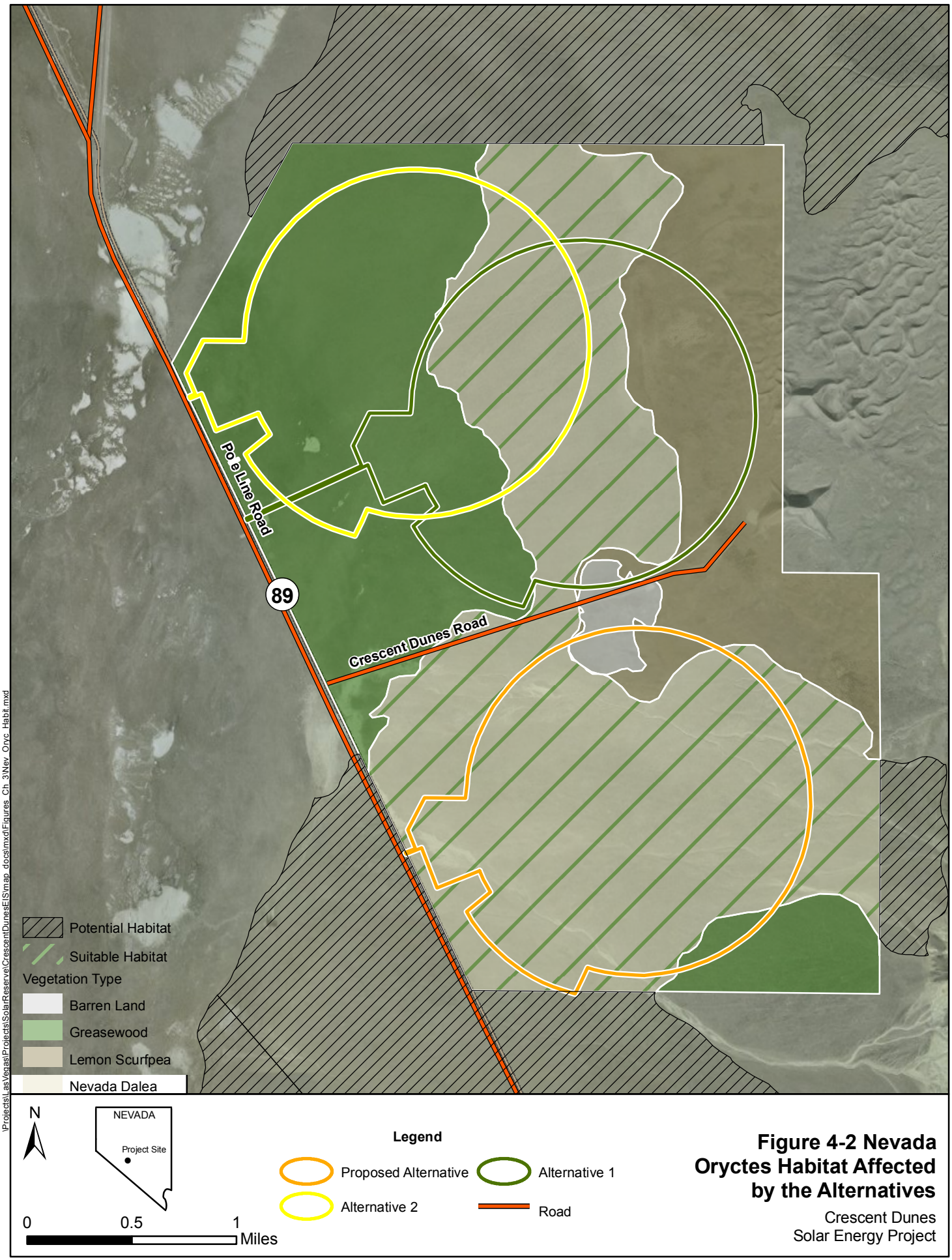


Figure 4-2 Nevada Oryctes Habitat Affected by the Alternatives

Crescent Dunes Solar Energy Project

Indirect Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities, and all construction activities would stay within the disturbed area; therefore, no indirect effects on Nevada oryctes are associated with construction of the Proposed Action.

4.3.2.2 Operation

Direct Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities, so no direct effects on Nevada oryctes are likely to occur during operation of the Proposed Action.

Indirect Effects

Nevada oryctes and associated habitat in the project area would be removed during construction activities, so no indirect effects to this species are likely to occur with operation of the Proposed Action.

4.3.3 Alternative 1

4.3.3.1 Construction

Direct Effects

Construction activities associated with Alternative 1 would directly affect Nevada oryctes by removing plants and suitable habitat within the project area during grading activities. Approximately 803 acres of suitable habitat for oryctes would be graded in order to construct the project facilities (i.e., heliostats, power block, evaporation ponds, and administrative buildings) and a paved access road (Figure 4-2). This is approximately 3.1 percent of the available suitable habitat identified within the CESA (25,880 acres).

Indirect Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities; therefore, no indirect effects to vegetation would be associated with construction of Alternative 1.

4.3.3.2 Operation

Direct Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities, so no direct effects to Nevada oryctes are anticipated during operation of the Alternative 1.

Indirect Effects

Nevada oryctes and associated habitat in the project area would be removed during construction activities, so no indirect effects to vegetation are likely to occur with operation of Alternative 1.

4.3.4 Alternative 2

4.3.4.1 Construction

Direct Effects

Construction activities associated with Alternative 2 would directly affect Nevada oryctes by removing plants and suitable habitat within the project areas during grading activities. Approximately 434 acres of suitable habitat for oryctes would be graded in order to construct the project facilities (i.e., heliostats, power block, evaporation ponds, and administrative buildings) and a paved access road (Figure 4-2). This is approximately 1.7 percent of the available suitable habitat identified within the CESA (25,880 acres).

Indirect Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities; therefore, no indirect effects to vegetation are associated with construction of Alternative 2.

4.3.4.2 Operation

Direct Effects

Nevada oryctes and associated habitat within the project area would be removed during construction activities, so no direct effects to Nevada oryctes are likely to occur during operation of Alternative 2.

Indirect Effects

Nevada oryctes and associated habitat in the project area would be removed during construction activities, so no indirect effects to vegetation are likely to occur with operation of Alternative 2.

4.3.5 Borrow Pit

The following subsections summarize the impacts of the construction and operation of the borrow pit together because the borrow pit would be open only until completion of construction of the generation facility.

Direct Effects

No special status plant species or Nevada oryctes habitat were found in the borrow pit; therefore, no direct effects to special status plants species are associated with construction of the borrow pit.

Indirect Effects

No special status plant species or Nevada oryctes habitat were found in the borrow pit; therefore, no indirect effects to special status plants species are associated with construction of the borrow pit.

4.3.6 TL and Anaconda-Moly Substation Corridor

4.3.6.1 Construction

Direct Effects

In 2009, one Nevada oryctes plant was found within the TL corridor, and the northern portion of the corridor was classified as suitable habitat. However, only a relatively small area within the TL corridor would be affected by grading and excavation activities needed to install TL poles.

Indirect Effects

Construction activities within the TL corridor may increase the spread of nonnative invasive plant species throughout the area (see Section 4.1). Introduction of nonnative invasive plant species could potentially displace Nevada oryctes or limit its reproduction success because invasive species can often dominate areas, out-competing native plants. Mitigation measures would be taken to limit the spread of invasive species throughout the TL area (see Section 4.1).

4.3.6.2 Operation

Direct Effects

No direct effects to special status plant species are associated with operation of the TL and Anaconda-Moly Substation corridor.

Indirect Effects

No indirect effects to special status plant species are associated with operation of the TL and Anaconda-Moly Substation corridor.

4.3.7 No Action Alternative

Under the No Action Alternative, no project-related impacts to special status plant species would occur.

4.3.8 Summary of Impacts

Direct impacts to Nevada oryctes would include removing plants and suitable habitat areas during grading activities. Indirect impacts may include the introduction on nonnative invasive species into adjacent oryctes habitat, which may potentially affect habitat quality and oryctes reproduction success.

4.3.9 Mitigation

BLM, NDOW, and TSE is in the process of developing a mitigation plan for impacts to wildlife, the final plan will be included as part of the Final EIS.

4.4 Special Status Wildlife Species

4.4.1 Methods

Biologists analyzed the effects of the Proposed Action, Alternative 1, Alternative 2, borrow pit, and TL and Anaconda-Moly Substation corridor on special status wildlife species. Direct impacts to special status wildlife were assessed by taking into consideration how construction and operation of the facilities may directly injure, harm, or harass special status wildlife species, or affect their behavior patterns. To assess the indirect effects on special status species, biologists identified the type and quantity of terrestrial wildlife habitat affected as a result of project levels of surface disturbance in relation to the habitat available throughout the CESA (see Section 4.1).

4.4.2 Proposed Action

4.4.2.1 Construction

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects to pale kangaroo mice would include injury or mortality during initial grading activities associated with construction of the facility and roadway, and the resulting loss of habitat. Mice occupying approximately 1,466 acres of habitat would be directly affected (Figure 4-3). This is approximately 5 percent of the available potential habitat identified within the CESA (29,343 acres).

Direct effects to a wide variety of special status bat species would include the removal of approximately 1,673 acres of potential foraging habitat. The Proposed Action would not restrict bat migration throughout the lower Big Smoky Valley.

Golden Eagles and Migratory Birds

Golden eagles and migratory birds would be directly affected because the project would remove approximately 1,500 acres of potential foraging habitat for golden eagles and nesting and foraging habitat for migratory birds. However, most of this habitat consists of Inter-mountain Basins Mixed Salt Desert Scrub, and this represents a relatively small proportion (less than 2 percent) of the available salt desert scrub habitat available throughout the CESA and a small area in relation to the lower Big Smoky Valley. The Proposed Action would not restrict bird migration throughout the lower Big Smoky Valley, but may destroy a small proportion of the available migratory bird habitat and golden eagle foraging habitat.

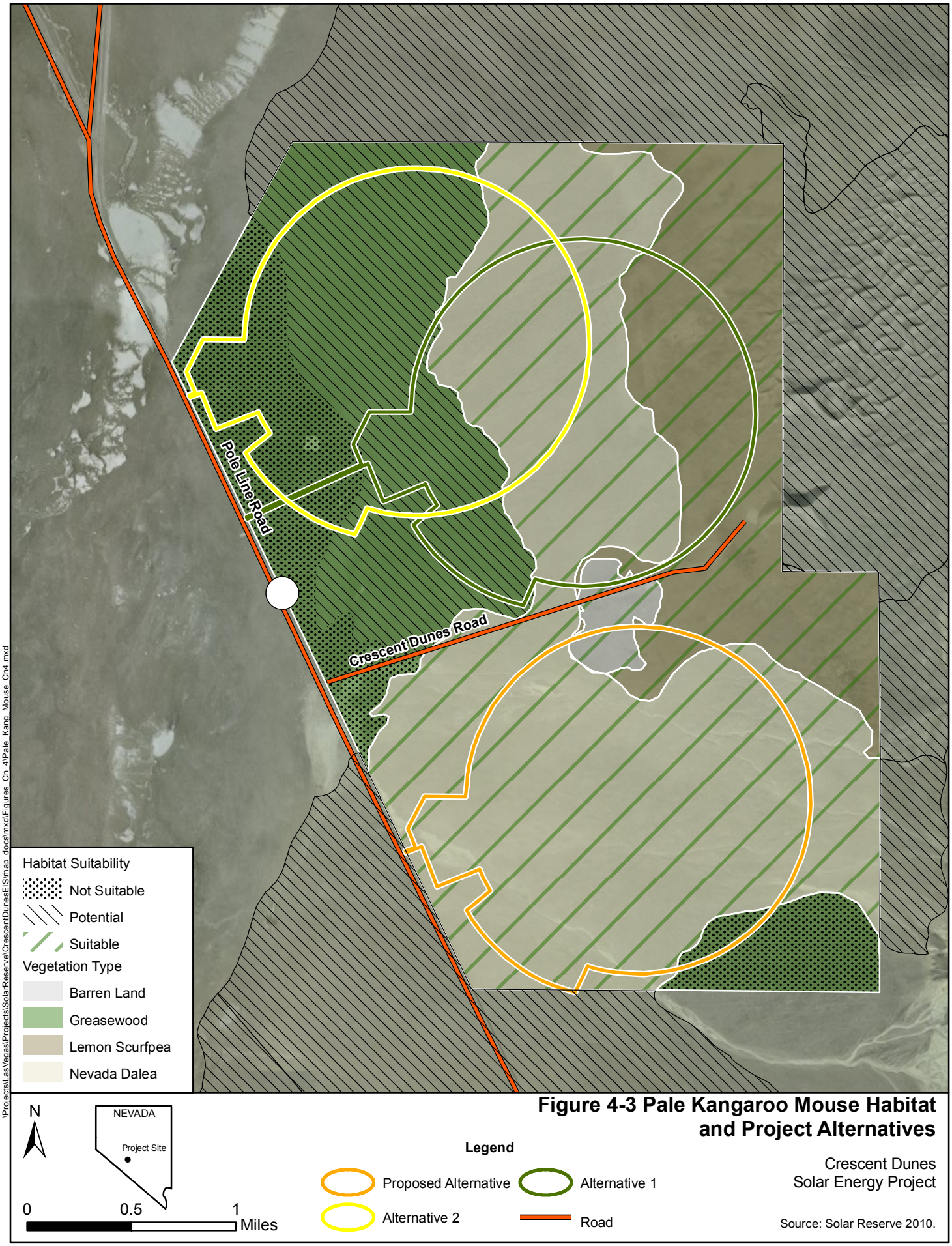


Figure 4-3 Pale Kangaroo Mouse Habitat and Project Alternatives

Crescent Dunes Solar Energy Project

Source: Solar Reserve 2010.

Because most birds are highly mobile, and initial construction activities would not occur during nesting periods, it is unlikely that grading activities associated with project construction would result in bird injury or death because most birds can flee the area. However, a few species such as burrowing owls may be more susceptible to injury or death during grading activities because they may hide in their burrows and not be able to flee in time. Grading activities could destroy nests; however, disturbances to nesting birds would be avoided by implementing mitigation measures. Mitigation would include restricting grading activities during migratory bird breeding season (April 1 – August 31) or having a monitoring biologist on-site during grading activities so that nests can be identified and avoided. Increased noise levels during construction may cause birds to avoid the area temporarily, possibly disrupting normal behavior patterns.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptile species are likely to occur with construction of the project.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No direct effects of the Proposed Action on special status insects are likely to occur because these species are associated with the Crescent Dunes, and the dunes do not extend into the Proposed Area.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

No indirect effects on the pale kangaroo mouse or special status bat species from the construction of this project are likely to occur.

Golden Eagles and Migratory Birds

No indirect effects on golden eagles or migratory birds from the construction of the proposed project are likely to occur.

Reptiles

No special status reptiles were observed or have the potential to occur within the Proposed Area; therefore, no direct effects to special status reptiles are associated with construction of the Proposed Action.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No indirect effects of the Proposed Action on these special status insects are likely to occur because these species are associated with the Crescent Dunes, and the dunes do not extend into the Proposed Area.

4.4.2.2 Operation

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects to pale kangaroo mice and bats may result from the operation of the facility's evaporation ponds. Mice and bats may be attracted to the water in the ponds (and would not be excluded by the fence around the facilities). The water in the evaporation ponds would be saturated with salt (making a brine solution). If mice or bats ingest water from the pond, they may become ill or die from sodium toxicity. Mice and bats could also fall into the ponds and drown if no escape route is available.

Golden Eagles and Migratory Birds

Direct effects may include bird injury or mortality during operation because of the presence of evaporation ponds associated with the facility, the presence of additional structures in the area, and the presence of the high-temperature central receiver. The evaporation ponds may attract birds to the project site. The water in the evaporation ponds would be saturated with salt (making a brine solution). Birds using the evaporation pond could ingest the brine and die from sodium toxicity if a freshwater source is not available nearby (USFWS 2009b). Additionally, birds that utilize the water may experience a build-up of sodium crystals in their feathers, resulting in a reduction of the feathers' thermoregulatory properties, causing the birds to die of hypothermia during cold weather (USFWS 2009b). A porous screen would cover the evaporation ponds this minimizing/eliminating these effects on golden eagles and migratory birds.

A potential direct effect of the project on golden eagles and other migratory birds is death or injury resulting from collisions with structures associated with the project. A variety of species of birds have been documented colliding with buildings and other structures, resulting in death or injury. Such collisions probably occur because of the reflection of the sky in the structure. A study on a project similar to this proposed project found that a variety of migratory birds were injured or killed after colliding with various components of the facility (McCrary et al. 1986). However, the study found that only a small proportion (less than 1 percent) of the birds in the area were affected.

Another potential direct effect on golden eagles and other migratory birds is injury or death associated with the heat generated by the central receiver/tower component of the proposed project. Reflected solar energy would be focused on the central receiver/tower, causing the surface temperature of the receiver to exceed 1,000 degrees Fahrenheit during the day. In the 40-week study at the previously mentioned project site with the central receiver, several birds were found dead at the base of the central tower; they had been severely singed or burned (McCrary et al. 1986). The dead birds were small, fast-flying species (swallows), and the authors speculated that the birds may have been unable to alter course at high speeds to avoid the heat in time to prevent injury. Based on these findings, it is possible that other migratory birds that fly at elevations similar to the receiver (600 feet), and those attracted to the tower as a potential perch or roost site, including golden eagles, may be at risk of death or injury.

Reptiles

No special status reptiles were observed or have the potential to occur within the Proposed Area; therefore, no direct effects to special status reptile species are associated with operation of the project.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

As stated previously, it is unlikely that special status insects would be found in the Proposed Area; therefore, no direct effects to special status insects are likely to occur from operation of the Proposed Action.

Indirect Effects

Mammals: Pale Kangaroo Mouse and Bats

Pale kangaroo mouse habitat and bat foraging habitat within the project area would be removed during construction activities. No indirect effects to these species are likely to occur during operation of the facility.

Additionally, project structures may provide roosting opportunities for raptors, owls, and other predatory birds that prey on sensitive species such as the pale kangaroo mouse and various bat species, thus increasing predation pressure on these sensitive species.

Golden Eagles and Migratory Birds

Migratory bird habitat and golden eagle foraging habitat within the project area would be removed during construction activities. No indirect effects to these species are likely to occur during operation of the facility.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area. No indirect effects to special status reptile species are associated with operation of the Proposed Action.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

As stated previously, it is unlikely that special status insects would be found in the Proposed Area. No indirect effects to special status insects are likely to result from operation of the Proposed Action.

4.4.3 Alternative 1

4.4.3.1 Construction

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects on special status mammal species associated with the construction of Alternative 1 would be similar to those associated with the Proposed Action, including the

potential injury and death of mice in the area and the loss of habitat associated with construction of the facility. However, Alternative 1 would remove 1,191 acres of pale kangaroo mouse habitat. Additionally, Alternative 1 would remove 306 acres of potential habitat, which is greasewood dominated mixed salt desert scrub with sandy soil or "mini" dune features. This is approximately 4.1 percent of the available potential habitat identified within the CESA (29,343 acres).

Direct effects to a wide variety of special status bat species would include the removal of approximately 1,640 acres of potential foraging habitat. Alternative 1 would not restrict bat migration throughout the lower Big Smoky Valley.

Golden Eagles and Migratory Birds

Direct effects on golden eagles and migratory birds associated with construction of Alternative 1 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the Proposed Area; therefore, no indirect effects to special status reptile species are associated with operation of the Proposed Action.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Alternative 1 would have the greatest potential effects on special status insect species compared with the other alternatives because this location would grade approximately 8 acres of Inter-Mountain Basins Active and Stabilized Dunes Habitat (see Section 4.1). This is the specific habitat on which these species depend. Direct effects to special status insect species may include injury or mortality during initial grading activities associated with construction of the facility and roadway. Insects may be able to avoid injury or death by flying away from grading activities.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Indirect effects to special status mammal species associated with the construction of Alternative 1 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Indirect effects to golden eagles and migratory birds associated with the construction of Alternative 1 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no indirect effects to special status reptile species are likely to occur with operation of Alternative 1.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Indirect effects to special status insect species would include habitat loss (see Section 4.1). Alternative 1 would remove 8 acres of the Crescent Sand Dunes (also known as Inter-mountain Basins Active and Stabilized Dunes), and this is a relatively high proportion (16.23 percent) of sand dune habitat available within the CESA.

4.4.3.2 Operation

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects to special status mammal species associated with operation of Alternative 1 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Direct effects to golden eagles and migratory birds associated with operation of Alternative 1 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptile species are associated with operation of Alternative 1.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Special status insect habitat would be removed during grading activities associated with the construction of the facility and roadway; therefore, no direct effects to special status insects would be associated with the operation of Alternative 1.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Indirect effects to special status mammals associated with operation of Alternative 1 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Indirect effects to golden eagles and migratory birds associated with operation of Alternative 1 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptile species are associated with the operation of Alternative 1.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Special status insect habitat would be removed during grading activities associated with the construction of the facility and roadway; therefore, no direct effects to special status insects would be associated with the operation of Alternative 1.

4.4.4 Alternative 2

4.4.4.1 Construction

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects on special status mammal species associated with construction of Alternative 2 would be similar to those associated with the Proposed Action, including the potential injury or death of mice in the area and the loss of habitat associated with construction of the facility. Alternative 2 would remove the least amount of pale kangaroo mouse habitat (434 acres), and a smaller portion of this area has sandy soils (because of the distance from the dunes) and contains less lemon scurfpea and Nevada dalea-dominated mixed salt desert scrub vegetation. Additionally, 761 acres of potential habitat (i.e., greasewood-dominated areas with sandy soils) would be removed. This is approximately 2.7 percent of the available suitable habitat identified within the CESA (29,343 acres).

Direct effects to a wide variety of special status bat species would include the removal of approximately 1,628 acres of potential foraging habitat. Alternative 2 would not restrict bat migration throughout the lower Big Smoky Valley.

Golden Eagles and Migratory Birds

Direct effects on golden eagles and migratory birds associated with the construction of Alternative 2 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no indirect effects to special status reptile species are associated with construction of Alternative 2.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No direct effects to special status insect species are associated with the construction of Alternative 2 because these species are endemic to the Crescent Dunes, and the dunes do not extend into the Alternative 2 project area.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Indirect effects to special status mammal species associated with construction of Alternative 2 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Indirect effects to golden eagles and migratory birds associated with construction of Alternative 2 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no indirect effects to special status reptile species are associated with construction of Alternative 2.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No indirect effects to special status insect species are associated with construction of Alternative 2 because these species are endemic to the Crescent Dunes, and the dunes do not extend into the Alternative 2 project area.

4.4.4.2 Operation

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects to special status mammal species associated with operation of Alternative 2 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Direct effects to golden eagles and migratory birds associated with operation of Alternative 2 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptile species are associated with the operation of Alternative 2.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No direct effects to special status insect species are associated with the operation of Alternative 2 because these species are endemic to the Crescent Dunes, and the dunes do not extend into the Alternative 2 project area.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Indirect effects to special status mammals associated with operation of Alternative 2 would be the same as those associated with the Proposed Action.

Golden Eagles and Migratory Birds

Indirect effects to golden eagles and migratory birds associated with operation of Alternative 2 would be the same as those associated with the Proposed Action.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptile species are associated with the operation of Alternative 2.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No indirect effects to special status insect species are associated with the operation of Alternative 2 because these species are endemic to the Crescent Dunes, and the dunes do not extend into the Alternative 2 project area.

4.4.5 Borrow Pit

The following subsections summarize the impacts of the construction and operation of the borrow pit together because the borrow pit will be open only until completion of construction of the generation facility.

4.4.5.1 Construction

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

No direct effects to pale kangaroo mice are associated with construction of the borrow pit because habitat for this species is not present.

Direct effects to a wide variety of special status bat species would include the temporary removal of approximately 40 acres of potential foraging habitat. Construction of the borrow pit would not restrict bat migration throughout the lower Big Smoky Valley.

Golden Eagles and Migratory Birds

Direct effects to golden eagles and migratory birds associated with construction of the borrow pit would be the same as those associated with construction of the Proposed Action in that 40 acres of potential foraging habitat would be lost.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no direct effects to special status reptiles are associated with construction of the borrow pit.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Special status insect species are associated only with the Crescent Dunes, which are not located near the borrow pit; therefore, no direct effects to special status insect species are associated with construction of the borrow pit.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Indirect effects to special status mammal species associated with construction of the borrow pit would be the same as those associated with construction of the Proposed Action.

Golden Eagles and Migratory Birds

No indirect effects to golden eagles and migratory birds associated with construction of the borrow pit were identified.

Reptiles

No special status reptiles were observed or have the potential to occur within the project area; therefore, no indirect effects to special status reptiles are associated with construction of the borrow pit.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Special status insect species are only associated with the Crescent Dunes, which are not located near the borrow pit; therefore, no indirect effects to special status insect species are associated with construction of the borrow pit.

4.4.6 TL and Anaconda-Moly Substation Corridor

4.4.6.1 Construction

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Direct effects of TL construction activities would be similar to those associated with the Proposed Action in those areas with potential habitat. Mice, if present, could be injured or crushed during initial grading activities and TL installation, and habitat would be lost.

Golden Eagles and Migratory Birds

Direct effects of TL construction activities would be similar to those associated with construction of the Proposed Action in that potential foraging habitat would be lost (see Section 4.4.2.1).

Reptiles

No special status reptile species were observed or have the potential to occur within the TL area; therefore, no direct effects to special status reptile species are associated with construction of the TL.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Since special status insect species are associated only with the Crescent Dunes, which are not located near the TL, no direct effects are associated with construction of the TL.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

No indirect effects to special status mammal species have been identified from construction of spur roads and installation of TL poles.

Golden Eagles and Migratory Birds

No indirect effects to golden eagles and other migratory birds have been identified from the construction of spur roads and installation of TL poles.

Reptiles

No special status reptile species were observed or have the potential to occur within the TL area; therefore, no indirect effects to special status reptile species are associated with construction of the TL.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

Since special status insect species are associated only with the Crescent Dunes, which are not located near the TL; therefore, no indirect effects are associated with construction of the TL.

4.4.6.2 Operation

Direct Effects

Mammals: Pale Kangaroo Mice and Bats

Because habitat for special status mammal species would be removed during initial grading activities associated with installation of the TL and completion of spur roads, no additional direct effects from operation of the TL are likely to occur.

Golden Eagles and Migratory Birds

Direct effects resulting from operation of the TL on migratory birds may include injury or mortality attributable to TL collisions and/or electrocutions. Birds may collide with TLs because TLs are not readily visible to them. Recent research has shown that the rate of bird collisions may be closely related to bird size (Janss and Ferrer 1998). This means that larger birds in the project area may be particularly at risk because it is harder for them to change direction quickly. Smaller birds such as passerines are generally much more agile and may be better at avoiding TLs. Because the TL would be built in a corridor that already contains several TLs, the

concentration of TLs may make them more visible, therefore making it more likely for birds to avoid the area. Bird electrocutions occur when the bird's body bridges the gap between two energized components of the TL (Harness and Wilson 2001). Once again, larger birds with greater wingspans may be much more susceptible to electrocution because larger wingspans can increase the potential for two points of contact. This potential effect can be mitigated by spacing the wires appropriately so that it is impossible for the wingspan of the largest birds in the area to contact two wires. Current design standards dictate these specifications.

In addition to collisions and electrocutions, electromagnetic fields may affect birds that roost or nest near TLs. Electromagnetic fields could affect a number of factors including but not limited to fertility rates, nest success, egg quality, and hatch success (Fernie et al. 2000). Some studies suggest that effects of electromagnetic fields are species-specific (Doherty and Grubb 1997), so the complete range of effects for birds in the area is unknown.

Not all direct impacts of the TL may be adverse. Recent research shows that raptors and *Corvids* (ravens) may benefit from the presence of TLs because they may provide more roosting or nesting opportunities (Steenhof et al. 1993). This study also found that nest success for golden eagles was higher (10 percent) for nests on TLs than for nests in cliffs.

Indirect Effects

Mammals: Pale Kangaroo Mice and Bats

Introduction of a new TL throughout the valley may increase perching opportunities for raptors, owls, and other avian predators. These avian species may increase the predation pressures on vulnerable species, such as the pale kangaroo mice and bat species in the area.

Golden Eagles and Migratory Birds

Because habitat for golden eagles and migratory birds would be removed during initial grading and excavation activities, no additional indirect impacts are likely to occur with operation of the TL and Anaconda-Moly Substation corridor.

4.4.7 No Action Alternative

Under the No Action Alternative, no project-related impacts to special status wildlife species would occur.

4.4.8 Summary of Impacts

Mammals: Pale Kangaroo Mice and Bats

Impacts to pale kangaroo mice would include direct mortality during grading and the removal of suitable habitat. Impacts to special status bat species would include the removal of approximately 1,628 to 1,673 acres of potential foraging habitat.

Golden Eagles and Migratory Birds

Impacts to golden eagles and migratory birds would include potential injury or mortality attributable to the operation of the facility or TL and the removal of approximately 1,628 to 1,673 acres of potential foraging habit. Impacts to migratory birds would include the loss of approximately 1,628 to 1,673 acres of potential nesting and foraging habitat.

4.4.9 Mitigation

Mammals: Pale Kangaroo Mice and Bats

A mitigation plan is being developed between TSE, BLM, and NDOW, and will be included as part of the Final EIS. Mitigation would include raptor deterrent mechanisms on TLs and any vertical structures that could promote predation by raptors. The evaporations ponds would be covered with a porous screen, which would allow evaporation but exclude wildlife (i.e. bats and mice).

Golden Eagles and Migratory Birds

In order to minimize impacts to migratory birds during initial grading activities, the Proponent would avoid land clearing activities such as vegetation removal during the avian breeding season (April 1 to August 31). These dates may be modified by BLM based on specific site and weather conditions. If land clearing activities take place during the avian breeding season, a qualified biologist would conduct preconstruction surveys in the affected area to identify nests and breeding birds. If active nests were located, then a protective buffer zone would be delineated around the area (approximately 100 feet) and land-clearing activities would be restricted within this buffer zone. An Avian Protection Plan (APP) is being developed by the proponent in corporation with the BLM, and USFWS that will detail additional monitoring, mitigation, and an adaptive management approach. The APP will be included as part of the Final EIS.

Reptiles

No sensitive reptile species were identified in the proposed project area; therefore, no mitigation measures would be required.

Insects: Aegialia Scarab, Crescent Dunes Aphodious Scarab, and Crescent Dunes Sirican Scarab

No mitigation is proposed.

4.5 Water Quality and Quantity

4.5.1 Methods

This section presents impacts that project actions, including construction and operation, may have on the hydrologic environment. This section includes mitigation measures to avoid or eliminate these impacts or reduce the effects. The groundwater portion of this section has been developed using data from the analytical hydro-geological report prepared by the Proponent (WorleyParsons 2010a).

The hydro-geological report outlines the data and methods used to assess the potential effects of water use for construction and operation of the proposed project, including the effects from the original point of diversion, which was located approximately 10.6 miles northwest of the project site(s). The location of the final point of diversion would be within the project area boundary based on the alternative chosen.

The proposed project would use the following amounts of water, regardless of the location:

- 500 acre-feet for the first year of construction
- 150 acre-feet per year for the next 2 years of construction
- 600 acre-feet per year for the operation of the proposed project

TSE has estimated the life cycle of the project to be 30 years, but has indicated that, with proper maintenance, the life cycle could be extended an additional 20 years to a total life cycle of 50 years. The numerical model was run for a 53-year time period to encompass 3 years of project construction and the 50-year operational life of the project as the reasonably foreseeable development scenario. Groundwater would be pumped from on-site wells for both construction and project operation. The model showed the anticipated drawdown contours for the 53-year water usage. The area analyzed included the 1-foot drawdown contour for the 53-year scenario.

Data from the test well boring show that the groundwater table from which water is pumped is located approximately 172 feet bgs and is not connected to any surface water features. Therefore, when describing the drawdown contour, it should be noted that it occurs approximately 172 feet bgs. In addition, the 10-foot drawdown contour occurs in an approximately 5-foot radius from the well.

To simulate aquifer recovery at the end of project life, the numerical model was run for 153 years, including 53 years of pumping at the project area, followed by 100 years of groundwater level recovery. Thus, the assumption was made that actual recovery would take less than 100 years, in order to allow the model simulation to capture the full time period of recovery. The purpose of this section is to estimate the time period required for groundwater levels to recover after 53 years of project-related pumping.

Six hundred AFY of steady-state agricultural pumping was simulated to turn off as it is diverted to the project area for 53 years. During the 100-year period of recovery evaluation, the original 600 AFY of diverted agricultural pumping was not restored to agricultural use in the model simulation. This matches the expected conditions that would likely occur. As a result of the diverted agricultural pumping not being restored, the aquifer was simulated to recover to above pre-pumping steady state groundwater levels. However, this effect does not change the time period needed for recovery from project pumping because each well affects the aquifer individually.

See Section 4.5.10 for a list of the expected drawdown of existing wells within the 53-year, 1-foot drawdown contour.

4.5.2 Proposed Action

4.5.2.1 Construction

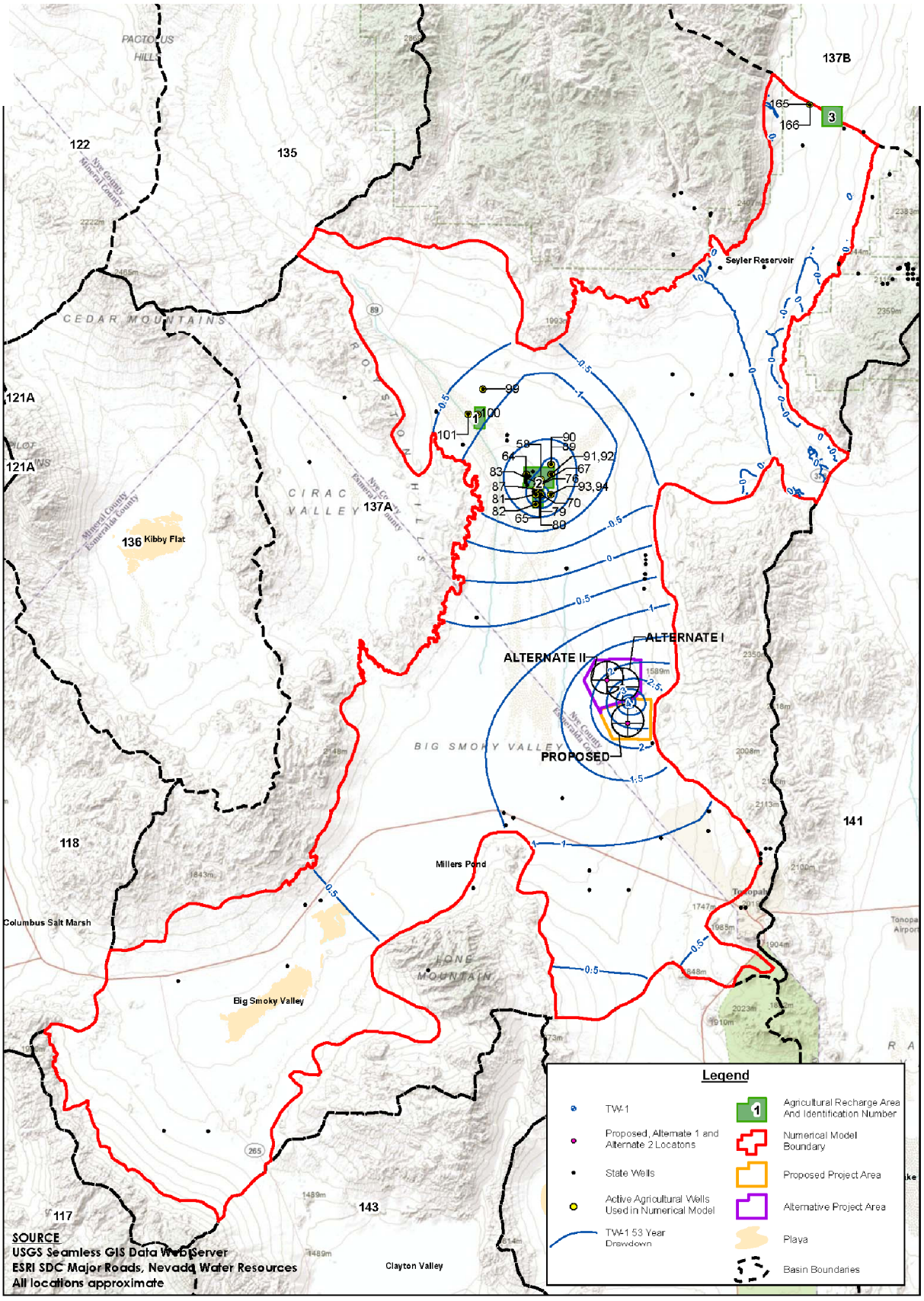
For purpose of water impacts during construction, the analysis used the impacts derived from the operational water consumption of 600 AFY.

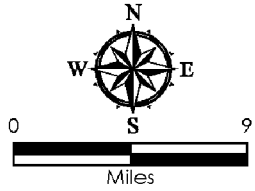
The existing test well would be used as a source of construction water for the Proposed Action. Figure 4-4 shows the 1-foot contour for the 53-year scenario.

Direct Effects

Drawdown imposed by a well on another nearby pumping well can have adverse effects on the performance of that nearby well and is referred to as interference drawdown, or well interference. Specific potential adverse effects that could be evaluated using model results reported in this document include the following:

- Interference drawdown can result in the water level of an aquifer being drawn down below the screen of the well (i.e., the well goes dry).
- Interference drawdown can result in the water level of an aquifer being drawn down to a point where the affected well's capacity to pump water is decreased and the well can no longer produce the amount of water that is needed for a particular use, or the well is at risk of becoming damaged and unusable over time because of exposure of the well's screen above the water table and resulting corrosion.
- Interference drawdown can result in the water level in the affected well being drawn down to near the intake of the well's pump, requiring lowering of the pump intake in order for the well to remain operational.
- Interference drawdown can cause a decrease in groundwater level in the affected well such that the well and pump can continue to operate and produce adequate amounts of water, but pumping must occur at either greater frequency or duration, and/or water must be lifted to a greater height, resulting in greater operational and maintenance costs.





\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\1 ft_cont_Const_Act.mxd

Figure 4-4 1-foot Drawdown Contour for Construction Activities

Crescent Dunes Solar Energy Project

Source: Worley Parsons, 2010

The extent and type of well interference experienced by an affected well depends on hydrogeologic conditions in the aquifer as well as characteristics of the affected well. These factors include the following:

- the amount of interference drawdown that is applied (which varies with the distance of the affected well from the proposed project well/wells)
- the depth and screened interval of the affected well
- the thickness of saturated sediments penetrated by the affected well
- local variations in the transmissivity of the saturated sediments in which the affected well is completed, if any
- the condition and efficiency of the affected well
- the affected well's pump specifications, including its rating curve, the depth at which the pump intake is set, and the resulting pumping water level in the well during operation
- the minimum required water production rate of the well

As shown in Figures 4-4 to 4-7, the amount of interference drawdown induced at the closest existing well ranges from approximately 1 to 2.5 feet for wells within 5 miles of the production well for the proposed project, Alternative 1, and Alternative 2 locations. This amount of drawdown will not result in wells going dry, their well screens being exposed, or the wells having a noticeably diminished capacity. Other wells located at a greater distance would experience lesser effects.

Lowering the water table would cause an incremental increase in electrical costs to pump groundwater from a greater depth and possibly higher maintenance costs over time or per unit of water pumped. For the limited amount of predicted interference drawdown, this effect would be relatively small.

Accidental spills from vehicles, motorized machinery, and heavy equipment could result in potential discharge of contaminants; however, applicable spill management plans would be implemented to minimize such impacts. In addition, no seeps or springs are located in or adjacent to the Proposed Action. The proposed project well has a depth to groundwater of 172 feet bgs (WorleyParsons 2010a). The wellhead protection area of the project well could be affected by on-site discharged contaminants.

Surface Water

Because the drawdown of groundwater would occur approximately 172 feet bgs, and would not be connected to surface water resources, no direct impacts to surface water are likely.

The potential of a large storm occurring during construction on disturbed surfaces within the proposed project site could increase sediment transport in stormwater runoff.

Accidental spills from vehicles, motorized machinery, and heavy equipment could result in potential discharge of contaminants. The potential for accidental spills and the additional impervious areas (paved access roads, unpaved perimeter roads surfaced with rock, and several

buildings and enclosures—with some buildings only temporary for construction) could result in increased pollutant loading of stormwater surface runoff during a storm.

The location of temporary construction facilities and laydown areas may affect the existing drainage patterns and runoff of the project site.

Indirect Effects

Groundwater

Water quality could potentially be affected by naturally occurring high-TDS water below the playa (in the southern part of the Tonopah Flat Subarea) migrating with pumping from the well.

Upon completion of construction, the well used for construction water would be capped in accordance with local and state regulations. A new well will be installed at the power block area of the Proposed Action to provide water during operation.

The modeled recovery time was shown to approximately 40 years, if the project well was pumped for 53 years. It should be noted that the construction water would be needed for only 3 years and, therefore, the recovery time would be shortened.

Surface Water

Because the drawdown of groundwater would occur at 172 feet bgs and because groundwater is not connected to surface water resources, no direct impacts to surface water are likely.

An increase in stormwater runoff flows generated by the addition of impervious areas could potentially result in the extension of downstream limits of existing ephemeral streams crossing the proposed project site. Currently, these ephemeral streams lose definition before reaching Peavine Creek, as shown in Figure 3-7. The effect of increased runoff could result in flow reaching closer to Peavine Creek.

The potential for a large storm occurring during construction on disturbed surfaces within the proposed project site could increase sediment transport in stormwater runoff. If disturbed surfaces remain exposed (possibly denuded of vegetation) during long storms, the increased sediment in runoff could potentially clog the culvert under Pole Line Road (SH 89) and/or possibly discharge to Peavine Creek, creating turbidity and degrading water quality downstream.

4.5.2.2 Operation

During operation of the project, water usage would be 600 AFY. The water use would result in industrial wastewater effluent that would be discharged to evaporation ponds as described in Chapter 2. A wastewater plan was prepared (WorleyParsons 2010b) that describes this effluent and its components.

In a 30-year operating life of the evaporation ponds, up to 3 feet of sludge may accumulate in the base of the ponds that consists of precipitated solids from the evaporated wastewater. The

total amount of accumulated solids is estimated to be approximately 50,000 tons. The predicted chemical makeup of the sludge, based on the raw water chemistry, is provided in Table 4-7. The concentration of chemical constituents expected in the evaporation residue is compared to the TCLP as reported under CFR Part 261, Section 261.24; however, there are no TCLP limits for the expected chemicals in the sludge. Therefore, it would be considered a non-hazardous waste under federal regulations.

The action leakage rate (ALR) is the allowable leakage from the primary liner system above which contingency actions are triggered. According to 40 CFR Section 264.222, the ALR is defined as "…the maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding 1 foot." The ALR must also include an adequate safety margin to allow for variability in the containment system design (e.g., liner and collection pipe slope, interstitial fill hydraulic conductivity, thickness of drainage material).

The estimated ALR for the evaporation ponds is 2,750 gallons per acre per day, which is based on one standard hole per acre, a drainage layer geonet with hydraulic conductivity of 0.06 m/s, and a 50 percent safety factor. The assumption underlying this ALR calculation would be verified in the actual constructed ponds. Based on a 10-acre pond, each evaporation pond would have an ALR of 27,750 gallons per day. However, the ALR would need field verification because this rate would vary depending on the actual drainage material used and its hydraulic conductivity.

Waterfowl and other birds may be attracted to the evaporation ponds. The use of anti-perching devices around the perimeter of each pond would assist in excluding ravens and other birds from accessing the edge of the ponds to drink the water. Additionally, operational design of the ponds is such that a minimum freeboard of 2 feet would be maintained at all times, and the interior slopes of the ponds would be at a 33 percent (a 3:1 slope). These project design features would make it difficult for perching birds and/or shorebirds to access the water, and are anticipated to minimize risk to wildlife by minimizing availability of water as a new subsidy. However, in the event that a bird or other animal accidentally falls into the ponds, they would be able to crawl out using the textured portion of the liner that would be present in each corner of the pond for that purpose.

1 **Table 4-7. Predicted chemical makeup of the pond sludge**

Constituent	Concentration in EP Discharge (mg/L)	Conversion to lbs/gal	Solids per year (lbs)	Total Residue Mass at Clean Out (lbs)	Total Residue Mass After 30 Years (lbs)	Weight (%)	Weight (ppm)	TCLP (mg/L)
Cations								
Calcium	206	0.001722	59,419	415,932	1,782,566	1.8184%	18,184	*
Magnesium	79	0.000659	22,743	159,204	682,305	0.6960%	6,960	*
Potassium	187	0.001557	53,698	375,887	1,610,943	1.6433%	16,433	*
Sodium	3,327	0.027763	957,752	6,704,265	28,732,562	29.3104%	293,104	*
Anions								
Chloride	533	0.004448	153,431	1,074,016	4,602,927	4.6955%	46,955	*
Fluoride	24.0	0.000200	6,904	48,328	207,121	0.2113%	2,113	*
Silica (dissolved)	176	0.001470	50,717	355,021	1,521,517	1.5521%	15,521	*
Sulfate	6,817	0.056891	1,962,611	13,738,276	58,878,326	60.0625%	600,625	*
Metals								
Manganese	0.67	0.000006	193	1,354	5,804	0.0059%	59	*
Zinc	0.504	0.000004	145	1,016	4,353	0.0044%	44	*
Total	**11,350**		**3,267,614**	**22,873,299**	**98,028,424**	**100.00%**	**1,000,000**	
TDS	**11,410**	**0.095220**	**3,284,867**	**22,994,071**	**98,546,018**			

Conversion Factors:
8.34 lb H_2O to 1 gallon of H_2O 8.345
Average wastewater flow rate (gal/min) 130.2
Operation time (min/year) 264,960
Wastewater quantity (gal/year) 34,497,792

Notes: Regulatory standards/reportable quantities are for mentioned elements only. * Not listed/no standards
1) Constituents in the evaporation pond discharge are based on the raw water constituents.
2) There may be other constituents in the residue; however, they are not listed because they have not been evaluated.
3) If the parameter was not detected in the groundwater, then it is considered to have zero residue in the sludge.
4) All waste would be non-volatile and would be collected in the evaporation ponds.
5) All species removed by MMF and RO would be returned to the evaporation ponds.
6) A comparison to TDS values is provided to show the consistency of the calculation.

Because the ponds would remain uncovered to maximize evaporation and to avoid trapping birds under netting or monofilament arrays, it is anticipated that primarily waterfowl such as ducks and geese would be able to access the evaporation ponds by landing on the water.

Adaptive measures that would be taken, as necessary, to keep birds from using the ponds include:

- In the event that climatic conditions are such that evaporation must be increased to maintain pond levels below the freeboard limits, evaporative disposal nozzles (see, for example, <www.bete.com/applications/disposal.html>) would be used to increase wastewater evaporation rates.
- An air cannon would be used to haze waterfowl and frighten them away from the evaporation ponds. The air cannon would be stored on-site, but would be used only under this circumstance because birds may become acclimated to the disturbance caused by air cannon hazing, if used on a regular basis. The air cannon would be used until the evaporation process was completed in the pond, or until the crystallized salts returned to solution.
- A "Bird-B-Gone Balloon" (a visual scare device) or other hazing devices would be deployed into the pond to discourage waterfowl from landing on the pond.

Direct Effects

During operation of the Proposed Action, the well would be located within the power block area, approximately 5,000 feet south of the test well. According to the hydrogeological model information, the geological features of this area are similar to that of the test well location, and the same drawdown contour can be expected from pumping water at this location (WorleyParsons 2010b). Figure 4-5 shows the 1-foot contour for the 53-year scenario at this location.

Direct effects would be similar to those discussed in Section 4.5.2.1.

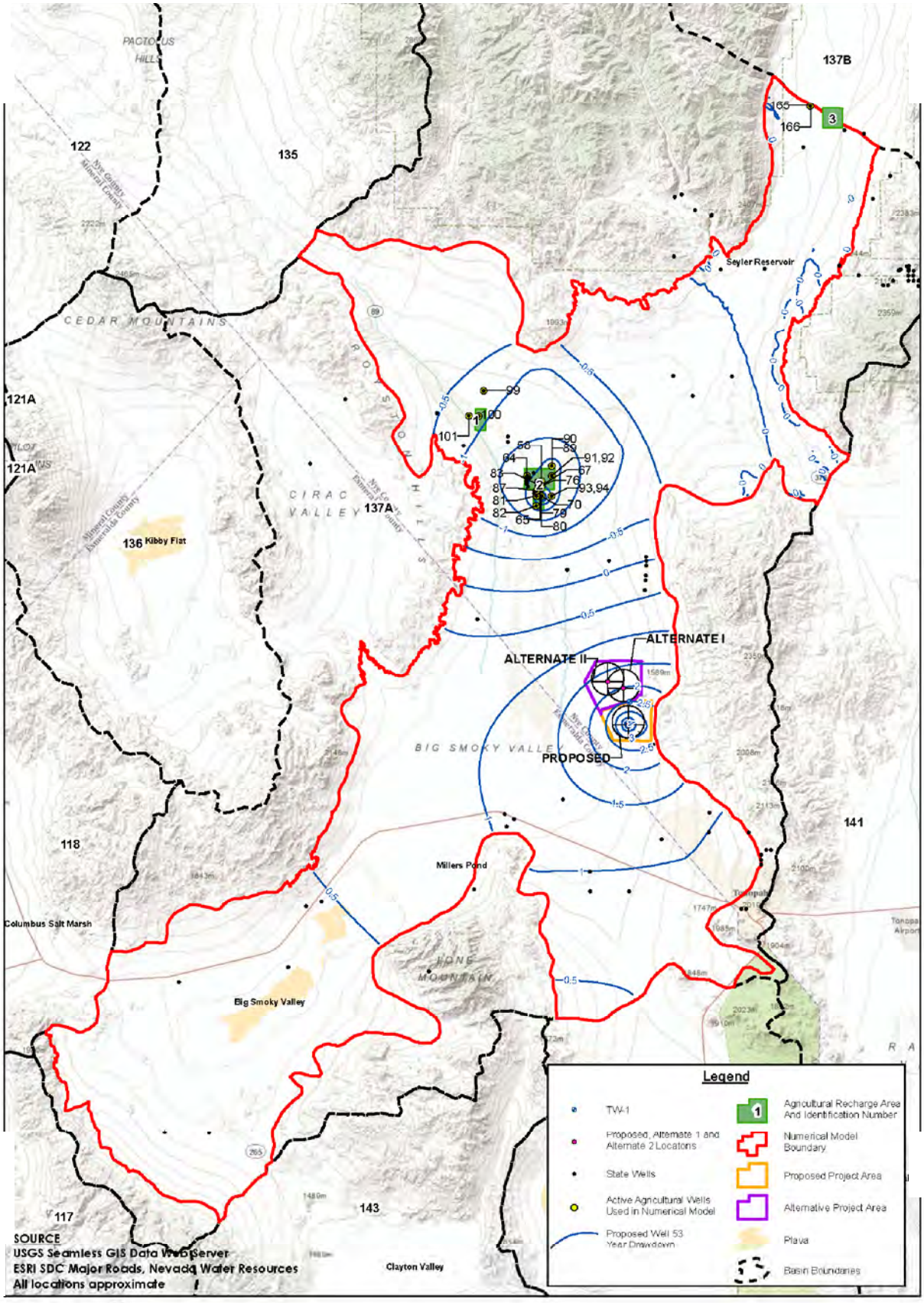


Figure 4-5 The 1-foot contour for the 53-year scenario for the Proposed Alternative.

Crescent Dunes Solar Energy Project

Source: Worley Parsons, 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\53_year_Prop_Alternv.mxd

Indirect Effects

Groundwater

The model showed that the recovery time for pumping groundwater for a 50-year lifetime of the project would be 47 years.

Accidental spills from vehicles, motorized machinery, and heavy equipment could result in potential discharge of contaminants. Project operation activities could result in contamination of the wellhead protection area of the project well on-site. The proposed project well would have a depth to groundwater of 172 feet bgs (WorleyParsons 2010a).

Surface Water

Because the drawdown of groundwater would occur at 172 feet bgs, and is not connected to surface water resources, no indirect impacts to surface water are likely.

Accidental spills from vehicles, motorized machinery, and heavy equipment during facility operations and maintenance could result in discharge of contaminants. The potential for accidental spills and the additional impervious areas (paved access roads, unpaved perimeter roads surfaced with rock, and several buildings and enclosures) could result in increased pollutant loading of stormwater surface runoff during a storm.

The location of operation facilities and addition of impervious areas may affect the existing drainage pattern and runoff of the project site.

4.5.3 Alternative 1

4.5.3.1 Construction

Direct Effects

Groundwater

Direct effects of the construction of Alternative 1 on groundwater would be similar to those described for the Proposed Action because the groundwater resource data are similar for both sites.

Surface Water

Direct effects of the construction of Alternative 1 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

Indirect Effects

Groundwater

Indirect effects of the construction of Alternative 1 on groundwater would be similar to those described for the Proposed Action.

Surface Water

Indirect effects of the construction of Alternative 1 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

4.5.3.2 Operation

During operation of Alternative 1, the well would be located within the power block area, approximately 1.85 miles north of the test well. The geological features of this area are similar to that of the test well location, and the same drawdown contour can be expected from pumping water at this location (WorleyParsons 2010b). Figure 4-6 shows the 1-foot drawdown contour for the 53-year scenario at this location.

Direct Effects

Groundwater

Impacts would be similar to those described for the Proposed Action.

Surface Water

Direct effects of the construction of Alternative 1 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

Indirect Effects

Groundwater

Indirect effects to groundwater would be similar to those described for the Proposed Action. The model showed that the recovery time for a well at this location would be 37 years.

Surface Water

Indirect effects of the construction of Alternative 1 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

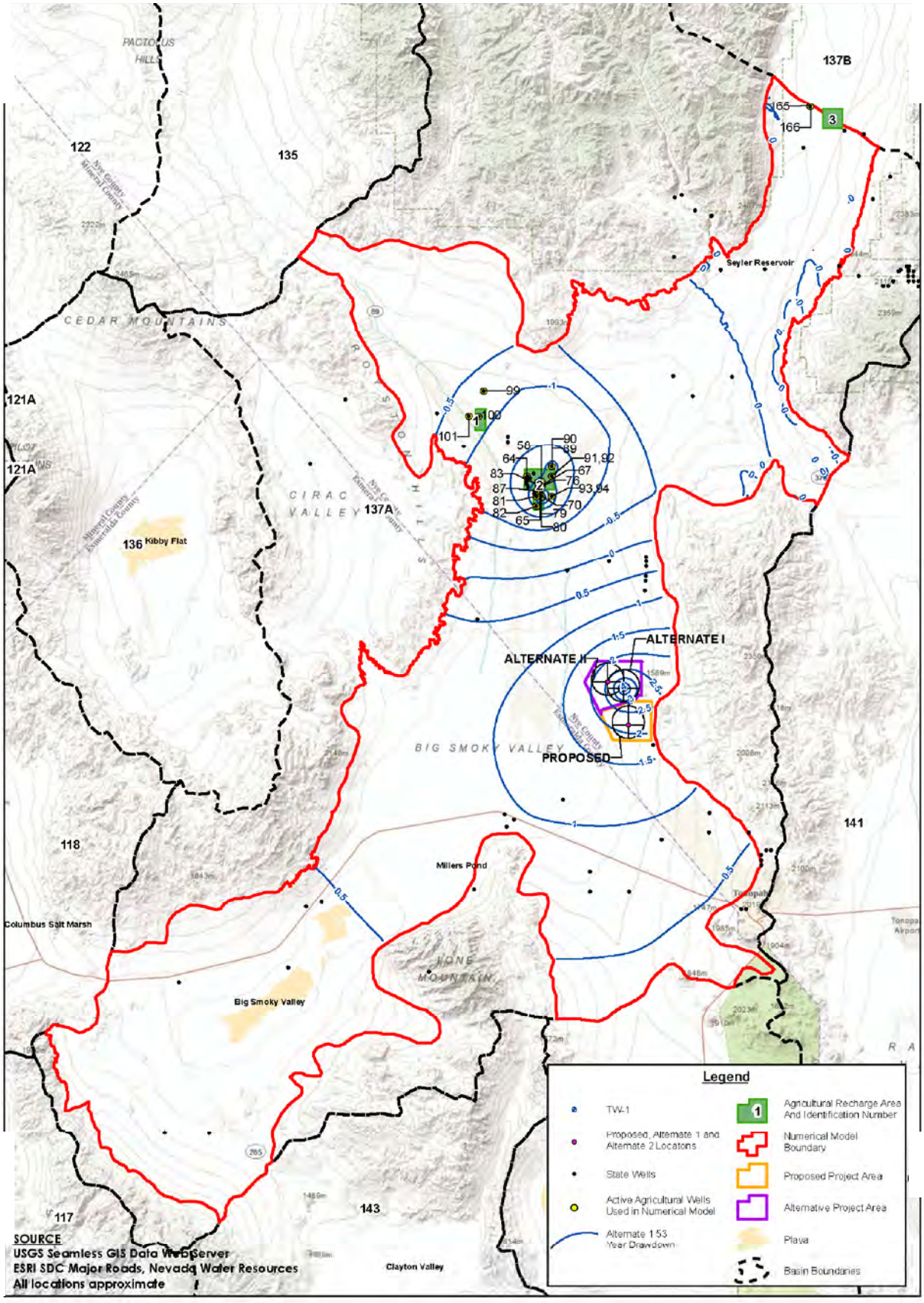


Figure 4-6 The 1-foot contour for the 53-year scenario for the Alternative 1. In-direct Effects.

Crescent Dunes Solar Energy Project

Source: Worley Parsons, 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\53_year_Alternitv_1.mxd

4.5.4 Alternative 2

4.5.4.1 Construction

Direct Effects

Groundwater

Direct effects of the construction of Alternative 2 on groundwater would be similar to those described for the Proposed Action because construction water would be delivered from the same point.

Surface Water

Direct effects of the construction of Alternative 2 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

Indirect Effects

Groundwater

Indirect effects of the construction of Alternative 2 on groundwater would be similar to those described for the Proposed Action because construction water would be delivered from the same point.

Surface Water

Indirect effects of the construction of Alternative 2 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

4.5.4.2 Operation

During operation of Alternative 2, the well would be located within the power block area, approximately 2.4 miles northwest of the test well. The geological features of this area are similar to that of the test well location, and the same drawdown contour can be expected from pumping water at this location (WorleyParsons 2010b). Figure 4-7 shows the 1-foot drawdown contour for the 53-year scenario at this location.

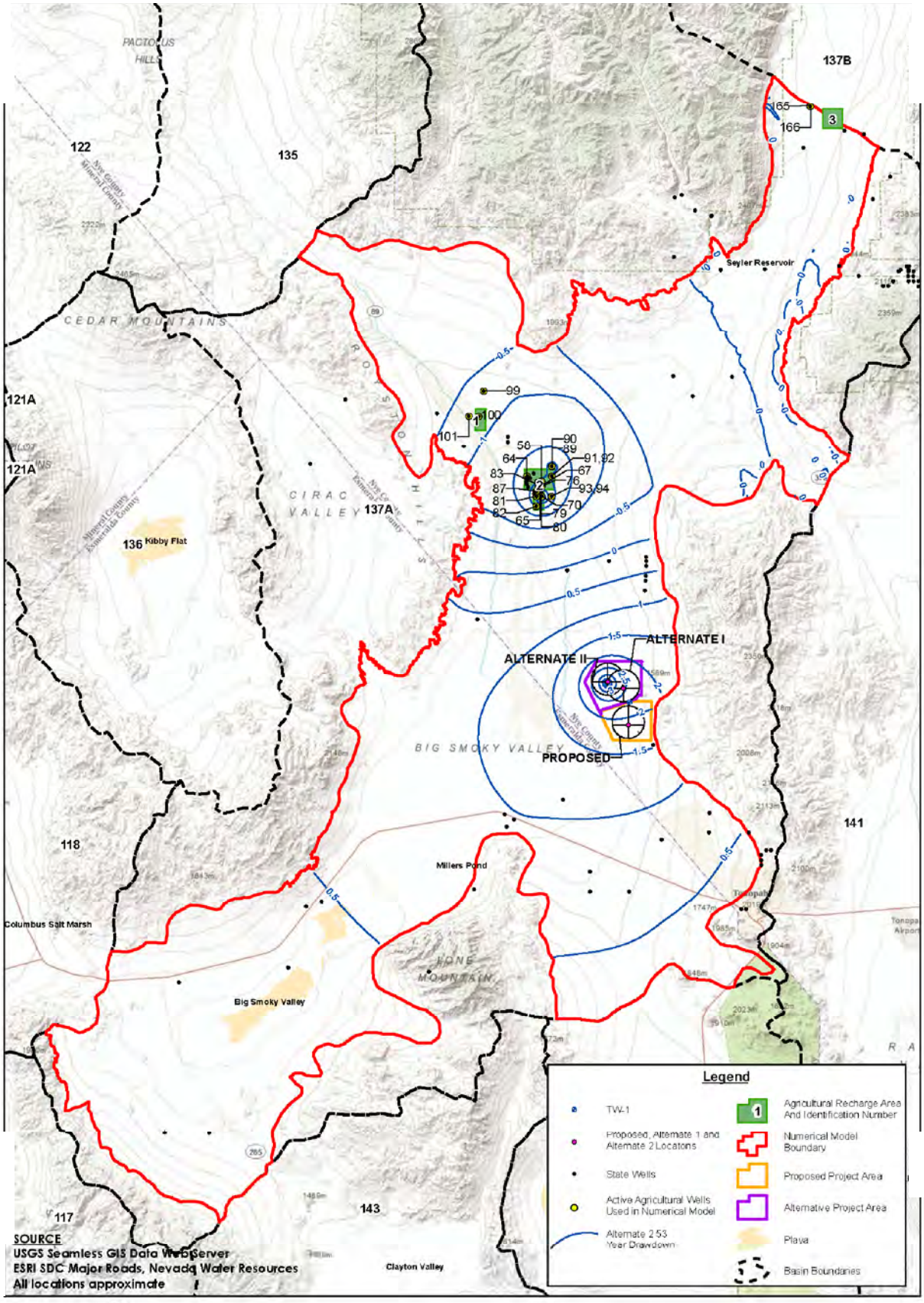


Figure 4-7 The 1-foot contour for the 53-year scenario for the Alternative 2.

Crescent Dunes Solar Energy Project

Source: Worley Parsons, 2010

\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\53_year_Alterntv_2.mxd

Direct Effects

Groundwater

Direct effects would be similar to those described for the Proposed Action.

Surface Water

Direct effects of the operation of Alternative 2 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites.

Indirect Effects

Groundwater

Indirect effects to groundwater would be similar to those described for the Proposed Action. The model showed that the recovery time for a well at this location would be 32 years.

Surface Water

Indirect effects of the operation of Alternative 2 on surface water would be similar to those described for the Proposed Action because the terrain is similar for both sites

4.5.5 TL and Anaconda-Moly Substation Corridor

4.5.5.1 Construction

Direct Effects

Groundwater

Construction of the TL corridor is not expected to affect groundwater.

Surface Water

The potential of a large storm occurring during construction on disturbed surfaces within the TL corridor could increase sediment transport in stormwater runoff.

Accidental spills from vehicles, motorized machinery, and heavy equipment could result in potential discharge of contaminants. The potential for accidental spills and the additional impervious areas (paved access roads, unpaved perimeter roads surfaced with rock, and several buildings and enclosures—with some buildings only temporary for construction) could result in increased pollutant loading of stormwater surface runoff during a storm.

The location of temporary construction laydown areas may affect the existing drainage pattern and runoff along the TL corridor. The location of transmission towers should avoid the ephemeral streams passing through the TL corridor to the extent feasible. TL construction activities and the placement of transmission towers could alter the normal flow of the defined ephemeral washes.

Indirect Effects

Groundwater

Construction of the TL corridor is not expected to affect groundwater.

Surface Water

A potential increase of stormwater runoff flows generated by the increase of soil compaction during construction could result in the extension of downstream limits of the existing ephemeral streams crossing the TL corridor. Currently, these ephemeral streams lose definition before reaching Peavine Creek. The increased runoff could result in flow reaching closer to Peavine Creek.

The potential of a large storm occurring during construction on disturbed surfaces within the proposed project site could increase sediment transport in stormwater runoff. If disturbed surfaces remain exposed (possibly denuded of vegetation) during long storms, the increased sediment in runoff could potentially discharge to Peavine Creek, creating turbidity and degrading water quality downstream.

4.5.5.2 Operation

Direct Effects

Groundwater

Operation of the TL and Anaconda-Moly Substation is not expected to affect groundwater.

Surface Water

Operation of the TL and Anaconda-Moly Substation is not expected to affect surface water.

Indirect Effects

Groundwater

Operation of the TL and Anaconda-Moly Substation is not expected to affect groundwater.

Surface Water

Operation of the TL and Anaconda-Moly Substation is not expected to affect surface water.

4.5.6 Borrow Pit

The following subsections summarize the impacts of the construction and operation of the borrow pit together because the borrow pit would be open only until the completion of construction of the generation facility.

Direct Effects

Groundwater

Water to support excavation of aggregate would be provided from the proposed well within the Proposed Action; therefore, no impact to groundwater associated with activities at the borrow pit during construction are likely.

Surface Water

The potential of a large storm occurring during construction (excavation) on disturbed surfaces within the borrow pit site could increase sediment transport in stormwater runoff. If disturbed surfaces remain exposed during long storms, the increased sediment in runoff could potentially discharge to the ephemeral Peavine Creek, creating turbidity and degrading water quality downstream.

Accidental spills from vehicles, motorized machinery, and heavy equipment could result in potential discharge of contaminants. The potential for accidental spills could result in increased pollutant loading of surface runoff during a storm that could discharge to the ephemeral Peavine Creek.

Indirect Effects

Groundwater

There should be no impacts to groundwater associated with activities at the borrow pit during construction.

Surface Water

Surface water runoff can have both direct and indirect effects. Contamination from spills can lead to effects such as small mammal fatalities, and subsequent predator/scavengers consumption.

4.5.7 Point of Diversion

Water rights for supplying the proposed project would be obtained by purchasing existing certificated water rights for agricultural use located in agricultural area 2 in the same basin as the proposed project site. Currently, this water is used for irrigation to grow and harvest alfalfa. If the water were diverted to the plant, the 853 AFY could no longer be used for the production of alfalfa.

It is likely that the land currently irrigated would be fallowed and, during the project lifetime, would revert back to native vegetation. Once alfalfa is no longer grown, the jobs associated with the alfalfa crop would no longer be needed. However, this discrepancy would be made up by the number of jobs the construction and operation of the project would generate.

4.5.8 PWR 107

Construction and operation of the proposed project should have no known direct or indirect effects on PWR 107 waters. The modeling showed no connection between the groundwater and springs/seeps, and further all identified PWR 107 locations outside the 1-foot drawdown contour.

There should be no known cumulative effects attributable to proposed project construction and operation activities. The 1-foot drawdown of the proposed well pumping is expected to be approximately 172 feet bgs and should not have an effect on the PWR 107 waters within the groundwater CESA (WorleyParsons 2010a).

4.5.9 No Action Alternative

Under the No Action Alternative, potential impacts to hydrological resources associated with this project would not occur.

4.5.10 Summary of Impacts

As discussed previously, there is a potential for direct, indirect, and cumulative impacts to hydrological resources associated with various tasks of construction and operation of the proposed project.

Groundwater

Potential direct impacts to groundwater associated with this proposed project include:

- contamination entering the wellhead protection area
- proposed well pumping causing drawdown, affecting nearby existing wells
- restrictions to existing well access or use

Potential indirect impacts to groundwater associated with this proposed project include:

- contamination entering groundwater within the CESA
- proposed well pumping causing drawdown, affecting existing springs or wells within the CESA

Table 4-8 shows the results provided in the Groundwater Evaluation Report regarding the drawdown on each of the existing wells within the CESA.

Table 4-8. Estimated drawdown on existing wells within the CESA

Well Number	Pumping Location			
	TW-1	Alt-2	Alt-1	Proposed
11	1.03	0.98	0.97	1.11
12	1.01	0.98	0.96	1.07
13	1.01	0.97	0.95	1.07
16	0.88	0.76	0.79	1.00
20	0.97	0.77	0.84	1.15
21	0.97	0.77	0.84	1.15
22	0.97	0.77	0.84	1.15
23	0.99	0.81	0.87	1.16
24	0.84	0.67	0.73	0.99
43	2.11	1.57	1.78	2.61
44	2.11	1.57	1.78	2.61
45	1.21	1.09	1.11	1.34

Surface Water

Potential direct impacts to surface water associated with this proposed project include:

- increased runoff flows
- increased sediment transport
- increased discharge and transport of contaminants
- possible effects to drainage paths or altered flow

Potential indirect impacts to surface water associated with this proposed project include:

- altered flow or drainage paths
- increased sediment or contaminants in downstream water, creating turbidity or degrading water quality downstream

4.5.11 Mitigation

Mitigation measures to avoid or eliminate the potential impacts to hydrological resources associated with various tasks of construction and operation of the proposed project are discussed below.

General water quality is protected under the Clean Water Act. All surface water runoff that would occur during and after construction as a result of the project would be controlled in accordance with the requirements of the construction and operational (post-construction) NPDES Stormwater Permit and other applicable laws, ordinances, regulations, and standards.

SPCC plans would be prepared for project construction and operation, to include spill prevention and countermeasure procedures to be implemented. To the extent practicable, SPCC would minimize the use of and need for disposal of hazardous and toxic wastes. The implementation of BMPs would prevent transport of contamination to the environment.

The preparation and implementation of a construction SWPPP (a requirement of NPDES) that includes site-specific BMPs would mitigate and reduce erosion and water pollution.

BMPs may include:

- silt barriers installed during construction to filter or contain sediment transport
- frequent inspection and cleaning of construction equipment to reduce or prevent contamination
- equipment fueling and service at designated locations away from drainage paths and wells to minimize contamination transport

As discussed in Section 2.5.2, grading of the site would allow storm flows to follow preexisting paths. The power island would be graded to direct rainfall within the power island to detention/retention basins adjacent to the on-site salt tanks to infiltrate into the ground instead of flowing off-site. Small ditches would be constructed along roadways and culverts as needed where washes cross roads. Transmission towers to be located along the proposed TL corridor would be positioned to avoid existing drainage paths of ephemeral washes to mitigate the potential for altered flow paths.

Facility water needs are estimated to be less than the anticipated maximum water right quantity to be acquired and would not negatively affect or alter the appropriation of groundwater.

The Proponent has filed for an approved jurisdictional determination requesting that the ephemeral Peavine Creek and its tributaries not be subject to jurisdiction under the Clean Water Act because they have been determined to be isolated intrastate waters (JBR 2010a).

Evaporation Ponds Avian and Wildlife Monitoring and Protection

A detailed monitoring and mitigation plan would be developed in coordination with NDOW as part of the Artificial Industrial Pond Permit application process. Initial mitigation and monitoring measures are described below.

Avian monitoring at the evaporation ponds would be conducted twice monthly for the first 2 years of project operation and would continue at least monthly over the life of the project. The monitor (an appointed biologist or Environment Compliance Manager) would identify bird species and/or functional groups (e.g., waterfowl, waders, shorebirds, upland shorebirds) and wildlife observed utilizing the ponds, record the behavior of the birds and wildlife (e.g., feeding, swimming, wading, nesting), and note any mortalities or physical infirmities (e.g., birth defects or reduced growth) associated with any animals observed on or adjacent to the evaporation ponds. This information would be compiled and submitted to NDOW on a quarterly basis in accordance with the AIPP guidelines and permit requirements. Any dead bird or wildlife that could be safely retrieved from the evaporation ponds would be collected by a biologist or Environment Compliance Manager and sent to a qualified laboratory to determine whether the mortality was directly related to salt toxicity or encrustation. In accordance with the AIPP guidelines and permit requirements, all mortalities or injuries would be reported to NDOW within 24 hours of the observation. Documented mortality resulting from salt toxicity or encrustation would result in corrective measures or additional mitigation actions implemented in coordination with NDOW, BLM, and any other appropriate agencies.

Each active evaporation pond would be outfitted with a level gauge for daily water level measurements, a hydrometer for daily salinity measurements, and a direct reading thermometer with the temperature data recorded at least diurnally. If the average overnight water temperature in the active evaporation ponds is at or below 4 degrees Celsius, a visual survey of the ponds would be conducted immediately on the following morning. If upon inspection of the active ponds, the designated representative observes evidence of recent substantive increases in salt crystallization anywhere within the pond (e.g., at or near the waterline) all wastewater would be pumped into one or two ponds to increase the pond volume and lower the average salinity within the pond(s). At the same time, the remaining pond or ponds would be pumped dry. The pond to which the combined flow is discharged during this time would be rotated each year periodically as needed so that water levels do not rise too high and minimum freeboard requirements are met.

4.6 Air Quality

This section describes the analysis conducted to assess the air quality impacts and to assess whether the proposed project conforms to Clean Air Act requirements and complies with state and local air quality requirements. Emission estimates are presented for project construction, commissioning, and operation. While the proposed solar power project would represent a significant reduction in greenhouse gas emissions relative to fossil fuel-based power generation projects, the relatively small amount of greenhouse gas emissions associated with the proposed project is provided for informational purpose. No conclusions regarding the significance of the greenhouse gas emissions are made in the analysis.

4.6.1 Methodology

For this project, the air quality impact analysis includes the entire proposed project site, the alternative sites, the borrow pit, the TL, and the Anaconda-Moly Substation corridor. The impacts do not substantively change for the alternative sites to necessitate separate evaluations.

In this section, the proposed project evaluation for air quality conformity is discussed. The annual direct and indirect criteria pollutant emission rates were calculated for the three phases of the project—construction, commissioning, and operation. The first two phases are nonrecurring, discrete, and of limited duration and extent. The first phase is the 30-month construction period for the permanent facilities, including the heliostat field, the liquid salt tower receiver, piping and storage systems, power generating block systems, and buildings. The construction phase also encompasses the salt melting and conditioning ("salt commissioning") activities. The second phase includes the power block commissioning activities. The third and final phase is the steady state operation of the facility. The criteria pollutants evaluated include oxides of nitrogen (NO_x), oxides of sulfur (SO_x), volatile organic compounds (VOCs), CO, PM_{10}, and $PM_{2.5}$.

Greenhouse gas emissions, which include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), were calculated for all three phases of the project. As previously noted, emissions of hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) will be present, but

they are expected to be insignificant for the proposed project. A quantification of HFCs, PFCs, and SF_6 was, therefore, not included in the analysis.

Hazardous air pollutants (HAPs) for the proposed project, which are mainly associated with mobile and construction sources powered by diesel fuel, were determined and found to be minor and well within the applicability thresholds of the National Emissions Standards for Hazardous Air Pollutants.

4.6.2 Proposed Project Emission Estimates

4.6.2.1 Construction

Short-term emissions would be generated from the installation of a 638-foot-tall solar receiving tower, the steam turbine power block, up to 17,500 heliostats, and various auxiliary equipment and ancillary structures. Approximately 1,600 acres (Table 4-1 shows the acreage associated with each alternative) of the total land holding would experience temporary disturbance during construction activities, which are expected to occur for approximately 30 months, resulting in between 1,652 and 1,673 acres (depending on alternative) of permanently disturbed land area.

Emissions were estimated for construction equipment exhaust, on-site and off-site motor vehicle exhaust, re-entrained road dust, fugitive dust emissions from soil disturbance, fugitive emissions from wind erosion of stockpiles, and fugitive emissions from a temporary concrete batch plant.

The salt commissioning activities would take place during the construction phase of the project and would involve the melting, heating, and conditioning of approximately 70 million pounds of sodium nitrate and potassium nitrate salts. The salt commissioning process is expected to take approximately 90 days and is planned to begin in the 18th month of construction. A detailed description of the salt system commissioning process is provided in Chapter 2. This section presents the analysis of the combined emissions from the concurrently scheduled construction and salt commissioning activities.

Construction Schedule

Project construction and initial commissioning would occur over approximately 30 months, from December 2010 to the third quarter of 2013. An overall project schedule is provided in the project description section. Construction would progress from site preparation to construction of the central receiver tower and molten salt system, then to construction of the power block and heliostat field. Other project requirements such as access roads, facility buildings, and new TLs would be constructed at the appropriate time during the overall construction schedule.

Estimated Construction Emissions

On-site and off-site project emissions were divided into three categories: vehicle and construction equipment exhaust, fugitive dust generated by vehicles and construction equipment, and wind-driven fugitive dust. Construction equipment exhaust emissions were estimated using the URBEMIS2007 (version 9.2.4) emission factors. Fugitive dust emissions from the concrete batch plant were estimated using EPA-approved emission factors published in AP-42 (EPA 2006). Fugitive dust emissions from paved and unpaved roads were estimated using EPA-approved emission factors and methodology published in

AP-42 (EPA 2006). These emission factors were reduced by 68 percent based on the proposed watering of traveled roads twice a day.

Fugitive dust emissions from soil disturbance (e.g., grading activities) were estimated based on the controlled emission factor published in URBEMIS. These emissions were assumed to have 50 percent control of fugitive dust emissions by the application of water to the disturbed surface. Fugitive dust emissions from wind erosion of material stockpiles were estimated using the methodology published in AP-42 (EPA 2006). On-road exhaust emissions were estimated using EMFAC2007 (version 2.3) emission factors. On-road and off-road exhaust emissions were estimated assuming the use of ultra low sulfur diesel fuel.

Construction emissions also would be generated during installation of a 9.5-mile-long TL. Off-site emission sources include the exhaust emissions from construction equipment and motorized vehicles used to install the TL poles and pull conductors, as well as the exhaust emissions from motor vehicles traveling to and from the planned work sites (e.g., delivery trucks and worker vehicles). Minor amounts of fugitive dust also would be generated by construction activities and vehicle travel on roadways. The emission calculation methodology for the off-site construction activities was similar to the methodology for estimating on-site construction emissions.

Maximum annual emissions were estimated based on the number and type of construction equipment, the number of heavy-duty trucks, fugitive dust, and the roundtrip workforce commutes projected for each month of construction. The maximum annual construction emissions were estimated as the sum of the maximum monthly emissions over a 12-month period.

The maximum annual construction emissions are presented in Table 4-9. The detailed emission calculations for construction are provided in the *Air Emissions Sources and Inventory Report* (Solar Reserve 2010).

Table 4-9. Maximum annual criteria pollutant emission estimates from construction activities

Construction Emission Source	Emissions (tons per year)					
	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
On-site construction emissions	26.1	14.0	3.0	0.03	28.4	4.4
Off-site vehicle emissions	5.8	15.5	1.9	0.02	7.6	0.9
Off-site construction emissions	2.9	1.7	0.3	0.004	2.3	0.3

Greenhouse gas emissions from construction activities are presented in Table 4-10. Construction equipment emissions and fuel use were estimated using emission factors from the California Climate Action Registry (CCAR) General Reporting Protocol (version 3.1) (CCAR 2009) and fuel consumption rates from the OFFROAD2007 model. Vehicle emissions and fuel use (trucks and worker commutes) were estimated using emission factors from the CCAR General Reporting Protocol (version 3.1) and EPA fuel economy values. This approach meets the reporting requirements of the Nevada Bureau of Air Quality Planning (BAQP).

Estimated total fuel use during construction would be 1,485,848 gallons of diesel and 1,168,622 gallons of gasoline. Detailed greenhouse gas emission and fuel use calculations are included in Air Emissions Sources and Inventory Report (Solar Reserve 2010).

Table 4-10. Nonrecurring greenhouse gas emissions estimates for construction activities

Duration	Greenhouse Gas Emissions (metric tons)			
	CO_2	CH_4	N_2O	CO_2 Equivalent
Maximum annual (tonnes/year)	7,037	0.30	0.146	7,089
Maximum project (tonnes/project)	9,415	0.48	0.228	9,496

Note: Tonnes are in metric tons.

4.7.2.1.3 Emissions Associated with Salt Commissioning Activities

The salt melting and heating processes would produce limited emissions of criteria pollutants resulting from the combustion of gaseous fuels in two temporary gas-fired convection heaters with rating capacities of 55 million British thermal units per hour (MMBtu/hr) and 20 MMBtu/hr. Propane was chosen for the analysis, but other fuels might include natural gas or liquefied natural gas as potential alternatives (there is no pipeline connection proposed for the project location and there is one potential liquefied natural gas truck terminal within a reasonable distance). Criteria and greenhouse gas emissions have been estimated using the highest emission rates among the fuel types considered. The NO_x emissions for the two heaters were estimated assuming the heaters would be equipped with both ultralow NO_x burners and flue gas recirculation. Minimal to no fugitive particulate emissions would be generated during the handling of the solid salts because the solid salts would be handled in an indoor environment. Furthermore, the salts are greatly hydrophilic (high tendency in absorbing moisture) and tend to solidify and remain in solid form.

The salt conditioning (i.e., the process of bringing salt up to its operating temperature range) would result in the release of NO_2 from the oxidation of magnesium nitrate impurity in the salt solution; this emission source would be separate from the combustion emissions from the heating process described above. The NO_2 estimates for the salt conditioning process assumed all the magnesium nitrate impurity as guaranteed by the supplier for each salt oxidizes completely and releases entirely from the liquid solution. This is conservative because the actual magnesium nitrate impurity is substantially less than the supplier guarantee level. To further reduce the potential emission from this process, the project is in the process of identifying sources and methods to further reduce the magnesium impurity in the salt. If achievable, salt conditioning would become unnecessary.

In the event that ultralow magnesium impurity salts are not available, the release of NO_2 from the salt conditioning process would be controlled by a multistage chemical wet scrubber. The project Proponent may also consider other control options such as the use of selective catalytic reduction. The emission estimates and analysis were conducted on the basis of the multistage chemical wet scrubber for controlling NO_2 emissions.

After the salt commissioning activity is completed, the two gas-fired heaters and the NO_2 scrubber system would be dismantled and removed from the project site.

The criteria pollutant emissions estimated for the salt commissioning process are presented in Table 4-11. The detailed emission calculations for commissioning are provided in the *Air Emissions Sources and Inventory Report* (Solar Reserve 2010).

Table 4-11. Nonrecurring criteria pollutant emission estimates for salt system commissioning activities

Salt System Commissioning	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Melting (lb/period)	1,282	12,327	1,644	2,465	1,151	1,151
Heating (lb/period)	186	1,790	239	358	167	167
Conditioning (lb/period)*	17,901	—	—	—	—	—
Total salt system commissioning period, tons (all phases)	9.7	7.1	0.9	1.4	0.7	0.7

*Conditioning emissions represent post-control emissions; this process would be unnecessary with ultralow magnesium impurity salts.

lb/period = pound(s) per duration of the commissioning activities

The greenhouse gas emissions resulting from the salt commissioning process are presented in Table 4-12. Salt commissioning activities would result in direct greenhouse gas emissions associated with combustion of propane in the salt heaters and indirect greenhouse gas emissions associated with electricity necessary to maintain the hot salt tank temperature during the conditioning period. Greenhouse gas emissions from propane combustion in the salt heaters were estimated using emission factors from Nevada's draft Greenhouse Gas Emissions Mandatory Reporter Monitoring Guidelines (2008b). Indirect greenhouse gas emissions from electricity used to maintain salt temperature were estimated using emission factors from the CCAR (2009) General Reporting Protocol. Since the draft guidance for greenhouse gas emissions by the CEQ is currently under review, the greenhouse gas emissions are presented here for informational purposes only at this time, and no conclusions regarding significance are presented.

Table 4-12. Nonrecurring greenhouse gas emission estimates for salt commissioning activities

	Greenhouse Gas Emissions (metric tons)			
	CO_2	CH_4	N_2O	CO_2 Equivalent
Total	12,442	0.24	0.03	12,458

4.6.2.2 Commissioning (Plant-Wide) Phase

The power block commissioning phase of the project would involve the steam blows and steam turbine startup activities. This phase of commissioning is expected to take place during the final months of construction and would follow the salt commissioning activities. The power block commissioning activities would not involve in any combustion of fossil fuels. As a result, no emissions of air pollutants would occur during the power block commissioning phase.

4.6.2.3 Operational Phase

Criteria Emission Estimates

The proposed project is based on concentrating solar-thermal power technology, which uses reflecting mirrors, called heliostats, to redirect sunlight onto a receiver on top of a tower near the center of the solar field. Liquid salt would be heated as it passes through the receiver and would be stored and circulated through a series of heat exchangers to generate high-pressure superheated steam. The steam would then be used to power an STG at conventional temperatures and pressures to produce electricity. The steam from the STG would be condensed using a steam condensing system and returned via feedwater pumps to the heat exchangers where the high-pressure superheated steam would be regenerated.

The plant is designed to capture available solar energy whenever the sun is not obscured by dense cloud cover. The thermal storage system would be sized so that the receiver and collector systems would be able to capture solar energy during the day and store the energy for use during hours with intermittent cloud cover or during evening hours when electric demand is still high. During off-generation hours, electricity would be back-fed from the power grid to maintain the hot salt tank temperature and balance-of-plant systems in a standby state. No fossil fuel-based combustion is proposed for the power generation process of this project. As a result, no criteria pollutant or HAP emissions would be generated from normal electrical generating operations or system start-up and shut-down events.

Although the solar-thermal power generation would not consume fossil fuels, the project prescribes two diesel-powered emergency generators and two diesel-powered emergency fire pumps. These units would be strictly for emergency response and would not normally be in operation. Additionally, these shop-assembled, skid-mounted modular units would be certified to EPA standards for engines of their respective application.

The primary function of the emergency generators would be to provide relatively instantaneous backup power needed to redirect the heliostat field flux off the solar receiver during loss of liquid salt flow emergencies. The emergency generators are approximately 4,000 brake-horsepower each and would be activated in test mode once every 2 weeks to meet supplier guarantee and the NFPA and insurance carrier requirements on maintenance and testing.

Emissions of NO_x, CO, PM_{10}, $PM_{2.5}$, and SO_x from the new diesel-powered emergency generators and emergency fire pumps were estimated assuming they would meet the EPA Tier II and Tier III emission standards, respectively.

To conserve water use and optimize plant performance, the project Proponent has proposed the use of hybrid cooling for the steam cycle. In addition to an air-cooled condenser, the project would implement a small water-cooled condenser. The condenser would reject its heat through a cooling tower. This cooling tower would also provide cooling to various ancillary heat sources from the power block. The cooling tower would have an approximate water recirculation rate of 24,093 gallons per minute and would be equipped with a mist elimination system rated at 0.001 percent by weight efficiency. The PM_{10} and $PM_{2.5}$ emissions from the cooling tower were calculated based on the measured TDS

concentration in the groundwater. Although the cooling tower may not be required during low-temperature hours, the emission estimates were conservatively based on a 50 percent annual capacity factor (i.e., 4,400 hours).

Annual criteria pollutant emissions for the operational phase of the plant are presented in Table 4-13. The emergency diesel engine emissions are based on 60 minutes of maintenance testing once every 2 weeks. The diesel-driven fire pumps emissions were based on 30 minutes of weekly testing. The annual cooling tower emissions were conservatively based on 4,400 hours of operation per year at a conservative 10 cycles of concentration.

Table 4-13. Annual criteria pollutant emissions from on-site stationary sources during the operation phase

Emission Source	NO_x	SO_2	VOC	CO	PM_{10}/ $PM_{2.5}$
Maximum Annual Emissions, lbs/year[a]					
Emergency generator (Unit 1)	1,174	1.17	23.1	145	6.9
Emergency generator (Unit 2)	1,174	1.17	23.1	145	6.9
Emergency fire pump (Unit 1)	99	0.17	1.6	19	3.6
Emergency fire pump (Unit 2)	99	0.17	1.6	19	3.6
Cooling tower	—	—	—	—	3,925
Total Project (lb/yr)	**2,546**	**2.7**	**49.4**	**328**	**3,946**
Total Project (tpy)	**1.27**	**0.001**	**0.02**	**0.16**	**1.97**

[a] Annual emissions are based on 26 hours of testing per unit. See Appendix 4.7-B.
Notes:
lb/year = pound(s) per year
tpy = ton(s) per year

Indirect criteria pollutant emissions from worker commutes, trucks used to wash the heliostats, and material deliveries were also calculated. These emissions are presented in Table 4-14. Exhaust emissions were estimated using emission factors from EMFAC2007 (version 2.3) database. Fugitive dust emissions from paved and unpaved roads were estimated using EPA-approved emission factors and methodology published in AP-42 (EPA 2006). Detailed calculations are included in the *Air Emissions Sources and Inventory Report* (Solar Reserve 2010).

Table 4-14. Annual criteria pollutant emissions from worker commute, heliostat washing, and deliveries during operation

Emission Source	Emissions (lb/yr)					
	VOC	CO	NO_x	SO_x	PM_{10}	$PM_{2.5}$
Worker commute	137	5,407	587	9	803	240
Trucks used for heliostat washing	155	257	575	1	10,160	1,040
Material deliveries	111	507	2,195	4	155	98
Total (lb/yr)	**403**	**6,171**	**3,357**	**13**	**11,118**	**1,378**
Total (tpy)	**0.2**	**3.1**	**1.7**	**0.01**	**5.6**	**0.7**

Greenhouse Gas Emission Estimates

Combustion of diesel fuel in the emergency fire pump engines and the emergency generators during weekly and biweekly testing would result in emissions of CO_2, CH_4, and N_2O. Greenhouse gas emissions for normal facility operations were calculated based on the maximum fuel use predicted for the project and emission factors contained in the Nevada Greenhouse Gas Emissions Mandatory Reporter Monitoring Guidelines (2008). The emission factors used to estimate the greenhouse gas emissions are summarized in the *Air Emissions Sources and Inventory Report* (Solar Reserve 2010). Emissions of CO_2, CH_4, and N_2O resulting from operation of the proposed project are presented in Table 4-15.

Table 4-15. Annual greenhouse gas emissions from on-site stationary sources

Emission Source	Estimated Emissions (metric tons/year)			
	CO_2	CH_4	N_2O	CO_2 Equivalent
Emergency generator (Unit 1)	45.7	0.039	0.008	49
Emergency generator (Unit 2)	45.7	0.039	0.008	49
Emergency fire pump (Unit 1)	8.3	0.0003	0.0001	8
Emergency fire pump (Unit 2)	8.3	0.0003	0.0001	8
Total emissions	**108**	**0.079**	**0.016**	**114**

Notes: CO_2 = carbon dioxide, CH_4 = methane, N_2O = nitrous oxide

Indirect greenhouse gas emissions from worker commutes, the trucks used to wash the heliostats, and material deliveries were calculated as part of the analysis. The greenhouse gas emissions are presented in Table 4-16. Emissions were estimated using emission factors from the CCAR General Reporting Protocol (version 3.1). Detailed calculations are included in the Air Emissions Sources and Inventory Report (Solar Reserve 2010).

Table 4-16. Annual greenhouse gas emissions from worker commute, heliostat washing, and deliveries during operation

Emission Source	Greenhouse Gas Emissions (metric tons/year)			
	CO_2	CH_4	N_2O	CO_2 Equivalent
Worker commute	635	0.019	0.01	640
Trucks used to wash heliostats	16	0.0005	0.0005	16
Material deliveries	172	0.005	0.005	172
Total emissions	**823**	**0.025**	**0.016**	**828**

Notes: CO_2 = carbon dioxide, CH_4 = methane, N_2O = nitrous oxide

4.6.3 Air Quality Conformity Assessment

The Clean Air Act General Conformity Requirements for the NEPA process provide the following conformity review steps.

1. Determine whether criteria pollutants or their precursors would be emitted from the proposed project.
2. Determine whether emissions of criteria pollutants or precursors would occur in a nonattainment or maintenance area.
3. Determine whether the proposed project is exempt from conformity determination.
4. Estimate emissions and compare to the threshold emissions and the nonattainment or maintenance area's emissions inventory.

As discussed in the previous sections, there are criteria pollutants and precursors emissions associated with the construction and operation of the proposed project. However, as stated in the environmental setting section and the EPA's Green Book (2010) on Nye County, the proposed project is located in a region currently classified as being in attainment for all pollutants. In accordance with the second step of the conformity determination process, the project would, therefore, be deemed in conformance with the national air quality goals and objectives.

In the highly unlikely event that the attainment status for the region changes any of the pollutants in the near future to a level immediately higher (i.e., "from attainment to maintenance status"), the following tables provide a comparison of the project emissions to the conformity threshold for each pollutant. Table 4-17 summarizes emission from the construction phase, which includes the salt commissioning activities. Table 4-18 shows the emission estimates for the project when the plant is in steady state operation. As stated in the previous section, emission associated with indirect vehicular sources include daily site employee commute, third-party trips to the plant, and wash trucks that travel in the heliostat field.

As shown in these tables, the estimated project emissions for each phase and activity are well below the conformity thresholds. A review of the emission inventory for Nye County through the EPA AirData database suggests that the estimated project emissions would be well below the 10 percent mark of the regional total emission inventory.

Table 4-17. Air quality conformity determination for project construction phase

Pollutant	Construction Phase Emissions (tons/year)					
	On-site Construction	Off-site Construction	Off-site Vehicle	Salt Commissioning	Conformance Thresholds[a]	Clean Air Act Conformance
VOC	3.0	2.9	0.3	0.9	100	Yes
CO	14.0	15.5	1.7	7.1	100	Yes
NO_X	26.1	5.8	2.9	9.7	100	Yes
SO_X	0.03	0.02	0.004	1.4	100	Yes
PM_{10}	28.4	7.6	2.3	0.7	100	Yes

[a] Conformance thresholds are for areas classified with "maintenance" requirement status. This is conservative because the project area has met attainment status for all pollutants.

Notes: CO = carbon monoxide, NO_x = oxide of nitrogen, SO_x = oxide of sulfur, PM_{10} = particulate matter, VOC = volatile organic compound

Table 4-18. Air quality conformity determination for project operation phase

Pollutant	Operation Phase (tons/year)			
	On-site Stationary Sources	On-site/Off-site Vehicle Sources	Conformance Thresholds[a]	Clean Air Act Conformance
VOC	0.02	0.2	100	Yes
CO	0.16	3.1	100	Yes
NO_X	1.27	1.7	100	Yes
SO_X	0.00	0.01	100	Yes
PM_{10}	1.97	5.6	100	Yes

[a] Conformance thresholds are for areas classified with "maintenance" requirement status. This is conservative because the project area has met attainment status for all pollutants.

Notes: CO = carbon monoxide, NO_x = oxide of nitrogen, SO_x = oxide of sulfur, PM_{10} = particulate matter, VOC = volatile organic compound

4.6.3.1 Regional Conformity

In addition to federal air quality conformity, the proposed project will also meet state and regional air quality goals and objectives. Nevada implements these goals and objectives through it state implementation plan, which consists of air pollution strategies, state statutes, rules, and local ordinances. In its implementation plan, Nevada provides for three areas jurisdictions: the NDEP through the BAQP and Air Pollution Control; Clark County, which encompasses Las Vegas; and Washoe County, which covers the Reno-Sparks metropolitan area. The proposed project is neither in Clark nor Washoe counties; in addition, as an electric generating facility, the project would be under the jurisdiction of NDEP.

Prior to the start of construction, the project Proponent will have submitted the necessary permit applications to BAQP of NDEP and obtained the necessary permits to construct. In this process, the project Proponent will have to demonstrate compliance with all applicable codes and regulations. The BAQP will also perform the necessary compliance determination, which will include best available control technology and the necessary modeling to demonstrate compliance with ambient air quality standards. The issuance of the permit would constitute conformance to state and regional air quality requirements.

Based on the sources and emission estimates provided in the previous subsections, it appears that the facility would qualify for BAQP's Class 2 operating permits status. These permits are typically provided for facilities that emit less than 100 tons per year for any one regulated pollutants. This category appears to be consistent with the federal air quality conformity thresholds. Based on the information provided above, key conditions anticipated for these permits would include but not be limited to:

- The temporary salt melter and heater shall be equipped with low NO_x burner and flue gas recirculation.
- Emissions resulting from the oxidation of magnesium impurity in the salt during the salt conditioning process shall be controlled, unless the project is able to locate an ultralow magnesium salt that renders the salt conditioning process unnecessary.

- The project shall equip the cooling tower with a mist elimination system that has an efficiency rating of 0.001 percent by weight.
- Emergency diesel-fired equipment shall be certified to meet applicable EPA emission standards for the respective class of equipment.

In addition, the project will apply for and obtain a Surface Area Disturbance permit from the bureau because the expected area of disturbance will exceed 5 acres. Consistent with the project intent and as required for the Surface Area Disturbance permit, a dust control plan will be filed with and approved by the NDEP-BACP. Key conditions of the permit would include but not limited to:

- Provide grid construction power to the site as soon as possible to minimize the use of portable diesel-powered generators during construction.
- Limit traffic speeds on unpaved roads to 15 miles per hour.
- Water all active construction areas twice daily.
- Use ultralow sulfur diesel for the construction fleet of vehicle and equipment.
- Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard.
- Apply a nontoxic soil stabilizer on all unpaved access roads, parking areas, and staging areas at the construction site.
- Sweep daily, with water sweepers, all paved access roads, parking areas, and staging areas at the construction site.
- Enclose, cover, water daily, or apply a nontoxic soil binder to exposed stockpiles of soil, sand, or similar materials.

4.6.4 Alternatives and Cumulative Effects Analysis

The air quality impact evaluation discussed in this section includes the construction and operational phases of the plant from both on-site and off-site sources, the construction of the TL, and the operation of the borrow pit. Since there are no other known projects in the project vicinity, this evaluation also represents the cumulative effect analysis. Also, because the operational and construction emissions would be the same for the Proposed Action and the two other alternatives (Alternatives 1 and 2), the air quality evaluation under the Proposed Action applies to the two alternatives.

4.6.5 Summary of Impact Analysis

A thorough review of the construction activities and the operational phase of the proposed plant suggest that the associated emissions would be within established federal, state, and regional thresholds. Furthermore, the proposed project is located in a region that EPA has categorized as an attainment area for all regulated pollutants. As such, the proposed project with all its proposed emission control strategies is not expected to cause a violation of established air quality standards and would conform to federal air quality goals and objectives. Through the permit application process with NDEP-BAPC, the proposed project would also conform to regional air quality requirements and objectives. The proposed project would have less-than-significant mitigated air quality impacts.

4.7 Cultural Resources

This section evaluates the effects of project construction and operation that the Proposed Action, Alternative 1, Alternative 2, the TL and substation, and the borrow pit may have on existing cultural resources. Also considered are the effects of the No Action Alternative. Subsection 4.7.6 presents the summary of impacts. Finally, Subsection 4.7.7 discusses proposed measures to avoid, reduce, or mitigate adverse effects to cultural resources. The evaluation focuses solely on the historic properties identified in Chapter 3.

4.7.1 Methods

Methods employed to identify historic properties for this analysis included preparing a Class I literature review, undertaking a Class III cultural resources survey, and conducting a TCP study. The literature review consulted site and survey records obtained from the BLM TFO in Tonopah, Nevada; the online NVCRIS; GLO plat maps and historic topographic and other maps accessed at the University of Nevada, Reno, Mary B. Ansari Map Library; and the Nevada Bureau of Mining and Geology Web site. The Class III survey was performed by archaeologists walking parallel, pedestrian, systematically spaced transects and documenting their findings through notation, photography, and collection of GIS data for all cultural resources encountered during fieldwork.

4.7.2 Proposed Action

4.7.2.1 Construction

Direct Effects

Construction would have direct effects on four existing properties recommended eligible for listing on the NRHP: CrNV-62-14707, 14718, 14731, and 14734. Possible direct effects would be surface or subsurface disturbances caused by construction activities. Unanticipated discoveries encountered during construction could also result in direct effects to unknown historic properties within the Proposed Action.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated with construction of the project.

4.7.2.2 Operation

Direct Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no direct impacts are associated with operation of the project. Undiscovered historic properties could be directly affected by operation of the facility.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated with operation of the project.

4.7.3 Alternative 1

4.7.3.1 Construction

Direct Effects

Construction would have direct effects on one existing historic property: CrNV-61-14853. Unanticipated discoveries encountered during construction could also result in direct effects to unknown historic properties within Alternative 1.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated with construction of the project.

4.7.3.2 Operation

Direct Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no direct impacts are associated with operation of the project. Undiscovered historic properties could also be directly affected by operation of the facility.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated with operation of the project.

4.7.4 Alternative 2

4.7.4.1 Construction

Direct Effects

Construction of Alternative 2 would result in direct effects to eight known historic properties: CrNV-61-14824, 14830, 14864, 14867, 14877, 14881, 14888, and 14893. Construction could also result in direct effects to unanticipated discoveries.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated with construction of the project.

4.7.4.2 Operation

Direct Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no direct impacts are associated with operation of the project. Undiscovered historic properties could also be directly affected by operation.

Indirect Effects

Any existing property eligible for listing on the NRHP would be salvaged prior to construction; therefore, no indirect impacts are associated operation of the project.

4.7.5 TL and Anaconda-Moly Substation Corridor

4.7.5.1 Construction

Direct Effects

No historic properties are known to be present within the boundaries of the TL and substation. Direct effects are not likely to occur; however, discovery of unanticipated finds during construction could result in direct effects to unknown historic properties.

Indirect Effects

No historic properties are known to be present within the boundaries of the TL and substation; therefore, indirect effects are not likely to occur.

4.7.5.2 Operation

Direct Effects

No direct effects to historic properties are likely to occur as a result of the operation of the TL and substation.

Indirect Effects

No indirect effects to historic properties are likely to occur as a result of the operation of the TL and substation.

4.7.6 Borrow Pit

The following subsections summarize the impacts of construction and operation of the borrow pit together because the borrow pit would be open only until the completion of construction of the generation facility.

4.7.6.1 Direct Effects

No historic properties are known to be present within the boundaries of the borrow pit. Direct effects to historic properties are not likely to occur; however, discovery of unanticipated finds during construction could result in direct effects to as yet unknown historic properties.

4.7.6.2 Indirect Effects

No historic properties are present within the boundaries of the borrow pit; therefore, no indirect effects are likely to occur.

4.7.7 No Action Alternative

The No Action Alternative would have no project-related impacts—direct or indirect—to cultural resources.

4.7.8 Summary of Impacts

Development of the Proposed Action would affect four historic properties. Eight historic properties would be affected by Alternative 2. Only one known historic property would be affected by Alternative 1. No impacts are likely to occur for the TL and substation or the borrow pit. Unanticipated discoveries during project construction could result in impacts to currently unidentified historic properties for any of the alternatives as well as for the TL and substation or borrow pit.

4.7.9 Mitigation

Further archaeological data collection would be needed to mitigate the adverse impacts to historic properties. A Historic Property Treatment Plan (HPTP) will be developed. The HPTP lists all historic properties to be adversely affected by the project and specify and describe in detail the mitigation measures—site avoidance, testing, data recovery, or monitoring—to be implemented prior to and/or during construction, including the management and protocol of any unanticipated discoveries.

4.8 Native American Religious Concerns

This section evaluates direct and indirect effects of project construction and operation that the Proposed Action, Alternative 1, Alternative 2, the TL and substation, and the borrow pit may have on Native American religious concerns (traditional and cultural sites, activities, resources).

To date, no specific prehistoric, ethnohistoric, or contemporary traditional and cultural resources, sites, or associated activities have been identified by tribal participants. However, considering that Native American consultation is ongoing, opportunities still exist to participate and identify concerns. Thus, specific direct and indirect impacts are not definitive at this time.

Possible impacts to tribal resources will be analyzed in a general sense, given current tribal input and the possibility of new and inadvertent discoveries, and will apply to the construction and operation of the Proposed Action, Alternative 1, Alternative 2, the TL and substation, and the borrow pit.

For cultural resources, treatment plan development and subsequent data recovery (excavation) of identified prehistoric or ethnohistoric archaeological sites are considered an acceptable mitigation measure. However, with regard to Native American religious concerns and to the tribes, proposed “mitigation” is often considered an adverse impact to tribal beliefs, customs, and traditional and cultural lifeways.

As stated earlier under Chapter 3, in Section 3.9.4.2, tribal participants have provided input on the following concerns: potential impacts to water sources and avoidance of identified cultural resources, further tribal participation (monitor or observer opportunities) during implementation of a cultural resources treatment plan (data recovery) or during new surface disturbance associated with construction activities, general concerns about possible impacts to older sites along the “old lakeshore” or within the dunes (Crescent Dunes), maintenance of existing access routes, and archaeological site inspections (BLM Cultural Resources Specialist accompanied by a tribal representative) to ensure construction activities do not degrade sites identified for avoidance.

4.8.1 Methods

Methods used to identify tribal concerns—which include traditional and cultural sites, activities, and resources—were: reviewing existing ethnographic literature and census records, providing to tribal entities the services of an ethnographer, conducting a Class I literature review and undertaking a Class III cultural resources survey, participating in (and continuing to provide opportunities for) site visits with participating tribal entities, conducting follow-up communications (by phone and e-mail), and conducting briefings and follow-up meetings.

4.8.2 No Action Alternative

The No Action Alternative would have no project-related impacts—direct or indirect—to Native American religious concerns.

4.8.3 Summary of Impacts

At this time, given the known and provided information, there exists some potential (not definitive) to affect project area specific archaeological sites and associated artifacts of concern. Potential impacts could occur because of cultural resources treatment plan implementation and the lack of avoidance of prehistoric and/or ethnohistoric archaeological sites. Based on previous consultations, historic sites appear to be of little concern, unless they are associated with specific family histories and ancestral habitations (i.e., homesteads located on turn-of-the-century allotment lands).

Considering that some impacts may not be known until after (or during) project development (i.e., inadvertent discovery of previously unidentifiable subsurface deposits) and the fact that consultation is ongoing, specific resource identification and subsequent determinations of impacts are not conclusive.

4.9 Land Use and Access

This section describes the potential impacts of construction and operation of the proposed project on land use and access in the area of analysis and CESA as described in Section 3.8.

4.9.1 Methods

The impact analysis for the land use and access areas was based on review of the existing conditions (as described in Section 3.8) and focuses on the following issues:

- conformity of the proposed project with federal and local land use plans, ordinances, and policies
- the potential for the proposed project to have direct and/or indirect land use and access conflicts with existing and planned uses

Project construction and operation would be considered to have an impact on land use and access if they would:

- permanently preclude a permitted or current land use over a substantial area

- permanently displace existing, developing, or approved urban/industrial buildings or activities over a substantial area (i.e., residential, commercial, industrial, governmental, or institutional)
- conflict with an existing ROW
- substantially conflict with applicable general and regional plans and/or approved or adopted policies, goals, or operations of communities or governmental agencies

4.9.2 Proposed Action

4.9.2.1 Construction

Direct Effects

The Proposed Action would have long-term direct impacts on potential uses of BLM-administered land within the analysis area by removing approximately 1,500 acres of lands from potential public use or disposal for the duration of the lease. Table 4-1 summarizes the amount of permanent land disturbance that would be associated with the project's construction.

The Proposed Action would have no direct effects to the authorized and pending BLM rights-of-way identified in Table 3-21 and presented in Figure 3-11. The meteorological tower is associated with this project and would remain if this project is developed.

The project would directly affect the grazing allotment by reducing the grazing potential, but only slightly. This impact is further summarized in Section 4.14 and Table 4-26.

The Proposed Action would have no direct effects on the restrictions on off-highway vehicles and would have minor effects on recreation uses established in the area, which are summarized in Section 4.15.

The Proposed Action would not affect the mineral leasing restrictions (no surface occupancy) adjacent to the project area.

The Proposed Action would not affect the intended use of the BLM-designated adjacent utility corridor.

The Proposed Action is within the U.S. Department of Defense Airspace Consultation Area, and could directly affect airspace use in the area. The U.S. Navy has expressed concerns about the potential impacts of this site on infrequent flights through this region; however, the FAA reviewed the proposed location and concluded the Proposed Action posed no hazard to aviation in the area. The FAA determined (FAA 2010b):

> "… that the structure would have no substantial adverse effect on the safe and efficient utilization of the navigable airspace by aircraft or on the operation of air navigation facilities.
>
> Therefore, pursuant to the authority delegated to me, it is hereby determined that the structure would not be a hazard to air navigation provided the following condition(s) is (are) met:
>
> > As a condition to this Determination, the structure is marked and/or lighted in accordance with FAA Advisory circular 70/7460-1 K Change 2, Obstruction Marking and Lighting, 24-hr hi-strobes - Chapters 4,7(HIWOL),&12."

The U.S. Air Force has indicated that this location would affect instrumentation in the region that is used in training activities on the Nevada Test and Training Range located southeast of the project area.

The use of Crescent Dunes Road would not be affected by the proposed project. The proposed project would result in the loss of access to the lands within the proposed project area, but would not otherwise minimize or prevent access to the adjacent areas or the region.

The Proposed Action is within the boundary of the Nye County Planning Area mapped as federal lands; however, land requested under the Proponent's ROW application is entirely under the jurisdiction of the BLM TFO. No residential, commercial, industrial, or institutional uses are located within the analysis area, so no effects on such uses would result from the project.

The Proposed Action is consistent with the policies, goals, objectives, and land use descriptions set forth in the Nye County Comprehensive Plan and the BLM Tonopah Resource Management Plan.

Indirect Effects

The proposed project is not likely to have indirect effects on the potential land use on or access to public lands in the region.

4.9.2.2 Operation

Direct Effects

Any direct effects to land use or access would occur during construction activities as identified above, and would continue during the operation of the facility.

Indirect Effects

No indirect effects to land use or access are likely to occur with operation of the proposed project.

4.9.3 Alternative 1

4.9.3.1 Construction

Direct Effects

Many of the impacts to land use and access described for the Proposed Action would be the same for Alternative 1. However, Alternative 1 is not consistent with several of the policies, goals, objectives, and land use descriptions set forth in BLM's Tonopah Resource Management Plan.

As with the Proposed Action, Alternative 1 would have long-term direct impacts on potential uses of BLM-administered land within the analysis area by removing approximately 1,504 acres of lands from potential public use or disposal for the duration of the lease. Table 4-1 summarizes the amount of permanent land disturbance that would be associated with the project's construction.

As with the Proposed Action, Alternative 1 would have no direct effects to the authorized and pending BLM rights-of-way identified in Table 3-21 and presented in Figure 3-11. The meteorological tower is associated with this project and would remain if this project is developed.

As with the Proposed Action, Alternative 1 would directly affect the grazing allotment by reducing the grazing potential, but only slightly. This impact is further summarized in Section 4.14 and Table 4-26.

Unlike the Proposed Action, Alternative 1 would directly affect approximately 130 acres of the ROW avoidance area that is established for protection of the Crescent Dunes, and is in direct conflict with the intent of that set-aside. This impact is further summarized in Section 4.15.

The proposed project would have no direct effects on the restrictions on off-highway vehicles and recreation uses established in the area, which are summarized in Section 4.15. However, Alternative 1 overlaps a portion of the SRMA that encompasses the Crescent Dunes area. Construction and fencing of the facility would exclude use of a portion of that area, reducing potential recreational use.

Alternative 1 would encroach on an area designated with mineral leasing restrictions (no surface occupancy) on the eastern side of the project area. Structures would be established within the restricted area, in direct conflict with the intended protections.

Alternative 1 would not affect the intended use of the BLM-designated adjacent utility corridor.

As with the Proposed Action, Alternative 1 is within the U.S. Department of Defense Airspace Consultation Area, and could directly affect airspace use in the area. The U.S. Navy has expressed concerns about the potential impacts of this site on infrequent flights through this region; however, the FAA reviewed the proposed location and concluded the proposed project posed no hazard to aviation in the area (FAA 2010c). The U.S. Air Force has indicated that this location would not affect instrumentation in the region that is used in training activities on the Nevada Test and Training Range located southeast of the project area.

The use of Crescent Dunes Road would not be affected by Alternative 1. The proposed project would result in the loss of access to the lands within the proposed project area, but would not otherwise minimize or prevent access to the adjacent areas or the region.

Alternative 1 is within the boundary of the Nye County Planning Area mapped as federal lands; however, land requested under the Proponent's ROW application is entirely under the jurisdiction of the BLM TFO. No residential, commercial, industrial, or institutional uses are located within the analysis area, so no effects on such uses would result from the project.

Indirect Effects

No indirect effects to land use or access are likely to occur with operation of the proposed project.

4.9.3.2 Operation

Direct Effects

Any direct effects to land use would occur during construction activities as identified previously, so no additional direct effects to land use are likely to occur during operation or maintenance of the facility.

Indirect Effects

No indirect effects to land use or access are likely to occur with operation of the proposed project.

4.9.4 Alternative 2

4.9.4.1 Construction

Direct Effects

Many of the impacts to land use and access described for the Proposed Action would be the same for Alternative 2. Alternative 2 is consistent with several of the policies, goals, objectives, and land use descriptions set forth in the BLM Tonopah Resource Management Plan.

As with the Proposed Action, Alternative 2 would have long-term direct impacts on potential uses of BLM-administered land within the analysis area by removing approximately 1,504 acres of lands from potential public use or disposal for the duration of the lease. Table 4-1 summarizes the amount of permanent land disturbance that would be associated with the project's construction.

As with the Proposed Action, Alternative 2 would have no direct effects to the authorized and pending BLM rights-of-way identified in Table 3-21 and presented in Figure 3-11. The meteorological tower is associated with this project and would remain if this project were developed.

As with the Proposed Action, Alternative 2 would directly affect the grazing allotment by reducing the grazing potential, but only slightly. This impact is further summarized in Section 4.14 and Table 4-26.

As with the Proposed Action, Alternative 2 would not affect the ROW avoidance area that is established for protection of the Crescent Dunes located east of the project area.

The proposed project would have no direct effects on the restrictions on off-highway vehicles and recreation uses established in the area, which are summarized in Section 4.15. Alternative 2 would not affect the SRMA that encompasses the Crescent Dunes area.

Alternative 2 would not affect the area designated with mineral leasing restrictions (no surface occupancy) east of the project area.

Alternative 2 would not affect the intended use of the BLM-designated adjacent utility corridor.

As with the Proposed Action, Alternative 2 is within the U.S. Department of Defense Airspace Consultation Area, and could directly affect airspace use in the area. However, the FAA reviewed the proposed location and concluded the proposed location posed no hazard to aviation in the area (FAA 2010d). No objections were noted in the declaration from FAA.

The use of Crescent Dunes Road would not be affected by Alternative 2. The proposed project would result in the loss of access to the lands within the proposed project area, but would not otherwise minimize or prevent access to the adjacent areas or the region.

Alternative 2 is within the boundary of the Nye County Planning Area mapped as federal lands; however, land requested under the Proponent's ROW application is entirely under the jurisdiction of the BLM TFO. No residential, commercial, industrial, or institutional uses are located within the analysis area, so no effects on such uses would result from the project.

Alternative 2 is consistent with the policies, goals, objectives, and land use descriptions set forth in the Nye County Comprehensive Plan and the BLM Tonopah Resource Management Plan.

Indirect Effects

No indirect effects to land use or access are likely to occur with operation of the proposed project.

4.9.4.2 Operation

Direct Effects

Any direct effects to land use would occur during construction activities as identified above, so no additional direct effects to land use are likely to occur during operation or maintenance of the facility.

Indirect Effects

No indirect effects to land use or access are likely to occur with operation of the proposed project.

4.9.5 TL and Anaconda-Moly Substation Corridor

4.9.5.1 Construction

Direct Effects

Impacts to land use and access from the construction of the TL and substation are summarized in this subsection. The TL and substation are consistent with the policies, goals, objectives, and land use descriptions set forth in the BLM's Tonopah Resource Management Plan.

Unlike other components of the project, the proposed TL and substation are within an existing utility corridor and, therefore, would have no long-term direct impacts on potential uses of BLM-administered land. The new TL would be designed and constructed in accordance with current design standards to ensure no interference with the function and safety of the existing line. Table 4-1 summarizes the amount of permanent land disturbance that would be associated with construction of the TL.

The TL and substation would have no direct effects to the authorized and pending BLM rights-of-way identified in Table 3-21 and presented in Figure 3-11.

The TL would have negligible direct effects on the grazing allotment by reducing the grazing potential through the loss of a very small amount of forage production potential. This impact is further summarized in Section 4.14 and Table 4-26.

The proposed TL would have no direct effects on the restrictions on off-highway vehicles and recreation uses established in the area, which are summarized in Section 4.15.

As with the other portions of the project, the TL and substation are within the U.S. Department of Defense Airspace Consultation Area, but fall below the height limitation (200 feet) within which consultation is required. Therefore, no impacts to airspace are likely to occur from the TL.

The proposed TL is within the boundary of the Nye County Planning Area mapped as federal lands; however, land requested under the Proponent's ROW application is entirely under the jurisdiction of the BLM TFO. No residential, commercial, industrial, or institutional uses are located within the analysis area, so no effects on such uses would result from the project.

The TL and substation are consistent with the policies, goals, objectives, and land use descriptions set forth in the Nye County Comprehensive Plan and the BLM's Tonopah Resource Management Plan.

Indirect Effects

No indirect impacts of the construction of the TL and substation are likely to occur regarding land use and access.

4.9.5.2 Operation

Direct Effects

No direct effects on land use or access as a result of operation of the TL are likely to occur.

Indirect Effects

No indirect effects on land use or access as a result of operation of the TL are likely to occur.

4.9.6 Borrow Pit

Direct Effects

Impacts to land use and access from the construction of the borrow pit are summarized in this subsection. The borrow pit is consistent with the policies, goals, objectives, and land use descriptions set forth in the BLM Tonopah Resource Management Plan.

Unlike the other components of the project, the borrow pit would have short-term, but not long-term, direct impacts on potential uses of BLM-administered land within the analysis area. The borrow pit would be in use only during construction of the proposed project, and then would be recontoured and revegetated, making it available for other future uses. Approximately 40 acres of land would be removed from short-term potential public use, and then be released sometime in the future (see Table 4-1).

The borrow pit would have no direct effects on the authorized and pending BLM rights-of-way adjacent to the project that are identified in Table 3-21 and presented in Figure 3-11.

The borrow pit would have negligible direct effects on the grazing allotment by reducing the grazing potential through the loss of only 40 acres of forage production potential. This impact is further summarized in Section 4.14 and Table 4-26.

Construction and operation of the borrow pit would have no direct effects on transportation along the existing SH 68, which passes through the area proposed for the borrow pit. Some impacts on traffic may result because of the construction and hauling vehicles that would use this road to move materials to the construction site. These impacts would cease upon completion of the construction of the generation facility and the TL.

The proposed borrow pit is within the boundary of the Nye County Planning Area mapped as federal lands; however, land requested under the Proponent's ROW application is entirely under the jurisdiction of the BLM TFO. No residential, commercial, industrial, or institutional uses are located within the analysis area, so no effects on such uses would result from the project.

The borrow pit is consistent with the policies, goals, objectives, and land use descriptions set forth in the Nye County Comprehensive Plan and the BLM's Tonopah Resource Management Plan.

Indirect Effects

No indirect impacts on land use or access are likely to occur from the proposed borrow pit.

4.9.7 No Action Alternative

With the No Action Alternative, no project-related impacts to land use or access would occur. The No Action Alternative is consistent with the policies, goals, objectives, and land use descriptions set forth in the Nye County Comprehensive Plan and the BLM's Tonopah Resource Management Plan.

4.9.8 Summary of Impacts

Potential impacts on land use and access from the proposed project and its various components are relatively limited. The proposed project and the associated alternatives would not create hazards to air traffic according to determinations reached by the FAA. Alternative 1 would encroach on a ROW avoidance area for recreation (SRMA) and a no surface occupancy area for mining, both associated with the Crescent Dunes. Existing rights-of-way, mining claims, and other leases have been identified near or within the proposed project, but none of these have been identified as potentially conflicting with the project.

4.9.9 Mitigation

No mitigation has been identified as being needed to address impacts on land use or access.

4.10 Soils

4.10.1 Methods

The detailed study areas for soils at the Crescent Dunes Solar Energy Project (the proposed project) are the individual project areas associated with the Proposed Area (encompassing the Proposed Action), Alternative Area (a single area that encompasses Alternatives 1 and 2), TL and substation corridor, and the borrow pit (Figure 3-1). Soils were identified and mapped for the detailed study areas as stipulated by the data adequacy standards. The CESA for soils at the project consists of the area within a 5-mile

radius of the project areas and proposed facilities (Figure 3-4). Identification and mapping of soils for the CESA was not stipulated by the data adequacy standards and was not performed.

The primary source of information for soils was the U.S. Department of Agriculture (USDA) NRCS online Web Soil Survey, which was accessed to obtain the soils data presented in this document (NRCS 2009). The specific soil survey represented by the data obtained through the Web Soil Survey is the survey of the Big Smoky Valley Area, Nevada, Part of Nye County. Information related to the principal soil orders and dominant suborders as provided by the BLM in the Data Adequacy Standards is also used.

As used in this section of the EIS, the term "soil" refers to the naturally weathered geologic sediments existing in layers or horizons of minerals and/or organic constituents of variable thickness, which differ from the geologic parent material (rock) in their morphological, physical, chemical, and mineralogical properties as well as their biological characteristics.

NRCS identifies and delineates soils into units with the objective of separating the landscape into segments with similar use and management requirements. Soils within the detailed study areas were described based on ten factors stipulated by the Data Adequacy Standards, including soil series name, texture, permeability, pH, available water capacity, hydrologic group, wind and water erosion hazard, landscape position, depth to bedrock, and suitability as topsoil for reclamation. This information is presented separately for each detailed study area in Section 3.9.

For the purpose of this EIS, project construction, operation, and maintenance activities could have direct and indirect impacts (effects) to soils if:

- on-site erosion increases
- on-site erosion results in downstream sedimentation
- increased soil compaction occurs
- there is a decrease in the potential or increase in the time period for revegetation or reclamation

Construction, operation, and maintenance activities could result in these direct and indirect impacts through the following ground-disturbing activities:

- excavation, blading, and/or grading for construction of project structures, buildings, and infrastructure
- construction of new roads and improvement of existing access roads
- temporary stockpiling of soil or construction materials and side-casting of soil and vegetation
- use of designated equipment staging areas
- soil compaction and dust
- equipment access through non-sensitive stream channels (defined as streams that do not support sensitive species, critical habitat, or woody riparian vegetation)

4.10.2 Proposed Action

4.10.2.1 Construction

Direct Effects

Erosion

Construction of the project would result in surface disturbances and removal of vegetation leading to increased on-site soil erosion potential. On-site soil loss could increase if disturbed soils were left exposed during periods of high precipitation, runoff, and winds.

Compaction

Soils with high clay content and saturated by storm events or by overwatering during dust control are susceptible to compaction by vehicles and construction equipment. Compacted soils can resist or delay reestablishment of vegetation and success in reclamation objectives.

Indirect Effects

Erosion

Construction of the project could result in surface disturbances and removal of vegetation, leading to increased on-site soil erosion. Sedimentation into ephemeral washes located downstream within the CESA, or beyond, could increase if disturbed soils were left exposed during periods of high precipitation and runoff. Off-site deposition of on-site soil eroded by wind could increase within the CESA, or beyond, if disturbed soils were left exposed.

Diminished Reclamation/Revegetation

Loss of topsoil through construction activity or construction-induced erosion, or over-compaction of topsoil from construction activity, can delay or reduce reclamation success following decommissioning. These conditions, alone or in concert, could make it difficult for native plant species to reestablish. The loss of topsoil can make plant establishment more difficult because of unfavorable nutrient level, water capacity, or permeability characteristics of surface soil remaining after topsoil loss. Over-compaction of soil can resist seed movement into the soil profile, seed germination, and subsequent seedling growth through the soil, and movement of water and nutrients into the root zone. These indirect effects are not expected to occur off-site within the CESA or beyond.

4.10.2.2 Operation

Direct Effects

Erosion

Operation of the project is not expected to result in increased on-site soil erosion.

Compaction

Operation of the project is not expected to increase soil compaction or resist or delay reestablishment of vegetation or success in reclamation objectives.

Indirect Effects

Erosion

Operation of the project is not expected to result in sedimentation into streams and water bodies located hydraulically downstream or off-site deposition of on-site soil eroded by wind.

Diminished Reclamation/Revegetation

Operation of the project is not expected to resist or delay reestablishment of vegetation or success in reclamation objectives.

4.10.3 Alternative 1

4.10.3.1 Construction

Direct Effects

Direct effects of construction of Alternative 1 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects

Indirect effects of construction of Alternative 1 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.3.2 Operation

Direct Effects

Direct effects of operation of Alternative 1 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects

Indirect effects of operation of Alternative 1 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.4 Alternative 2

4.10.4.1 Construction

Direct Effects

Direct effects of construction of Alternative 2 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects

Indirect effects of construction of Alternative2 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.4.2 Operation

Direct Effects

Direct effects of operation of Alternative 2 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects
Indirect effects of operation of Alternative 2 are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.5 TL and Anaconda-Moly Substation Corridor

4.10.5.1 Construction

Direct Effects
Direct effects of construction of the TL and Anaconda-Moly substation corridor are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects
Indirect effects of construction of the TL and Anaconda-Moly substation corridor are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.5.2 Operation

Direct Effects
Direct effects of operation of the TL and Anaconda-Moly substation corridor are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects
Indirect effects of operation of the TL and Anaconda-Moly substation corridor are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.6 Borrow Pit

Direct Effects
Direct effects of construction of the borrow pit are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

Indirect Effects
Indirect effects of construction of the borrow pit are anticipated to be similar to those described for the Proposed Action because the soils in the areas and the proposed activities are similar.

4.10.7 No Action Alternative

Under the No Action Alternative, impacts to existing soils resources associated with this project would not occur. Soils impacts could occur in other areas if planning efforts pursue other transmission and/or generation projects to meet the projected energy shortfalls.

4.10.8 Summary of Impacts

The potential for direct, indirect, and cumulative impacts associated with construction of the project exist. Impacts may include increased erosion, increased soil compaction, and diminished potential for revegetation. Direct, indirect, and cumulative impacts associated with operation of the project are not expected.

4.10.9 Mitigation

Mitigation of potential direct, indirect, and cumulative impacts are discussed separately below for each potential impact identified.

Erosion

The objectives of erosion mitigation are to reduce short-term erosion and sedimentation, as well as quickly restore topography and vegetation to preconstruction conditions in all areas required and approved by BLM. Measures to be implemented by the project Proponent during project construction and reclamation are listed below.

Implementation of the following measures and practices would minimize the effects of grading, excavation, and other surface disturbances in all project areas. Schedules and specifications on the use of these features would be included in the Construction, Operation, and Maintenance Plan (COM Plan).

- Confine all vehicular and equipment traffic associated with construction to the construction footprint, material yards, and access roads designated in the COM plan.
- Limit soils and vegetation disturbance and removal to the minimum areas necessary for access and construction.
- Where vegetation removal is necessary, use cutting/mowing methods instead of blading, wherever possible.
- Adhere to a construction methodology that mitigates impacts in sensitive areas during severe weather events.
- Prior to work on the project, inform all construction personnel of environmental concerns, pertinent laws and regulations, and elements of the erosion control plan.
- Minimize grading to the greatest extent possible. Where required, grading should be conducted away from drainages and watercourses to reduce the risk of material entering these features.
- Graded material should be sloped and bermed to reduce surface water flows across the graded area.
- Replace excavated materials and minimize the time between excavation and backfilling.
- Direct dewatering operations to stable surfaces to avoid soil erosion.

- Use detention basins, certified weed-free straw bales or wattles, or silt fences where appropriate to reduce soil loss from erosion.
- Use drainage control structures including culverts, ditches, water bars (berms and cross ditches), and sediment traps, as necessary, to direct surface drainage away from disturbed areas and minimize runoff and sedimentation down-slope from all disturbed areas.
- Implement other appropriate BMPs to minimize erosion-related impacts during site preparation and construction, and subsequent reclamation.
- Reestablish native vegetation and, if necessary, non-persistent, non-invasive, non-native vegetation in highly erodible areas as soon as possible following construction.

In areas of highly erodible soils, construction equipment and techniques that minimize surface disturbance, soil compaction, and loss of topsoil would be used, such as vehicles with low ground pressure tires. Erosion control measures, in accordance with the Soil Conservation and Erosion Control Plan, would be installed prior to construction in potential soil erosion areas. Erodible slopes that do not require grading should be cleared using equipment that results in little to no soil disturbance.

Compaction

Construction, operation, and maintenance activities would be restricted when the soil is too wet to support construction or maintenance equipment (i.e., when heavy equipment creates ruts in excess of 4 inches deep over a distance of 100 feet or more in wet or saturated soils). If soil is too wet, one or more of the following measures would apply:

- Where feasible, route all construction or maintenance activities to avoid wet areas as long as the route does not enter sensitive resource areas.
- If wet areas cannot be avoided, implement BMPs for use in these areas during construction and improvement of access roads, and during subsequent reclamation. Appropriate BMPs include use of wide-track or balloon-tire vehicles and equipment, or other approved weight dispersing systems, geotextile cushions, pre-fabricated equipment pads, and other materials to minimize damage to soil. If BMPs cannot be successfully applied, construction or routine maintenance activities would not be allowed in these areas until the project conditions improve and construction activity can proceed without damage to soils.
- Limit construction equipment access to the minimum amount feasible, remove and separate topsoil in wet or saturated areas, and stabilize subsurface soils with a combination of one or more of the following: grading to dewater problem areas, use of weight dispersion mats, and erosion control measures such as surface rilling and back-dragging. Following construction, regrade and recontour the area, replace topsoil, and reseed to achieve preconstruction native plant densities.

Diminished Reclamation/Revegetation

Vegetation removal and soil disturbances (including temporary road improvements) would be minimized. Where vegetation removal is required, mowing or cutting methods would be used to the greatest extent possible. Topsoil removed during clear and grub activity and grading and excavation required for construction would be collected and stockpiled on-site. Stockpiles would be protected from

wind and water erosion through establishment of native vegetation and temporary or permanent erosion control BMPs including weed-free straw bales or wattles for the duration of facility construction, operation, and decommission. Following decommission, the stockpiled topsoil would be replaced across the site where topsoil was previously removed to provide a proper soil substrate for seeding or planting and enhance reestablishment of native vegetation to preconstruction conditions.

4.11 Social and Economics

4.11.1 Methods

Implementation of any of the action alternatives would have direct and indirect effects on local and regional social and economic conditions. These would be the result of temporary (during construction) and permanent (during operations) activities. No differences are anticipated in the effects on these resources from the different action alternatives. As such, the following sections will not differentiate between the action alternatives but, rather, will present all potential effects of any action alternative, as well as the effects of the No Action Alternative, cumulative impacts, and proposed mitigation.

The work force will remain the same for any of the alternatives, the TL, substation, and borrow pit, and it is concluded that the socioeconomic factors would not change with each of these actions. Therefore, the results of the Proposed Action remain the same for each of the other action alternatives.

4.11.2 Proposed Action

4.11.2.1 Construction

Direct Effects

Social Conditions

The following subsections contain an analysis of impacts on the local and regional social conditions, specifically population and housing, during construction.

Population

During the anticipated 30-month construction phase, an average of 250 construction personnel would be on site, with a peak of 400–500 personnel. Where possible, construction workers would be hired from the local and regional workforce. Table 4-19 illustrates the forecast construction industry work force in the county and the state.

Table 4-19. County and state construction industry work force

Area	2008 Workforce	2010 Workforce Forecast
Nye County, Nevada	1,571	Not available
Esmeralda County, Nevada	24	Not available
Nevada	116,500	85,895

Source: Nevada Department of Employment, Training, and Rehabilitation: Nevada Workforce Informer 2010

If communities of 25,000 or more residents are located within 60–70 miles of the construction site, a substantial number of construction workers can be hired within the region (EPRI 1982). The closest communities to the project area are shown in Table 4-20, along with the community population and approximate travel distance to the project area.

Table 4-20. Communities, population, and travel distance from project site

Community	Population	Travel Distance
Tonopah, Nevada	2,580	13
Goldfield, Nevada	441	40
Silver Peak, Nevada	141	68
Round Mountain, Nevada	837	70
Pahrump, Nevada	38,247	180
Ely, Nevada	4,291	181
Las Vegas, Nevada	591,422	224
Reno, Nevada	218,143	251
Carson City, Nevada	56,506	250

Source: Nevada State Demographer's Office, 2009 Estimates by County

With limited opportunities to hire a construction work force in the immediate project area, a substantial temporary work force is anticipated. At the peak of construction, the local population could increase by 20 percent or more.

Housing

Of the housing units in the project area, approximately one-third are rental properties (City-data.com 2010). With a projected vacancy rate of 29 percent to 49 percent, it is anticipated that there would be approximately 150 rental properties available for temporary workers. Eight hotels/motels are present in Tonopah and one in Goldfield. Based on the available information, guest rooms are available at these facilities. Accommodations are also available at recreational vehicle facilities, mobile home parks, and campgrounds.

Public Services

Law Enforcement

During construction, security would be provided by on-site personnel and, as needed, the Nye County Sheriff's Department. The on-site guards would be tasked with controlling entering and exiting of vehicles and personnel. During off hours, the guards would perform fire and security watch.

Fire and Emergency Medical Services

As a backup to the on-site services, the Tonopah Fire and Emergency Medical Services has 14 emergency medical technicians and 3 ambulances, which are backed up by a volunteer hazardous materials team from Tonopah and Round Mountain. The Nye Regional Medical Center (Tonopah) is equipped to provide immediate medical care and has emergency medical flight services to emergency care units in Las Vegas and Reno.

Utilities

Water required for construction and operation of the facility would be acquired from a new groundwater well on the project site. No additional water would be required.

Temporary sanitary facilities would be provided at the site, including portable toilets in the construction area. A temporary septic system would be installed during the construction phase and would be abandoned upon completion of construction.

Schools

Families relocating during construction would reside in existing housing within the communities surrounding the project site. The Nye County School District has an established schooling program that would accommodate the relocating families.

Economic Conditions and Fiscal Resources

Total expenditures for construction, including materials, supplies, and equipment, of any of the action alternatives is anticipated to be between $700 million and $800 million over the 30-month construction period. Typically, 250 personnel would be employed, with up to 500 personnel during peak construction periods. Similar to personal income, the gross state product for Nevada would experience an increase of up to $160 million per year directly or indirectly as a result of construction (Nevada State Demographer's Office 2008).

Indirect Effects

For each construction-related job created by a 100-megawatt solar energy facility, there can be up to two additional indirect or induced jobs created during the construction phase. With up to 500 jobs on-site during peak construction, up to 1,000 indirect or induced jobs would be created. This would result in an influx of approximately $140 million of personal income in Nevada per year of construction.

4.11.2.2 Operation

Direct Effects

Social Conditions

The following subsections contain an analysis of impacts on the local and regional social conditions, specifically population and housing, during operations.

Population

As part of the operations, the project Proponent anticipates employing 30 to 40 full-time employees. This staff would include engineering and administrative staff, skilled workers, and operators. The facility would be operated up to 7 days a week and 24 hours per day. While some of this staff may be hired locally, it is anticipated that many of them would relocate to the area from the region or nationally. This would result in a potential 2 percent increase in the local population.

Housing

The project area is experiencing a residential vacancy rate of 29 to 49 percent. It is assumed any need for permanent housing for operations staff would be accommodated within the existing market. No additional housing would be required.

Public Services

Law Enforcement

During operations, security would be provided by on-site personnel and, as needed, by Nye County Sheriff's Department. The on-site guards would be tasked with controlling entering and exiting of vehicles and personnel. During off hours, the guards would perform fire and security watch.

Utilities

All water needs at the project site would be accommodated through the use of a new groundwater well installed for construction. No additional water sources would be required.

Schools

Families relocating during construction would reside in existing housing within the communities surrounding the project site. The Nye County School District has an established schooling program, which would accommodate the relocating families.

Economic Conditions and Fiscal Resources

Throughout the life of the proposed action facility, it is anticipated that up to 50 employees would be required to operate and maintain the site. Similar to personal income, the gross state product for Nevada would experience an increase of up to $22.7 million per year directly or indirectly as a result of operations (Nevada State Demographer's Office 2008).

Indirect Effects

For each job directly created by the operation and maintenance of the facility, there would be up to 3 additional indirect or induced jobs created. This would result in an influx of approximately $30 million of personal income in Nevada per year of operation.

4.11.3 No Action Alternative

Under the No Action Alternative, the previously described action alternative impacts would not occur. However, the land would remain available for use consistent with the existing BLM land use plan, including potential other renewable energy projects. Both state and federal law support the increased use of renewable power generation because such renewable projects would likely be developed on other sites in the region.

The temporary and permanent impacts associated with identification of an action alternative would not occur, including the need for temporary housing, the increase in personal income, and the increase in the Nevada gross state product.

4.11.4 Summary of Impacts

The following subsections summarize the anticipated construction and operation of the project as related to socioeconomic impacts.

4.11.4.1 Construction

- While some construction work force is available locally, the majority would relocate to the surrounding communities temporarily. This could increase the local population by 20 percent or more during the peak of construction, resulting in the need for temporary work force housing.
- Through direct, indirect, and induced impacts during the peak of construction, approximately 1,500 jobs would be created, $140 million of personal income would be added to the State of Nevada annually, and $160 million would be added to the gross state product annually.

4.11.4.2 Operation and Maintenance

- While some operations and maintenance work force is available locally, the majority would relocate to the surrounding communities. This could increase the local population by 2 percent or more. However, enough existing residential properties exist to accommodate the relocating workforce.
- Through direct, indirect, and induced impacts during operations and maintenance of the facility, approximately 200 jobs would be created, $30 million of personal income would be added to the State of Nevada annually, and $22.7 million would be added to the gross state product annually.

4.11.5 Mitigation

Following are the proposed mitigation measures for the socioeconomic impacts associated with the construction and operations/maintenance phases of the proposed project:

- In coordination with the Tonopah Town Board, develop a housing and rental plan to coordinate available rental property in and around Tonopah.
- If available rental properties do not meet needs, work with the Town Board to develop a temporary trailer park for relocating work force members in town or at the site.

4.12 Visual Resources

4.12.1 Methods

The visual resource analysis discussed in this section followed the BLM VRM system as an objective methodology to assess the aesthetic conditions of the landscape, characterize the current viewing environment, and evaluate the potential effects of the proposed project on the environment. The analysis included an evaluation of existing visual conditions and an impact analysis that considered viewer sensitivity and visual contrast. Where BLM VRM guidelines do not apply (e.g., non-BLM-administered lands), an inventory of aesthetic conditions was conducted using BLM visual resource inventory guidelines to determine public sensitivity toward the introduction of the proposed facilities.

Viewer Sensitivity

The viewer sensitivity analysis determined the classes of viewers or viewer groups that would experience the visual landscape. That is, viewer sensitivity establishes what the visual response is to the introduction of the proposed project in the viewshed.

Viewer sensitivity is influenced by existing topography, vegetation, and urban development or structures. Views of the proposed project typically would diminish with distance, topographic or landform interference, overgrown vegetation, and other structural impediments.

Viewer sensitivity was established by evaluating the types of viewers and their proximity to the proposed project. Viewer sensitivity is ranked from high to low, with "high" being the most sensitive viewing condition (Table 4-21). The viewer sensitivity analysis also considered the frequency, duration, and type of viewing conditions. Additionally, viewer sensitivity is affected by viewer activity, awareness, perception, and visual expectations.

Table 4-21. Sensitivity ratings for viewer types

Viewer Sensitivity Rating	Viewer Type
High	Residents within viewing proximity to project
Medium	Recreationists within viewing proximity to project
Low	Motorists and non-recreational travelers along roadway

Visual Contrast

Visual contrast is the measure of the degree of perceived change that would occur in the landscape attributable to potential effects from the proposed project (e.g., construction, use, and maintenance). BLM's visual contrast rating system was used to determine visual effects and identify measures to mitigate these effects. The contrast rating form was completed at all KOPs that represent important views (HDR 2010).

Visual Simulations

To indicate the probable visual effects of the proposed action alternatives, computer-aided simulations were prepared. These simulations not only represent effects at KOPs, but also broadly represent typical views in the project area. These simulations removed elements of the existing conditions and added the features of the proposed build alternatives. The purpose of the simulations was to provide a comparison of visual changes. Not all potential views were reproduced or simulated. Visual simulations were performed based on the determination of sensitivity from these KOPs. The visual simulations provided a general depiction of the scale and significance of the solar facility as it would likely appear from the selected KOPs.

Visual Impact Evaluation

The visual impact evaluation determined the degree of change and the viewer response to change after the proposed facility is introduced into the environment. All of the previously listed criteria helped to determine the level of impact including exposure, viewer sensitivity, simulations, and visual contrast ratings. Additionally, other factors helped determine the level of impact for each proposed action

alternative including the cultural significance and the local values. A visual resource specialist used all these factors to assign each proposed action alternative a visual impact level. Visual impact levels, definitions, and examples are presented in Table 4-22.

Effects from the proposed project were considered for both phases of the project, construction and operation. Building on the baseline of environmental conditions, the visual contrast rating system and viewer sensitivity analysis were applied to each proposed action alternative.

Table 4-22. Visual impact levels defined

Impact Level	General Definition	Definition Specific to Visual Resources	Examples
Major	Effects that potentially would cause significant change or stress to an environmental resource or use, or severe adverse or exceptional beneficial effects	Visual contrasts resulting from construction disturbances and the presence of new facilities that would substantially alter the scenic value of the landscape and would dominate views from sensitive viewpoints	• Structures that significantly impede and obstruct scenic views, such as impeding a view from a scenic turnout or observation point • Construction that would irrevocably damage scenic quality • Facilities that would be seen in the foreground to middleground distance zones in previously undisturbed, highly scenic landscapes
Moderate	Effects that potentially would cause some change or stress to an environmental resource or use, or readily apparent effects to scenic quality	Visual contrasts that would diminish the scenic quality of the landscape and would easily be noticeable from sensitive viewpoints	• Vertical structures that may detract from existing scenic quality • Facilities would be visible in the foreground to middleground distance zones from sensitive viewpoints • Facilities parallel to highly scenic landscape that have not been previously disturbed
Minor	Effects that are potentially detectable but slight	Visual contrasts that diminish the scenic quality of the landscape to a minimal degree and are potentially noticeable when viewed from moderately sensitive viewpoints	• Facilities would be visible in middleground or background distance zones from moderate sensitivity viewpoints, or parallel to existing facilities in a previously disturbed landscape, or landscapes of common scenic quality
Negligible	Effects that potentially cause an insignificant or indiscernible change or stress to an environmental resource or use, effects range from immeasurable and undetectable to low levels of detection	Visual contrasts that would not diminish the scenic quality of the landscape	• Temporarily displacing vegetation while maintenance and/or construction occurs • Facilities would be visible in the background distance zone, where new facilities parallel existing facilities or traverse previously disturbed landscape in landscapes of common to minimal scenic quality
None	No discernable or measureable effects would result	No discernable or measureable visual contrast	• No project activity would take place

Distance Zones

To establish the impacts of the proposed project on the visual environment, the following distance zones (Table 4-23) were used to describe perception thresholds, the scale and nature of the objects being viewed, and the viewing environment. The perception of the landscape character, including form, line, texture, and color, is among other complex phenomena, largely a function of changing distance

from a viewing point. Landscape elements tend to become less obvious and less detailed at greater distances. Perception of texture and color become less noticeable with increased distance.

Table 4-23. Distance zones (from BLM 1986a)

Distance Zone	Distance (in miles)	Summary of Definition
Foreground/Middleground	0 to 5	These areas can be seen from each travel route for a distance of 3 to 5 miles where management activities may be viewed in detail.
Background	6 to 15	These areas can be seen from each travel route to approximately 15 miles. To be included within this distance zone, vegetation should be visible at least as patterns of light and dark.
Seldom Seen	Beyond 15	These areas are beyond the background zones.

Source: BLM Manual H-8410-1. Visual Resource Inventory. 1986.

4.12.2 Proposed Action

The landscape in the Proposed Area is generally characterized by flat desert with low-lying desert scrub vegetation bounded by high-relief fault-block mountains in the seldom seen distance zone (over 15 miles away). Landscape in the region appears desolate, that is, devoid of any major cultural modification aside from a paved two-lane rural highway and a power line corridor (oriented northeast and southwest) that bisects the landscape approximately 3 miles north of the Proposed Area. The colors within the landscape are limited to bands of earth tone browns and tans with few other distinguishing colors, creating a relatively homogenous appearance.

The most distinctive natural feature in the area is the Crescent Dunes SRMA. The Crescent Dunes are relatively unique because they are smooth, undulating sand dunes that are visible from over 5 miles away.

The closest residences to the Proposed Area are approximately 10 miles away to the south. The residential area is on the outskirts of Tonopah, located off of Radar Road. Most of the residences in this area are single-family detached homes. Approximately 10 houses (located at a slightly higher elevation) currently have views of the Crescent Dunes in the distance and, as such, would have views of the Proposed Area. Views from this area may be slightly obstructed by vegetation, topography, and distance.

The Proposed Area is located immediately adjacent to Pole Line Road, which is a paved two-lane highway. This road provides access to residences and farmland and the existing Anaconda-Moly substation from US 95. Pole Line Road has a very low level of daily traffic.

Given the special recreation designation of the Crescent Dunes, the area supports some recreational activity, although no signs indicating recreational areas are apparent. The Crescent Dunes and the surrounding landscape are used by off-highway vehicle recreationists, as evidenced by an extensive network of four-wheel-drive trails and staging areas located sporadically throughout the area.

4.12.2.1 Construction

Direct Effects

Visual effects resulting from the construction of the proposed facility are considered short-term and would include the implementation of mitigation measures (e.g., dust abatement, phased construction) intended to minimize effects to the aesthetic environment. During construction, large equipment, vehicles, and materials would be present and visible on the project site. Given that there are no other construction activities within the viewshed, the visual effects of construction are likely to be moderate for recreationists (with a medium sensitivity rating) and moderate for travelers (with a low sensitivity rating) traveling along Pole Line Road.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.2.2 Operation

Visual simulations were prepared for the Proposed Action at each of the six KOPs. Given the height of the central receiver tower and the distance from the project site, the project may be highly visible from KOP 1 and KOP 4; moderately visible from KOP 3; and barely visible from KOP 2, KOP 5, and KOP 6. Therefore, the visual contrast rating, viewer sensitivity analysis, and visual impact analysis are included for only KOP 1, KOP 3, and KOP 4.

KOP 1

Visual Simulation from Crescent Dunes (KOP 1) to the Proposed Action.

KOP 1 is located on the Crescent Dunes just northeast of the Proposed Action. This KOP was chosen to represent views that recreationists would see while using the dunes. From this location, the view is to the southwest and looks out over the wide-open valley floor in the foreground and middleground. Low shrubs and grasses sparsely cover the valley floor. The Monte Cristo Mountain Range forms a rugged horizon line in the background.

In relation to the surrounding landforms, the Proposed Action would result in a moderate contrast in form, line, color, and texture. The tower would be a new structure in the surrounding flat landscape, introducing a strong vertical line. The central receiver tower would be approximately 1.5 miles from this KOP. At this distance, the tower and surrounding heliostat field would be clearly visible from the dunes. Additionally, the Proposed Action would result in a moderate contrast of texture because the solar

panels would create a repetitive texture on the landscape that would be moderately different from the texture of the surrounding landforms. Additionally, at this distance, the tower may appear white, and the reflective properties of the heliostats may appear to have a water-like effect on the surrounding landscape.

The primary type of viewer in this area is the off-highway vehicle recreationist. Typically, off-highway vehicle users are considered to have moderate viewer sensitivity because their primary objective is not to view scenic vistas. They often travel at speeds that are not conducive to viewing the landscape. However, because this area is undeveloped, recreationists who frequent this area may enjoy the sense of isolation from the modern world. For this reason, recreationists in the Crescent Dunes SRMA may be more sensitive to changes in the landscape.

Based on visual contrast, viewer sensitivity, and the KOP distance from the proposed project, the overall visual impact rating for the Crescent Dunes SRMA is considered major. This level of change is consistent with development of a VRM Class IV landscape, which allows “for major modifications to the existing characteristic of the landscapes” (BLM 1986).

KOP 3

Visual Simulation from the Anaconda-Moly Substation Access Road (KOP 3) to the Proposed Action.

KOP 3 is located at the junction of Pole Line Road and the Anaconda-Moly substation access road, approximately 5.6 miles from the Proposed Action. This KOP was chosen to represent the view that travelers would have while driving along the Anaconda-Moly mine access road. From this location, the project is visible to the southeast and looks over the wide-open valley floor in the foreground and middleground. The San Antonio Mountains are visible in the background. The Proposed Action would introduce a weak visual contrast for form, line, color, and texture into the viewshed because the central receiver tower and surrounding heliostats would barely be discernable from this distance. Viewers in this area would likely be commuters. Typically, commuters have a low sensitivity rating because they are traveling at high speeds and tend to be focused on the road rather than the surrounding landscape. The overall visual impact rating associated with the proposed action is moderate because of the lack of sensitive viewers in the area and the distance from the proposed facility.

KOP 4

Visual Simulation from Pole Line Road (KOP 4) to the Proposed Action.

KOP 4 is located at the junction of Pole Line Road and the Crescent Dunes access road, approximately 1.8 miles from the central tower of the Proposed Action. This KOP was chosen to represent the view that travelers would have while driving along Pole Line Road. From this location, the view is to the east and looks over the valley. The Crescent Dunes are visible in the foreground and the San Antonio Mountains are visible in the middleground. The Proposed Action would introduce a moderate visual contrast for form, line, color, and texture because the facilities would be dominant in the foreground. Viewers in this area would likely be commuters traveling to work or home. Typically, these viewers would be considered low sensitivity viewers because they pass through the area frequently, traveling at high speeds, and tend to be focused on the road and not on the surrounding landscape. Based on the scenic quality of the area, viewer sensitivity, and the visual contrast evaluation, the visual impact rating is considered moderate.

4.12.2.2.1 Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.3 Alternative 1

4.12.3.1 Construction

Direct Effects

Visual effects resulting from the construction of Alternative 1 would be the same as those presented for the Proposed Action.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.3.2 Operation

Visual effects for Alternative 1 would be similar as those for the Proposed Action. Visual simulations for KOP 1, KOP 3, and KOP 4 are provided on subsequent pages.

KOP 1

Visual Simulation from the Crescent Dunes (KOP 1) to Alternative 1.

KOP 1 is located on the Crescent Dunes just southeast of Alternative 1. The visual contrast rating, viewer sensitivity analysis, distance from the KOP, and the visual impact analysis are the similar to those associated with the Proposed Action.

KOP 3

Visual Simulation from the Anaconda-Moly Substation Access Road (KOP 3) to Alternative 1.

KOP 3 is located approximately 3.8 miles from Alternative 1. Although the Alternative 1 is slightly closer to this KOP (approximately 1.8 miles closer), the visual contrast rating, viewer sensitivity analysis, distance from the KOP, and the visual impact analysis are similar to those associated with the Proposed Action.

KOP 4

Visual Simulation from Pole Line Road (KOP 4) to Alternative 1.

KOP 4 is located approximately 1.7 miles southwest of the Proposed Action. The visual contrast rating, viewer sensitivity, and visual contrast evaluation are the same as those associated with the Proposed Action.

Indirect Effects

No indirect effects to visual resources are likely to occur.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.4 Alternative 2

4.12.4.1 Construction

Direct Effects

Visual effects resulting from construction of Alternative 2 would be similar to those presented for the Proposed Action.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.4.2 Operation

Visual effects for Alternative 2 would be similar to those associated with the Proposed Action. Visual simulations for KOP 1, KOP 3, and KOP 4 are provided below.

KOP 1

Visual Simulation from the Crescent Dunes (KOP1) to Alternative 2.

KOP 1 is located on the Crescent Dunes approximately 1.8 southeast of Alternative 2. The visual contrast rating, viewer sensitivity analysis, distance from the KOP, and visual impact analysis would be the same as those associated with the Proposed Action.

KOP 3

Visual Simulation from the Anaconda-Moly Substation Access Road (KOP 3) to Alternative 2.

KOP 3 is located approximately 2.9 miles from Alternative 2. Although Alternative 2 would be slightly closer to this KOP (approximately 2 miles closer), the viewer contrast rating, viewer sensitivity analysis, and overall visual impact analysis would be similar to those associated with the Proposed Action.

KOP 4

Visual Simulation from Pole Line Road (KOP 4) to Alternative 2.

KOP 4 is located approximately 1.6 miles from Alternative 2. The visual contrast rating, viewer sensitivity, and the visual impact analysis would be the same as those associated with the Proposed Action.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.5 TL and Anaconda-Moly Substation Corridor

The proposed TL and substation would connect the existing Anaconda-Moly substation to the proposed power block location at the project site. The majority of the proposed TL would follow the existing Miller's to Anaconda-Moly TL corridor, oriented northeast to southwest. The TL corridor would run perpendicular to Pole Line Road in the vicinity of the proposed project site, then would parallel the road before connecting with the proposed power block.

The landscape in the area of the TL corridor is flat desert valley, bounded by high-relief, fault-block mountains in the seldom seen distance zone (beyond 15 miles).

Views of the proposed TL would be evident from Pole Line Road but would likely be indiscernible from other areas.

Recreationists (with a medium viewer sensitivity rating) using the Crescent Dunes SRMA would likely be able to see the proposed TL from the Crescent Dunes, resulting in a moderate effect.

4.12.5.1 Construction

Direct Effects

The construction of the TL facilities is considered a short-term visual effect. During construction, large equipment, vehicles, and materials would be present and visible on the project site and within the TL corridor.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.5.2 Operation

Direct Effects

TL facilities would be used to connect the proposed substation to the existing Anaconda-Moly substation. This TL corridor would primarily be constructed within the existing Miller's to Anaconda-Moly TL corridor, with connections to the proposed substation and solar field diverging from the existing corridor. The proposed 230 kV TL poles would be constructed on "H"-frame wooden structures, which span approximately 500 feet apart.

KOP 2 is located at the Anaconda-Moly substation, approximately 8.1 miles north of the project area. This KOP was chosen to represent views from travelers on the Anaconda-Moly substation access road. From this location, the view is to the southeast and looks out over the wide-open valley floor in the foreground and middleground. The San Antonio Mountains are visible in the background. The proposed solar facility would be barely discernible because of the distance; however, this view represents the visual impacts of the transmission line. The new transmission line would result in a moderate contrast in form, line, and texture by introducing new vertical and horizontal lines into the surrounding landscape. Viewers in this area would likely be traveling to the existing substation. Typically, commuters have a low sensitivity rating because of constant motion and high traveling speeds. As a result, commuters tend to focus on the road and not the surrounding scenery. The visual contrast in this area is considered minor because while the TLs would be evident, they would not be a dominant feature in the viewshed because they would be among many TLs in the existing corridor. Based on the scenic quality, visual contrast rating, and viewer sensitivity in the area, the overall visual impact rating associated with the TL is minor because of the lack of sensitive viewers in the area and the existing TLs already present within the corridor.

Indirect Effects

No indirect effects to visual resources are likely to occur.

4.12.6 Borrow Pit

The borrow pit area is an existing industrial use area located outside of the viewshed. None to very few sensitive viewers are likely to see this area.

4.12.6.1 Construction

Direct Effects

No effects on visual resources are likely to occur.

Indirect Effects

No effects on visual resources are likely to occur.

4.12.6.2 Operation

Direct Effects

No effects on visual resources are likely to occur.

Indirect Effects

No effects on visual resources are likely to occur.

4.12.7 No Action Alternative

The No Action Alternative would result in no change to the visual landscape.

4.12.8 Summary of Effects

The proposed solar energy generating facility would have an estimated footprint of 1,628–1,673 acres, which would house the solar field, administration buildings, evaporation pond, generation transmission tie line, substation, and ancillary facilities. The solar field would have approximately 17,500 heliostats, or solar reflector panels, that would stand approximately 25 feet in height. The heliostats would be arranged asymmetrically in an array oriented within a 4,300-foot-diameter circle. The power block, located in the center of the solar field, would have a diameter of approximately 800 feet and would house storage tanks, a steam turbine, an air-cooled condenser, transformers, heat exchanges, buildings, and the central receiver tower, which would stand at approximately 633 feet in height and would be the tallest (most visible) element of the project.

Additionally, linear facilities would include the overhead TLs and access roads. The proposed TLs would run about 6 miles due north of the solar field and would be placed in the existing TL corridor when possible. The outgoing TL would follow Pole Line Road and head north to the Miller's to Anaconda-Moly TL and parallel the existing corridor to the Anaconda-Moly substation to interconnect with the electrical grid. For most of the distance between the project site and Anaconda-Moly substation, the TL would be placed within existing ROW. The proposed power line poles are approximately 80 feet tall and would be cor-ten steel 230 kV single-circuit monopoles.

Roads would be built to provide access to the project site from Pole Line Road. Major access roads to the project will be surfaced with asphalt and will have a width of 24-feet wide within 80-foot ROW. Traffic on these roads will occur predominantly during construction. There will also be unpaved perimeter roads constructed and located to provide access from the power block to the east and south edges of the solar field and around the perimeter of the solar field.

Table 4-24 summarizes visual effects of introducing the aforementioned project components into the existing environment from selected KOPs within the visual resources study area.

Table 4-24. Visual effects summary for KOPs for each proposed action alternative

KOPs/Action Alternative	Viewer Sensitivity	Construction Effects	Operation Effects
Proposed Action			
KOP 1	Recreationists – medium/high	Moderate	Major
KOP 3	Travelers – low	Moderate	Moderate
KOP 4	Travelers – low	Moderate	Moderate
Alternative 1			
KOP 1	Recreationists – medium/high	Moderate	Major
KOP 3	Travelers – low	Moderate	Moderate
KOP 4	Travelers – low	Moderate	Moderate
Alternative 2			
KOP 1	Recreationists – medium/high	Moderate	Major
KOP 3	Travelers – low	Moderate	Moderate
KOP 4	Travelers – low	Moderate	Moderate

4.12.9 Mitigation

The project location would be integrated with the surrounding landscape to avoid conflict with significant aesthetic conditions. Mitigation measures would include color treating the buildings, the backs of the solar panels, and the central receiving tower to a BLM-approved color that blends into the surrounding landscape. Subsequent to construction, restoration efforts would be made in areas that were temporarily disturbed.

Given the importance of maintaining dark sky conditions, conscious efforts would be made to protect the current dark skies from light pollution. The FAA requires lighting on any temporary or permanent structure that exceeds an overall height of 200 feet above ground level. In order to maintain dark sky conditions and minimize visual disturbance, it is recommended that the central receiver tower be illuminated with white lighting during daytime hours and red strobe lights during the night. Additionally, perimeter lighting, including lighting used to illuminate walkways, roadways, equipment yards, and parking lots, would be shielded so that light would be cast in a downward direction. Low-pressure sodium lighting would be used to reduce or eliminate detrimental lighting impacts and prevent unnecessary light pollution.

The TL poles would be constructed of wooden "H"-frame poles, which tend to blend into the landscape with distance. Given the flat, expansive nature of the landscape, the poles would provide less structural contrast as they blend into the horizon and skyline. The appearance of the poles would be similar to the existing wood power line poles present in the corridor.

4.13 Hazardous Materials

4.13.1 Methods

A variety of chemicals and hazardous substances would be stored and used during construction and operation of the project. The storage, handling, and use of all chemicals would be conducted in accordance with applicable laws, ordinances, and regulations. The analysis in this section included a review of the Proponent's Plan of Development (Tonopah Solar Energy 2009), which lists the expected hazardous materials that would be stored and used during construction and operation of the proposed facility.

As discussed in Chapter 2, the proposed project alternatives would be designed to meet all applicable standards to reduce the risk of an accidental release, operated in a manner that complies with safety standards and practices, and maintained to provide a safe workplace for personnel and to prevent significant adverse off-site impacts.

Construction and operation would involve the use of the latest industrial technology and design standards and would adhere to regulatory health and safety codes and guidelines. Training, operating, inspection, and maintenance procedures that would minimize the risk and severity of potential upset conditions would be implemented.

4.13.2 Proposed Action

4.13.2.1 Construction

During construction, several hazardous materials would be used, including diesel fuel, gasoline, oil, lubricants, welding gases, solvents, and paints. During the startup, the solar facility would require the use of large amounts of nitrate salt ($NaNO_3$, CAS 7631-99-4; and KNO_3, CAS 7757-79-1) at the site. The salt would be melted once during construction of the project and would be used throughout the project life at temperatures between 550°F and 1050°F.

Flammable materials, such as paint and solvents, would be stored in approved flammable material cabinets. Any welding gases would be stored in approved metal cylinders. A temporary 10,000-gallon aboveground storage tank would be used to supply diesel fuel during construction of the facility. The tank would be located in the temporary lay down area and would be double walled or located within a containment area in accordance with applicable regulations.

The salt would be delivered in 1-ton "super sacks," which can be stored on-site until melted for use in the plant process. The salt must be heated until fluid for use in the system, and would be stored within the lay down area of the site until it is heated, liquefied, and sent to the storage tanks. The solid salt

would be heated to liquid form using propane gas. It is not anticipated that the salt would have to be refilled during operation of the plant because it would be stored in a fully closed system.

A hazardous materials and waste management plan would be implemented prior to construction of the proposed project that would instruct workers on the applicable procedures on hazardous materials storage and waste disposal. A SWPPP would be in place before construction detailing the BMPs for managing any stormwater runoff.

Direct Effects

The potential for hazardous material spills would increase during the construction phase of the project; however, by implementing the plans listed in Section 4.13.9, the direct effects of construction of the proposed project would be minimal.

Indirect Effects

If proper cleanup of any hazardous material spills in the construction phase were not implemented, the potential for soil contamination to remain and the potential to migrate with stormwater runoff from the construction area would exist. By implementing the plans and control measures listed in Section 4.13.9, the indirect effects of the project would be minimal.

4.13.2.2 Operation

Hazardous materials would be used and stored at the facility during operation and maintenance; a list of the materials expected to be used during operation is presented in Table 4-25.

Table 4-25. Hazardous materials that would be used during project operation

Material	Chemical Abstract Service Number (CAS No.)	Use	Hazardous Characteristics	Estimated Quantity On Site
Carbon dioxide (gas)	124-38-9	Generator purging	Asphyxiant, compressed gas	25,000 scf
Carbon dioxide (liquid)	124-38-9	Fire suppression	Asphyxiant, compressed liquid, cryogen	25,000 lb
Diesel fuel (no. 2)	68476-34-6	Fuel for emergency generator, fire water pump, and diesel storage for vehicle use	Toxic, combustible	11,500 gal
Ferric chloride solution	7705-08-0	Possible use for water pretreatment	Toxic	3,000 gal
Hydrogen	1333-74-0	Generator cooling	Toxic, flammable, explosive	24,000 scf
Hydrated lime	1305-62-0	Possible use for water pretreatment	Toxic, corrosive	2,000 cf
Lubricating oil	Various	Mechanical equipment lubrication	Toxic, combustible	25,000 gal
Mineral oil	Various	Transformer oil	Toxic, combustible	100,000 gal
Nitrogen	7727-37-9	Blanketing	Asphyxiant, compressed gas	400 lb
Sodium carbonate	497-19-8	Water pretreatment	Toxic	2,000 cf
Sulfur hexafluoride	TBD	Contained in switchgear devices	Toxic	200 lb
Sodium hydroxide (50% by weight)	1310-73-2	Possible water demineralizer media regeneration	Toxic, corrosive	3,000 gal
Sulfuric acid (29% by weight)	7664-93-9	Batteries	Toxic, corrosive	2,000 gal
Sulfuric acid (93% by weight)	7664-93-9	RO feed pH control, possibly water demineralizer media regeneration	Toxic, corrosive	5,000 gal

The project would produce maintenance and plant wastes typical of a power generation plant. These wastes would be managed in accordance with a waste management plan. Wastes may include oily rags, broken and rusted metal and machine parts, defective or broken solar mirrors and electrical materials, empty containers, and other miscellaneous solid wastes including the typical refuse generated by workers. These materials would be collected by a local waste disposal company and disposed at a landfill permitted to receive these wastes. Waste collection and disposal would be in accordance with applicable regulatory requirements to minimize health and safety effects, prevent leaks and spills, and prevent potential contact with stormwater.

Several methods would be used to properly manage and dispose of hazardous wastes generated by the project. Waste lubricating oil would be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters would be disposed of in a Class I landfill. Workers would be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes would consist of alkaline and acid cleaning solutions used during pre-operational chemical cleaning of heat exchangers after the units are put into service. These wastes,

which can contain elevated metal concentrations, would be temporarily stored on-site in portable tanks, and would be disposed of off-site by a chemical cleaning contractor in accordance with applicable regulatory requirements.

Industrial wastewater would consist of a relatively small amount of blowdown from the steam system and reverse osmosis treatment return flow. This wastewater would be disposed in evaporation ponds at the site. The ponds would be designed to hold the accumulated sludge/precipitated solids for the 33-year operational life of the facility. Pond cleanout is, therefore, not proposed as a regular part of maintenance activities; however, cleanout could be required to support unscheduled maintenance, repairs, or contingency responses. The general requirements for undertaking cleanout works for evaporation ponds are outlined below.

Before water could be pumped out of the pond for maintenance, the capacity of the other evaporation ponds would be assessed to verify that sufficient capacity exists to contain wastewater from continued operation for a sufficient amount of time to allow planned maintenance activities. Design estimates indicate that if one pond is undergoing cleanout activities, the additional two ponds could operate effectively for up to 1 year.

A manually placed pumping system would be used to transfer the water into an adjacent evaporation pond. Because the bases of the ponds would not be covered with a hard liner/protective layer, care must be taken with pump placement to avoid damaging the pond liners or transfer piping. During pond drainage, the flow rates from the pumps would be monitored to ensure that the outflow would not negatively affect the receiving evaporation pond.

Dust generated during the activities would be controlled through moisture conditioning, if needed. Wastewater would not be used as a dust suppression agent. Work would be conducted pursuant to the TSE site health and safety program and under a job-specific safety analysis.

Sludge removal activities would be conducted on an as-needed basis. The sludge would be removed by a pumping or vacuum system if fluid, or should be dried and removed using light excavation and loading equipment light enough to not damage the liner system. Ramps constructed of granular material at least 1 foot thick may be placed to serve as a working platform for equipment access, if necessary. The sludge would be sampled and analyzed to meet the characterization requirements of the receiving disposal facility because this would determine the transportation and disposal methodology.

A technical document would be submitted to NDEP to permit evaporation ponds for industrial wastewater disposal at the site. The document would include waste characterization, impoundment design, leak collection and detection, construction and operating parameters for the ponds, and closure requirements.

Direct Effects

Once the project were constructed, all hazardous materials would be stored in accordance with applicable regulations as listed in Section 3.13, and managed in accordance with the plans listed in Section 4.13.9. Operation of the facility would increase the risk of accidental spills; however, through

implementation of the mitigation measures and proper housekeeping at the facility, no direct effects are likely to occur.

Indirect Effects

By implementing the required mitigation measures and plans, any potential for long-term effects are not likely to occur; therefore, no indirect effects are likely to occur from the operation and maintenance of the facility.

4.13.3 Alternative 1

The construction and operation of Alternative 1 would be the same as for the Proposed Action; therefore, Alternative 1 would have the same direct and indirect effects as the Proposed Action.

4.13.4 Alternative 2

The construction and operation of Alternative 2 would be the same as for the Proposed Action; therefore, Alternative 1 would have the same direct and indirect effects as the Proposed Action.

4.13.5 TL and Anaconda-Moly Substation Corridor

Construction of the TL would require that hazardous materials be transported and used along the 7- to 9-mile-long TL route. The main hazardous material during construction of the TL would be diesel and gasoline fuel for the construction trucks. The fuel would be stored in the trucks, and refueling would take place from the 10,000-gallon tank located at the temporary lay down area as described in Section 4.13.2.1.

Applicable plans would be implemented to minimize and clean any spills during the construction phase, as described in Section 4.13.9.

4.13.5.1 Construction

Direct Effects

The potential for minor spills, mainly vehicle and equipment fuel, would be present throughout the construction of the TL and substation; however, by implementation of the mitigation measures and proper housekeeping during the construction phase no direct effects are likely to occur.

Indirect Effects

By implementing the required mitigation measures and plans, any potential for long-term effects are not likely to occur; therefore, no indirect effects are likely to occur from construction of the TL and substation.

4.13.5.2 Operation

Once constructed, the TL would require only periodic inspections, which would be accomplished by a service vehicle using the adjacent maintenance road. No hazardous materials would be used for the periodic inspections, except vehicle fuel stored in the gas tank.

Direct Effects

Because of to the minimal amount of hazardous materials required during operation of the TL, no direct effects are likely to occur from construction of the TL.

Indirect Effects

No indirect effects are likely to occur during construction of the TL.

4.13.6 Borrow Pit

The borrow pit would be used only during parts of the construction phase, and would mainly require that diesel fuel and gasoline be available at the site for the construction vehicles and aggregate equipment. The fuel would be stored in accordance with applicable regulations, and the plans described in Section 4.13.9 would be implemented during operation of the pit.

The following subsections summarize the impacts of construction and operation of the borrow pit together because the borrow pit would be open only until the completion of construction of the generation facility.

Direct Effects

The potential for minor spills, mainly vehicle and equipment fuel, would be present throughout the operation of the borrow pit. However, through implementation of the mitigation measures and proper housekeeping during the construction phase, no direct effects are likely to occur.

Indirect Effects

By implementing the required mitigation measures and plans, any potential for long-term effects are not likely to occur; therefore, no Indirect effects are likely to occur from use of the borrow pit.

4.13.7 No Action Alternative

Under the No Action Alternative, no project-related impacts from hazardous materials would occur.

4.13.8 Summary of Impacts

- An increase of accidental hazardous material spills may occur.
- Larger spills may leek into the proposed facility's groundwater well, affecting groundwater.

4.13.9 Mitigation

During facility construction, various hazardous materials and one regulated substance would be stored on-site. Construction service personnel would follow general industry health, safety, and environmental BMPs for filling and servicing construction equipment and vehicles. The BMPs are designed to reduce the potential for incidents involving hazardous materials. They include the following:

- Refueling and maintenance of vehicles and equipment would occur only in designated areas that are either bermed or covered with concrete, asphalt, or other impervious surfaces to control potential spills. Employees would be present during refueling activities.

- Vehicle and equipment service and maintenance would be conducted only by authorized personnel.
- Refueling would be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans would be placed under equipment to catch potential spills during servicing.
- All disconnected hoses would be placed in containers to collect residual fuel from the hoses.
- Vehicle engines would be shut down during refueling.
- No smoking, open flames, or welding would be allowed in refueling or service areas.
- Refueling would be performed away from bodies of water to prevent contamination of water in the event of a leak or spill.
- When refueling is completed, the service truck would leave the project site.
- Service trucks would be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil would be put in containers and disposed of as appropriate. All containers used to store hazardous materials would be inspected at least once per week for signs of leaking or failure. All maintenance and refueling areas would be inspected monthly. Results of inspections would be recorded in a logbook that would be kept on-site.

In the unlikely event of a spill, the spill may need to be reported to the appropriate regulatory agencies and cleanup of contaminated soil could be required. Small spills would be contained and cleaned up immediately by trained, on-site personnel. Larger spills would be reported by emergency phone numbers to obtain help from off-site containment and cleanup crews. All personnel working on the project during the construction phase would be trained in handling hazardous materials and the dangers associated with hazardous materials. An on-site health and safety person would be designated to implement health and safety measures. If there is a large spill from a service or refueling truck, contaminated soil would be placed into barrels or trucks by service personnel for off-site disposal at an appropriate facility in accordance with the law. If a spill involves hazardous materials quantities equal to or greater than the specific Reportable Quantity (42 gallons for petroleum products), all federal, state, and local reporting requirements would be followed. In the event of a fire or injury, the local fire department would be called.

In addition to these BMPs to address accidental hazardous materials releases, a construction site security plan would be prepared to address hazardous materials security and would include the following elements:

- descriptions of the site perimeter fencing and access security
- evacuation procedures
- a protocol for contacting law enforcement in the event of conduct endangering the facility, its employees, its contractors, or the public
- a site access protocol for contractors and vendors, including applicable personnel background checks consistent with state and federal law regarding security and privacy
- a protocol for hazardous materials vendors to prepare and implement security plans in accordance with 49 CFR 172.800 and to ensure that all hazardous materials drivers are in

compliance with personnel background security checks in accordance with 49 CFR Part 172, Subpart I

- a protocol for ensuring the security of nitrate salts in accordance with DHS measures to protect listed Chemicals of Interest (risk: theft) in accordance with 6 CFR Part 27

During facility operation, various hazardous materials and one regulated substance would be stored on-site as shown in Table 4-25. MSDS for the chemicals likely to occur on-site during operation of the proposed project can be found in the Plan of Development (Tonopah Solar Energy 2009).

During operation of the facility, all hazardous materials would be handled and stored in accordance with applicable codes and regulations specified in Section 3.13. Some general measures that would be implemented include:

- provision of an automatic sprinkler system for indoor hazardous material storage areas
- provision of an exhaust system for indoor hazardous material storage areas
- separation of incompatible materials by isolating them from each other with a noncombustible partition
- spill control in all storage, handling, and dispensing areas
- separate secondary containment for each chemical storage system; secondary containment is required to hold the entire contents of the tank plus the volume of water for the fire suppression system that could be used for fire protection for a period of 20 minutes in the event of a catastrophic spill

The above mitigation measures will be outlined in the following plans:

Health and Safety Requirements – To comply with regulations set forth by OSHA and the Nevada Division of Industrial Relations, health and safety programs would be established for construction and operations at the site that would document potential hazards and requirements for establishing and maintaining a safe working environment during construction and operation. The programs would include identification of all hazardous substances and chemicals used at the site, including MSDS, a communication and training program, labeling, and identification of hazards and safe work practices. In addition, safety showers and eyewashes would be provided adjacent to, or in the vicinity of, chemical storage and use areas. Plant personnel would use approved personal protective equipment during chemical spill containment and cleanup activities. Personnel would be properly trained in the handling of these chemicals and instructed in the procedures to follow in case of a chemical spill or accidental release. Adequate supplies of absorbent material would be stored on-site for spill cleanup.

Construction and Operating SWPPPs – The project would comply with the requirements of the NPDES through preparation and implementation of a SWPPP and filing of an NOI to comply with the General Construction and General Industrial Stormwater NPDES permit. The plans would include procedures to be followed during construction to prevent erosion and sedimentation, non-stormwater discharges, and contact between stormwater and potentially polluting substances.

Hazardous Materials Management Plans (HMMPs) – HMMPs would be filed with Nye County for the construction and operation of the facility. The plans would inventory the hazardous materials and waste properties, quantities, storage containers and locations, and contingency planning and emergency response procedures.

SPCC Plans – SPCC Plans would be prepared for construction and operation of the site. The plans would include spill prevention and countermeasures procedures to be implemented, including (but not limited to) a spill record (if applicable), analysis of potential spills, description of containment facilities, fill and overfill prevention facilities, spill response procedures, personnel training, and spill prevention. In addition, all spills would be reported to the BLM Hazardous Materials Coordinator.

4.14 Range Resources

4.14.1 Methods

The environmental consequences of the proposed project on range resources were evaluated by reviewing the proposed activities associated with the project components and evaluating each of the range resources individually. The primary evaluation focused on the extent to which livestock grazing would be affected either because of the loss of forage production relative to the grazing allotment or by altering the grazing management within the allotment.

Project construction and operation activities would affect range resources (livestock grazing) if they:

- result in loss of forage such that it would adversely affect livestock operations and dramatically reduce the number of AUMs available
- substantially disrupt livestock movement and migration routes for wild horses
- substantially increase human disturbance/harassment to wild horses, burros, or livestock
- substantially conflict with the use of existing livestock grazing areas and HMAs for wild horses

Actual impacts to acreages of the allotment and forage production, and the resulting AUMs, would depend on the alternative selected and the final designs of the project. However, to address the potential for the loss of AUMs, BLM notified the permittee that the authorized grazing could be reduced to approximately 434,875 acres and 13,270 AUMs (a reduction of about 1.7 percent) because the permittee had requested a much larger area in the original ROW application. This number will be adjusted when the final alternative is selected and the ROW granted. The impacts of each of the alternatives are evaluated based on the acreage of impacts presented in Table 4-1 at the beginning of this chapter.

4.14.2 Proposed Action

4.14.2.1 Construction

The following section describes impacts to range resources that would occur as a result of constructing the Proposed Action.

Direct Effects

Construction of the generation facility under the Proposed Action would result in the long-term loss of approximately 1,500 acres of forage production and livestock grazing area, which amounts to 46 AUMs. This area would be within the security fence, inaccessible to cattle, and nearly all of the area would be disturbed for the construction of the heliostats and other facilities. The reduction in potential cattle production because of the loss of the AUMs from the generation facility is approximately 0.4 percent of the current authorized grazing level (reduction from 13,505 AUM to 13,453 AUM).

The proposed project would result in increased vehicle traffic on the existing SH 69 from US 95 to the proposed project site, with the greatest increase occurring during the construction period. Increased traffic on these roads may result in a minimal increase in the potential death or injury of cattle caused by vehicle collisions. The occurrence of these impacts is expected to be infrequent because of the low density of cattle in this large allotment and the speed limits currently established on these roads.

In cases where projects are proposed near water sources, or crossing traditional movement paths between grazing areas and water sources, substantial impacts to grazing and grazing management can occur. However, for this project, no natural or constructed water sources are known to occur in the vicinity of the Proposed Area. For these reasons, no impacts to water sources or associated movement patterns are expected.

Indirect Effects

Indirect effects on range resources from construction of the Proposed Action are likely to be limited to the areas adjacent to the construction area and would result from increased presence of humans and noise during construction, which may cause livestock to leave the vicinity of the construction areas. No impacts are likely to occur to water sources in the region; therefore, no reductions in water availability would occur. No additional potential indirect effects have been identified.

4.14.2.2 Operation

Direct Effects

Operation of the power generation facility is expected to have few direct effects on range resources other than the continued loss of forage production and grazing opportunities that are associated with construction of the facility.

Indirect Effects

Indirect effects of operations of the facility on range resources would continue to be the increased human presence in the area and the potential that livestock would avoid the area adjacent to the project area.

4.14.3 Alternative 1

4.14.3.1 Construction

Direct Effects

The direct effects of construction of Alternative 1 would be similar to the effects described for the Proposed Action. The total acreage removed as a result of construction of the facility would be 1,504 acres, and the grazing potential would be reduced by 46 AUMs. The reduction in potential cattle production attributable to the loss of the AUMs from the generation facility is approximately 0.4 percent of the current authorized grazing level (reduction from 13,505 AUM to 13,453 AUM).

Indirect Effects

The indirect effects of construction of Alternative 1 would be similar to the effects described for the Proposed Action.

4.14.3.2 Operation

Direct Effects

The direct effects of operation of Alternative 1 would be similar to the effects described for the Proposed Action.

Indirect Effects

The indirect effects of operation of Alternative 1 would be similar to the effects described for the Proposed Action.

4.14.4 Alternative 2

4.14.4.1 Construction

Direct Effects

The direct effects of construction of Alternative 2 facility be similar to the effects described for the Proposed Action. The total acreage removed as a result of construction of the facility would be 1,501 acres, and the grazing potential would be reduced by 46 AUMs. The reduction in potential cattle production attributable to the loss of the AUMs from the generation facility is approximately 0.4 percent of the current authorized grazing level (reduction from 13,505 AUM to 13,455 AUM).

Indirect Effects

The indirect effects of construction of Alternative 2 would be similar to the effects described for the Proposed Action.

4.14.4.2 Operation

Direct Effects

The direct effects of operation of Alternative 2 would be similar to the effects described for the Proposed Action.

Indirect Effects

The indirect effects of operation of Alternative 2 would be similar to the effects described for the Proposed Action.

4.14.5 TL and Anaconda-Moly Substation Corridor

This section describes the potential effects associated with the TL and substation that would be constructed if any of the three action alternatives are selected.

4.14.5.1 Construction

Direct Effects

Construction of the TL towers and the associated access pullouts from the existing power line road would result in between 127 and 173 acres of new disturbance and loss of forage production, which amounts to between 4 and 5 AUMs. The range of impacts associated with construction of the TL is attributable to the varying distances between the generation facilities and the substation, and thus the number of towers required. In addition to the long-term disturbance of grazing areas with the construction of the access spurs, some construction activities may result in only temporary disturbance of the vegetation. The type of disturbance would vary in nature, with some temporary disturbance requiring removal of vegetation and leveling of the ground surface, and others requiring only crushing or cutting of the vegetation. Temporary disturbance associated with the facility is expected to result in between 127 and 173 acres of disturbance, such as crushed or cut vegetation that would be able to recover after construction is complete. This disturbance would result in a temporary reduction in forage production for between 4 and 5 AUMs.

In cases where projects are proposed near water sources, or crossing traditional movement paths between grazing areas and water sources, substantial impacts to grazing and grazing management can occur. However, for this project, the TL does not appear to cross known movement paths nor is it near any water resources. The TL would not be fenced during construction; therefore, cattle movement would not be restricted.

No range improvements such as fences, gates, or cattle guards are present within the project area. Therefore, no impacts to range improvements are likely to result from the construction of the TL or substation.

The construction of the new TL and expanded substation would result in increased vehicle traffic along Pole Line Road, resulting in a potential increase in death or injury of cattle caused by vehicle collisions. The occurrence of these impacts is expected to be infrequent because of the low density of cattle in this large allotment and the low vehicle speeds associated with construction.

Indirect Effects

No indirect effects of the construction of the new TL are likely to occur on range resources.

4.14.5.2 Operation

Direct Effects

Operation of the TL may include occasional monitoring and maintenance of the transmission towers, which would include vehicle traffic on the existing access road. Vehicle traffic could result in death or injury of cattle resulting from collisions, but such accidents are unlikely because of the speed limits on the roads.

Indirect Effects

Operation of the TL and the substation is not anticipated to have indirect effects on range resources.

4.14.6 Borrow Pit

4.14.6.1 Construction

Direct Effects

Expansion of the borrow pit is anticipated to require approximately 40 acres of previously undisturbed area may be removed from forage production. The loss of this amount of area would equate to 1 AUM within the allotment. However, the subsequent reclamation of the area makes this impact temporary in nature. Expansion of the borrow pit would be conducted in accordance with BLM guidelines currently in place for the existing facility to prevent cattle from entering the facility and potentially being killed or injured. No other direct effects on range resources are anticipated.

Indirect Effects

No indirect effects on range resources are anticipated from construction of the borrow pit.

4.14.6.2 Operation

Direct Effects

No direct effects on range resources as a result of operation of the borrow pit are anticipated.

Indirect Effects

No indirect effects on range resources as a result of operation of the borrow pit are anticipated.

4.14.7 No Action Alternative

Under the No Action Alternative, impacts to range resources associated with this project would not occur.

4.14.8 Summary of Impacts

As stated in the previous sections, the primary effect on range resources resulting from implementation the Proposed Action or the other action alternatives would be the loss of forage production and the associated reduction in grazing. Table 4-26 presents the estimates of acreage to be lost to the construction of the Proposed Action and each alternative, as well as the estimated AUMs that would be lost. In each case, the number of AUMs is small relative to the current preference of 13,505 AUMs.

Table 4-26. Grazing acreage and AUM reductions attributable to project components and alternatives

Project Component/Alternative	Long-term Impact		Temporary Impact	
	Acreage	AUMs	Acreage	AUMs
Proposed Project Area				
Generation facility	1,500	46	52	2
Transmission line and substation	173	5	173	5
Borrow pit		0	40	1
Total	**1,673**	**52**	**265**	**3**
New Authorized Totals	**440,882**	**13,453**	**—**	**—**
Alternative 1				
Generation facility	1,504	46	52	2
Transmission line and substation	136	4	136	4
Borrow pit		0	40	1
Total	**1,640**	**50**	**228**	**7**
New Authorized Totals	**440,918**	**13,455**	**—**	**—**
Alternative 2				
Generation facility	1,501	46	52	2
Transmission line and substation	127	4	127	4
Borrow pit		0	40	1
Total	**1,628**	**50**	**219**	**7**
New Authorized Totals	**440,927**	**13,484**	**—**	**—**

Note: AUM = animal unit month

4.14.9 Mitigation

The project would be designed to minimize impacts where possible, and construction measures would be taken to reduce long-term impacts during construction of the facility and the TLs, such as blading only areas that are needed for long-term access. Mitigation of these impacts would include recontouring and revegetating the area after removal and decommissioning of the facility at the end of the lease period. Goals of the revegetation plan are to return the site to a condition of production of comparable type and volume of forage and to a sustainable ecological condition.

Mitigation for temporary impacts would vary by the type and severity of the impact. Impacts requiring removal of vegetation would be mitigated through revegetation efforts as described in the Revegetation Plan. These efforts may include salvage and subsequent redistribution of topsoil, distribution of seeds to promote reestablishment of native plants, and control of noxious and invasive weed species. Where possible, vegetation would be crushed to allow the necessary construction access, minimizing impacts to the vegetation and the soils. In other cases, plants may be cut to allow construction access, retaining a root stock to provide a base for resprouting and more rapid plant reestablishment.

4.15 Recreation and Wilderness

4.15.1 Methods

A recreation specialist analyzed the effects of the Proposed Action, Alternative 1, Alternative 2, the TL and Anaconda-Moly substation corridor, and the borrow pit on recreation and wilderness resources. To

assess the direct effects on recreation and wilderness, GIS was used to overlay the footprints of the project components on the mapped recreation and wilderness resources within the proposed project area to identify those resources that would be directly affected by the project construction and operation (Figure 4-8).

4.15.2 Proposed Action

4.15.2.1 Construction

Direct Effects

The recreational opportunities identified in the project area are the Crescent Dunes ROW avoidance area (i.e., the SRMA), the TRAC-ON trail ride route, and Hunting Unit 173 (see Section 3.15). The Proposed Area does not encroach upon the Crescent Dunes ROW avoidance area; therefore, no effects to the ROW avoidance area are anticipated. The proposed project would affect the existing TRAC-ON trail ride route by building the facility over the existing trail. Construction of the solar facility would result in decreased scenic quality and increased traffic throughout the area, affecting recreational opportunities within the Crescent Dunes SRMA. Project construction would be visible from the Crescent Dunes SRMA, Crescent Dunes Road, and Pole Line Road (see Section 4.12). Construction of the solar facility may reduce a recreationist's sense of a remote experience.

The Proposed Action could directly affect hunting activities by removing approximately 1,500 acres of potential hunting grounds for pronghorn, mule deer, and bighorn sheep within Hunting Unit 173. However, during hunting season, pronghorn have an affinity for areas with water sources, most likely alfalfa fields (NDOW 2010c). Mule deer and bighorn sheep prefer more mountainous habitat (above 8,500 feet) (NDOW 2010a, 2010b). Because the Proposed Area is at a relatively low elevation (below 5,000 feet) and does not contain any water sources or alfalfa fields, it is unlikely that game species would utilize the project area during hunting season; therefore, no direct effects to hunting during construction activities are anticipated.

Indirect Effects

Construction of the Proposed Action would not impede access to the Crescent Dunes or optimal hunting areas (i.e., nearby mountains and water sources); therefore, no indirect effects to recreational opportunities are anticipated.

4.15.2.2 Operation

Direct Effects

As previously stated, the Proposed Action would not encroach upon the Crescent Dunes ROW avoidance area or optimal hunting areas; therefore, no direct impacts to recreational opportunities are associated with the operation of the Proposed Action. However, operation of the solar facility would result in decreased scenic quality and increased traffic throughout the area, affecting recreational opportunities within the Crescent Dunes SRMA. The project would be visible from the Crescent Dunes SRMA, Crescent Dunes Road, and Pole Line Road (see Section 4.12). The presence of the solar facility may detract from a recreationist's remote experience.

Indirect Effects

Operation of the proposed project would not impede access to the Crescent Dunes or optimal hunting areas (i.e., nearby mountains and water sources); therefore, no indirect impacts to recreational opportunities are anticipated.

4.15.3 Alternative 1

4.15.3.1 Construction

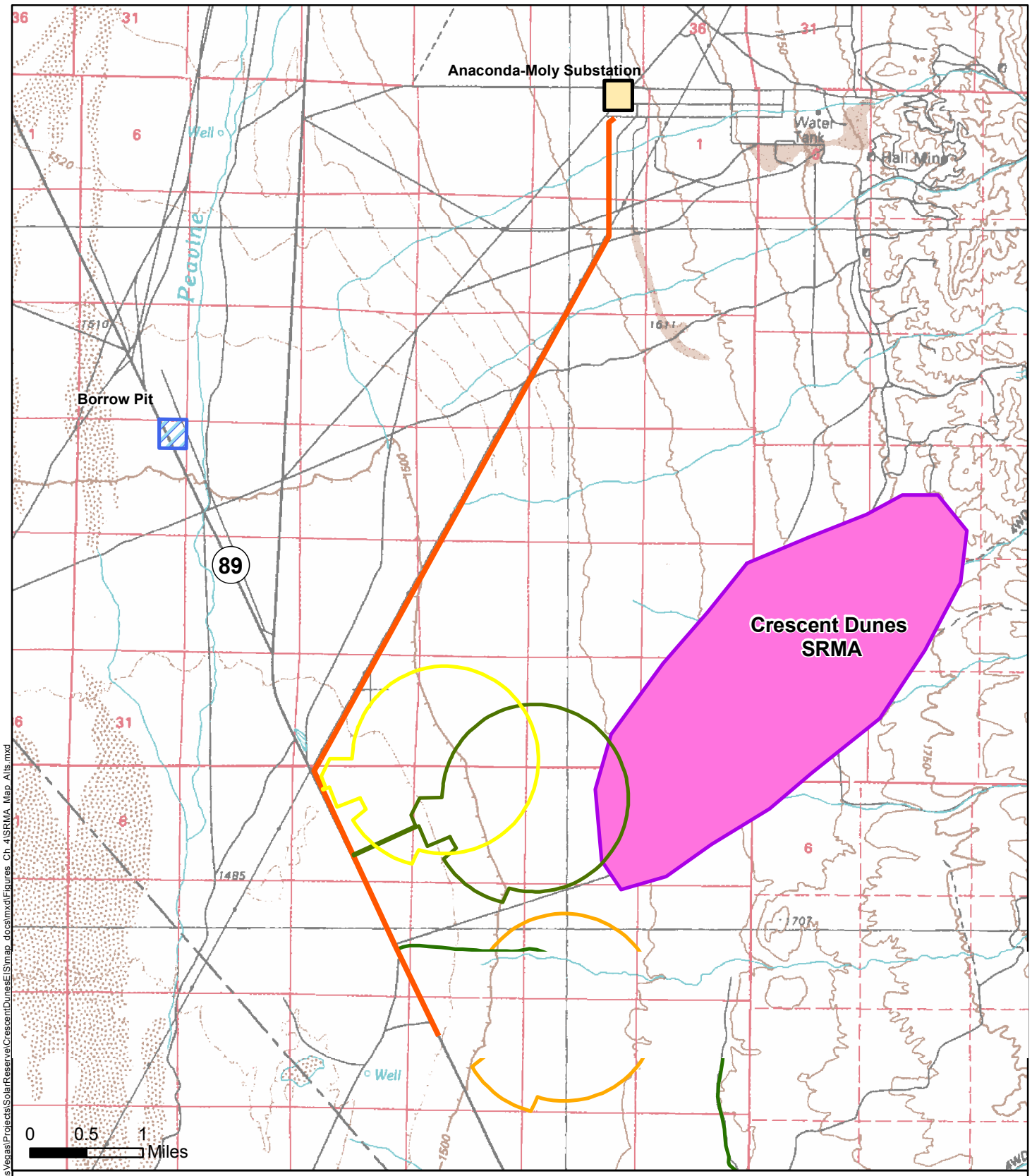
Direct Effects

Direct effects of construction of Alternative 1 would be similar to that of the Proposed Action except that construction of Alternative 1 would result in direct effects to approximately 130 acres of the Crescent Dunes ROW avoidance area (Figure 4-8). During construction, this area would fenced in, graded, and permanently converted into project facilities for the life of the project, thus restricting recreational access to that portion of the ROW avoidance area.

Similar to the Proposed Action, construction of Alternative 1 would remove approximately 1,504 acres of potential hunting grounds. However, as previously stated, this would have minimal impact on hunting activities because game animals would not likely be found in the Alternative 1 area during hunting season.

Indirect Effects

Construction of the proposed project would not impede access to the Crescent Dunes or optimal hunting areas (i.e., nearby mountains and water sources); therefore, no indirect effects to recreational opportunities are anticipated.



\Projects\LasVegas\Projects\SolarReserve\CrescentDunesEIS\map_docs\mxd\Figures_Ch_4\SRMA_Map_Alts.mxd

Figure 4-8 SRMA (rights-of-way avoidance area) and Alternatives

Crescent Dunes Solar Energy Project

Source: USGS

4.15.3.2 Operation

Direct Effects

Direct effects of operation of Alternative 1 would be similar to that of the Proposed Action except that approximately 130 acres of the Crescent Dunes ROW avoidance area and 1,504 acres of potential hunting grounds would be permanently converted into project facilities during construction; therefore, no direct impacts to recreation resources are associated with operation of the facility.

Indirect Effects

Operation of Alternative 1 would not impede access to the majority of the Crescent Dunes ROW avoidance areas (approximately 2,770 acres) or optimal hunting grounds; therefore, no indirect impacts to recreational resources are associated with operation of the facility.

4.15.4 Alternative 2

4.15.4.1 Construction

Direct Effects

Direct effects from construction of Alternative 2 would be similar to the Proposed Action in that this location would not affect the Crescent Dunes ROW avoidance areas, and construction of Alternative 2 would remove approximately 1,501 acres of potential hunting grounds in Hunting Unit 173. As previously stated, this would have minimal impact on hunting activities because game animals would not utilize the habitat in the Alternative 2 area during hunting season. Therefore, no direct effects on recreation are associated with the construction of Alternative 2.

Indirect Effects

Construction of Alternative 2 would not impede access to the Crescent Dunes or optimal hunting areas (i.e., nearby mountains and water sources); therefore, no indirect effects to recreational opportunities are anticipated.

4.15.4.2 Operation

Direct Effects

As previously stated, the project area would not encroach upon the Crescent Dune ROW avoidance area or optimal hunting areas; therefore, no direct impacts to recreational opportunities are associated with the operation of Alternative 2.

Indirect Effects

Operation of Alternative 1 would not impede access to the Crescent Dunes or optimal hunting areas (i.e., mountains and water sources); therefore, no indirect impacts to recreational opportunities are anticipated.

4.15.5 TL and Anaconda-Moly Substation Corridor

4.15.5.1 Construction

Direct Effects

Direct effects from construction of the TL and Anaconda-Moly substation would be similar to the Proposed Action in that this location would not affect the Crescent Dunes ROW avoidance areas or optimal hunting habitat; therefore, no effects to recreational resources are associated with the construction of the TL and Anaconda-Moly substation.

Indirect Effects

Construction of the TL and Anaconda-Moly substation corridor would not impede access to nearby recreational opportunities; therefore, no indirect effects to recreation are associated with construction of the TL and Anaconda-Moly substation.

4.15.5.2 Operation

Direct Effects

Direct effects from operation of the TL and Anaconda-Moly substation would be similar to the Proposed Action in that this location would not affect the Crescent Dunes ROW avoidance areas or optimal hunting habitat; therefore, no effects to recreational resources are associated with operation of the TL and Anaconda-Moly substation.

Indirect Effects

Operation of the TL and Anaconda-Moly substation corridor would not impede access to nearby recreational opportunities (i.e., Crescent Dunes or optimal hunting grounds); therefore, no indirect effects to recreation are associated with operation of the TL and Anaconda-Moly substation.

4.15.6 Borrow Pit

4.15.6.1 Construction

Direct Effects

Direct effects from construction of the borrow pit would be similar to the Proposed Action in that this location would not affect the Crescent Dunes ROW avoidance areas. Construction of the borrow pit would remove approximately 40 acres of potential hunting grounds within Hunting Units 171 and 173. As previously stated, this would have minimal impact on hunting activities because game animals would not utilize the habitat in the borrow pit area during hunting season. Therefore, no direct effects on recreation are associated with the construction of the borrow pit.

Indirect Effects

Construction of the borrow pit would not impede access to nearby recreational or wilderness opportunities; therefore, no indirect effects are associated with construction of the borrow pit.

4.15.6.2 Operation

Direct Effects

Direct effects from operation of the borrow pit would be similar to the Proposed Action in that this location would not affect the Crescent Dunes ROW avoidance areas or optimal hunting habitat; therefore, no effects to recreational resources are associated with operation of the borrow pit.

Indirect Effects

Operation of the borrow pit would not impede access to nearby recreational opportunities (i.e., Crescent Dunes or optimal hunting grounds); therefore, no indirect effects are associated with construction of the borrow pit.

4.15.7 No Action Alternative

Under the No Action Alternative, no project-related impacts to existing recreation or wilderness would occur.

4.15.8 Summary of Impacts

As stated in the previous sections, the primary effect on recreation and wilderness resources of the proposed project or the other action alternatives would be the loss approximately 1,652–1,673 acres of BLM land that is currently used for recreational activities such as hunting. Additionally, Alternative 1 would affect approximately 130 acres of the SRMA, which is currently used primarily as an off-road vehicle use area.

4.15.9 Mitigation

The TRAC-ON Trail ride route would be affected only by the Proposed Action. If the Proposed Action is selected as the BLM-preferred alternative; then the TRAC-ON Trail ride route would need to be rerouted around the project area. Two possible new routes include: rerouting the trail to the north of the project where it would intersect with the Crescent Dunes access road, or rerouting the trial to the south of the project where it would intersect with Pole Line Road.

4.16 Unavoidable Adverse Environmental Impacts

Unavoidable adverse impacts are those impacts that would occur after implementation of all committed and recommended mitigation. Unavoidable impacts do not include temporary or permanent impacts that would be mitigated by the actions of the project. They also do not include impacts from speculative events such as hazardous waste spills that are not contained and removed promptly in accordance with accepted industry standards or regulatory requirements.

The Proponent has committed to implementing mitigation measures in the project design to avoid or minimize potential impacts from construction and operation of the proposed project. However, unavoidable adverse impacts would result from the project. The proposed project would result in the unavoidable removal of vegetation, wildlife habitat, and grazing potential within the portions of the project area proposed for construction of the generation facility, borrow pit, and the TL towers.

However, these impacts would be reversed with revegetation and reclamation of the site upon decommissioning of the facility. Individuals of various wildlife species within the proposed project area that may not be able to move from the area would be killed during construction of the proposed project.

The aesthetic nature of the area would be unavoidably altered as a result of the proposed project, although efforts would be made to minimize the impact. The structures associated with the generation facility would alter the viewshed until the facility is decommissioned and removed.

If additional mitigation requirements are identified through other permitting processes, the Proponent would develop appropriate measures in consultation with the requesting agency and include these in the project design.

4.17 Irreversible and Irretrievable Commitment of Resources

This section describes the irreversible and irretrievable commitments of resources associated with construction and operation of the proposed project. A commitment of resources is irreversible when primary or secondary impacts limit the future options for a resource. The term applies primarily to the effects or use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over very long periods of time.

Irretrievable is a term that applies to the loss of production, harvest, or use of natural resources. For example, livestock forage production from an area is lost while an area is serving as a mining area. The production lost is irretrievable, but the action is not irreversible. If the use changes and the mine is reclaimed, it is possible to resume forage production. Irreversible and irretrievable impacts of the Proposed Action are summarized in Table 4-27.

Implementation of the proposed project would result in the consumption of energy as it relates to the fuel needed for construction-related activities. Large amounts of gasoline and diesel petroleum products would be required for project construction. Additionally, construction would require the manufacture of new materials, some of which would not be recyclable at the end of the lifetime of the proposed project. The raw materials and energy required for the production of these materials would also result in an irretrievable commitment of natural resources. Operation of the proposed project would not cause a substantial increase in the consumption or use of nonrenewable resources.

Construction and operation of the proposed project would require the use of a limited amount of hazardous materials such as fuel, lubricants, and cleaning solvents. All hazardous materials would be stored, handled, and used in accordance with BMPs and applicable federal, state, and local regulations, including a construction-phase SWPPP and an operational phase SWPPP. Assuming appropriate implementation of these plans and practices as recommended in the conditions of certification, potential degradation of the environment attributable to accidental spills associated with the proposed project's use of hazardous materials would not occur.

Table 4-27. Irreversible and irretrievable commitment of resources by the Proposed Action

Resource	Irreversible?	Irretrievable?	Commitments Explanation
Vegetation resources	No	Yes	Approximately 1,628–1,673 acres of land would be committed for the life of the project, but could be reclaimed upon decommissioning.
Wildlife resources	No	Yes	A total of 1,628–1,673 acres of wildlife habitat would be lost to development of the facility, but could be reclaimed upon decommissioning.
Special status species	No	Yes	Habitat and an undetermined sum of individuals
Water quality and quantity	No	Yes	Water that is removed from the aquifer and used in the operations would not be available for other uses.
Wetlands, riparian zones, and waters of the United States	No	No	No wetlands, riparian zones, or waters of the United States are present in the project area.
Hazardous materials	No	No	No irreversible or irretrievable commitment of resources or impact is anticipated. However, if a spill were to affect a sensitive resource, an irretrievable impact could occur pending the recovery of the resource.
Air quality	No	No	Emissions from the project would not deteriorate the existing air quality of the air quality management area.
Cultural resources	Yes	No	Cultural resources would be documented and mitigated
Land use and access	No	Yes	Approximately 1,628–1,673 acres would be committed to the proposed project, which would not be available for other land uses or access within that area. The area would be available for other land uses and access upon decommissioning and reclamation of the area.
Geology, minerals, paleontology	Yes	Yes	Mineral resources that are mined from the borrow pit (aggregate, sands, other construction materials) would no longer be available for future production. Impacts to paleontological resources (if present) would be irreversible.
Soils	No	No	Soils excavated from the borrow pit or the generation site would be salvaged and stockpiled for future use in reclamation.
Social, economic	No	No	No socioeconomic resources would be irreversibly or irretrievably committed to this project.
Environmental justice	No	No	No environmental justice populations would be affected by the project; therefore, no associated resources would be committed.
Noise	No	No	Noise is not considered irreversible because it would cease when construction and operation of the facility cease.
Visual resources	No	Yes	Impacts to visual resources would result from construction/operation of the facilities. Successful reclamation procedures at the end would return the visual continuity. However, because of the extended time required for the desert to recover to the point of such disturbances being unnoticeable, the commitment could be deemed irreversible.
Range resources	No	Yes	Temporary loss of 50–52 animal unit months throughout the life of the project, but reclamation of the facility after decommissioning would return the site to previous production levels.
Recreation/ wilderness	No	Yes	Approximately 1,628–1,673 acres of lands potentially used for recreation would be committed to the project, but the lands would be available upon decommissioning of the area.
Transportation/ traffic	No	No	No commitment of resources associated with transportation would occur.

4.18 Relationship between Short-Term Uses and Long-Term Productivity of the Environment

NEPA requires consideration of the relationship between short-term uses and long-term productivity of the environment (40 CFR 1502.16). This section discusses the short-term use of the local environment and the maintenance and enhancement of long-term productivity as a result of construction and operation of the proposed project.

For the purposes of this discussion, "short-term" is defined as the period from the onset of construction activities through the initiation of project operation. "Long-term" is defined as the entire operational life of the solar energy plant, which is anticipated to be 3 years of construction and 30 years or more of operation.

4.18.1 Short-Term Uses

The proposed short-term uses of the natural environment associated with the Proposed Action are the development of about 1,628–1,673 acres of land for the proposed solar power plant and ancillary facilities, the borrow pit, and TL; the consumptive use of approximately 800 AFY of groundwater over a 30-month construction period; and the direct loss of localized vegetation and wildlife resources. Short-term effects on the natural environment would result from land-clearing and construction activities. These would be related primarily to soil disturbance and air quality effects from site clearing and grading, and an increase in noise and traffic in the local area.

Short-term effects on social and economic resources would be beneficial and would include an increase in revenue for some local businesses such as construction suppliers, hotels, restaurants, gas stations, and grocery stores.

4.18.2 Long-Term Productivity of the Environment

The long-term productivity of the areas affected by the proposed project would depend on the effectiveness of the decommissioning and revegetation efforts that would be implemented in the project area. A reclamation plan would include recontouring the site after the facility is removed and redistributing topsoil prior to revegetating the site. Because of the low precipitation and relatively brief growing season in this high desert, reestablishing a fully functioning and productive ecosystem would take time. Long-term effects to resources important to Native Americans would include visual effects.

4.19 Cumulative Impacts

4.19.1 Actions Considered for Cumulative Analysis

The CEQ regulations for implementing NEPA define cumulative effects as:

> "… the impact on the environment which results from the incremental impact of the action [project] when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." (40 CFR 1508.7)

Past, present, and reasonably foreseeable future actions will be identified for the geographic and temporal scope for the resources considered in the cumulative effects analysis.

4.19.2 Regulations and Guidance

Cumulative effects may result from actions that include current and projected area development, management activities and authorizations on public land, land use trends, and applicable industrial/infrastructure components. Although the individual impacts of each separate project may not be significant, the additive effects of multiple projects could be. These past, present, and reasonably foreseeable future actions are analyzed to the extent that "they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have an additive and significant relationship to those effects."

4.19.3 Methodology for Assessing Cumulative Impacts

The principles for cumulative effects analysis identified by CEQ—*Considering Cumulative Effects under the National Environmental Policy Act* (CEQ 1997)—have gained acceptance for use. These principles are based on the premise that resources, ecosystems, and the human community each can experience effects. For each of these, there are thresholds, or levels, of stress beyond which their desired conditions degrade.

Each affected resource, ecosystem, or human community must be analyzed in terms of its capacity to accommodate additional effects, based on its own geographic and temporal parameters. Appropriate cumulative effects analyses focus on what is needed to ensure long-term productivity or sustainability of the resource.

Information about past, present, and reasonably foreseeable future activities in the CESA were gathered from BLM, Nye County, and other agencies; land use plans; and personal communications with public agency representatives.

The approach to cumulative impacts of the proposed project considers "past" projects to be those that have completed construction and are in operation. These projects are included in the environmental baseline, described in the affected environment portion of each resource area. Since the impact analysis in each resource area assesses impacts in terms of changes to existing environmental conditions, past projects are not separately addressed in the cumulative analysis. "Present" projects include those that are currently under construction or have been fully permitted such that they are likely to be part of the existing environment when the proposed project has begun construction.

"Reasonably foreseeable" future projects are those for which a formal application has been filed and substantive progress has been made to move the projects forward. The working definition of "reasonably foreseeable" projects on BLM land is based on whether or not a draft or final Plan of Development has been filed with BLM by an applicant. The projects specifically considered in the

cumulative scenario for this project include other solar power projects and mining projects proposed on public land managed by BLM.

4.19.4 Past and Present Actions

CEQ NEPA regulations and guidance on cumulative effects do not require development of a catalog of specific past actions or quantification of these actions in a cumulative effects analysis, and CEQ recognizes that this may not be practical and the information may not be available (40 CFR 1500–1508; and CEQ 2005). Therefore, description or quantification of individual past actions is typically not performed. However, past actions are considered collectively in describing the current health of each resource.

Present actions are actions that are ongoing at the time of the analysis and are described individually.

4.19.5 Reasonable Foreseeable Future Actions

Reasonably foreseeable future actions are those for which there are existing decisions, funding, formal proposals, or which are highly probable based on known opportunities or trends (BLM 2008a). When identifying reasonably foreseeable future actions for the cumulative effects analysis, reasonably foreseeable actions will include those actions within the geographic and temporal scope that meet one of more of the following criteria:

- The action is included in an adopted long-range or comprehensive plan.
- The action is included in an existing proposal, such as a submitted permit application.
- The action has a commitment of resources, such as funding.
- If the action is federal, the NEPA process has been initiated.

In addition to these criteria, BLM considered the cumulative effects area for each resource area. BLM identified the resource with the largest CESA, which is socioeconomics (50-mile radius). Even though the cumulative area for other resources is substantially smaller, BLM determined that projects within 50 miles could potentially affect socioeconomics and/or environmental justice (Table 4-28).

Sierra Geothermal Power is proposing development of a geothermal energy facility in the southernmost portion of the Big Smoky Valley, approximately 15 miles north of Silver Peak, in Esmeralda County. This project is proposed on approximately 9,660 acres of lands managed by BLM. The project is approximately 25 miles from the proposed project, but is within the southern extent of the Big Smoky groundwater subbasin.

Indeck Energy Services, LLC, has proposed development of a 20 MW solar energy project on 150 acres of lands that would be leased from Nye County at the Tonopah Airport, which is located approximately 8 miles east of the town of Tonopah. The proposed project would be located approximately 13 miles from the project site.

Iberdrola Solar has proposed development of a 30 MW photovoltaic solar energy project on approximately 200 acres of lands to be leased from Nye County at the Tonopah Airport. The airport is

approximately 8 miles east of the town of Tonopah, which is approximately 13 miles from the project site.

Nye County has proposed development of a new TL from the Tonopah Airport, east of the town of Tonopah, in Nye County. The 3-mile-long TL would connect renewable energy projects proposed at the airport and an existing line along SH 6. The project is approximately 13 miles from the proposed project site.

Midway Gold Corporation has proposed expanded exploration and future development of a mine approximately 20 miles east the project area. The project is east of the San Antone Mountains.

Tonopah Solar Energy, LLC, may consider purchasing the lands on which the project is being constructed subsequent to the ROW lease.

Tonopah Solar Energy, LLC, may consider continuing operation of the plant for an additional 20-year period, thereby extending the total project lifetime to 50 years. If the project will operate for an additional 20 years, the identified direct, indirect, and cumulative effects would also continue for 20 years.

Table 4-28. Reasonable and foreseeable future projects

Project Name	Project Proponent/ BLM Applicant	Location (County)	Description	Size (Acres)
Alum Site – Geothermal Exploration	Sierra Geothermal Power, Corp.	15 miles north of Silver Peak, 25 miles from project, southern extent of Big Smoky Valley (Esmeralda County)	Geothermal exploration for a potential geothermal energy facility. In 2010 plan. Exploration continuing.	9,660
Tonopah Airport Transmission Line	Nye County	Transmission line from Tonopah Airport to the existing transmission line along State Highway 6 (3 miles) (Nye County)	Development of 3 miles of power transmission line from airport to existing transmission line along State Highway 6. Planning stages.	TBD
Tonopah Airport Solar Project – Indeck	Indeck	Tonopah Airport, 8 miles east of Tonopah on State Highway 6 (Nye County)	Develop up to 20 MW of solar energy on airport property. Lease agreement signed with Nye County.	150
Tonopah Airport Solar Project – Iberdrola	Iberdrola Solar	Tonopah Airport, 8 miles east of Tonopah (Nye County)	Develop 10–30 MW of photovoltaic power on airport property. Planning stage for a potential lease agreement with Nye County for a 10–30 MW photovoltaic facility.	200
Midway Exploration Project (Mining)	Midway Gold Corporation	15 miles north of Tonopah; 20 miles from project over San Antone Mountains; at State Highway 376 and Belmont Road, Ralston Valley (Nye County)	Proposed expanded exploration and development of an underground mine. BLM's 2009 planning schedule indicated this project is on hold pending evaluation of water treatment options. No mention in the 2010 planning schedule.	TBD
Crescent Dunes Solar Energy Project (Disposal)	Tonopah Solar Energy	Current project	Tonopah Solar Energy may propose to purchase the land after construction of the facility is completed.	1,700

Notes: BLM = Bureau of Land Management; MW = megawatt; TBD = to be determined

4.19.6 Cumulative Impacts, by Resource

Vegetation

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Wildlife

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Special Status Species (Plants)

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Special Status Species (Wildlife)

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Water and Water Quality

Of the potential impacts identified, increased runoff and sediment transport are expected to have a potential cumulative effect. If ground surface disturbances in the surrounding watershed or adjacent areas have occurred in the past, are currently occurring, or will occur in the future attributable to activities unrelated to the proposed project (i.e., recreational vehicle use), cumulative impacts related to the project could occur within the CESA.

Air Quality

At this time, there are insufficient data on the reasonably foreseeable future projects in the CESA to adequately perform an impact analysis (data are not available specifically on air quality emissions from these projects). If any of the listed projects were constructed during the same period as the Crescent Dunes Solar Energy Project, there may be an increase in dust emissions within the CESA.

Cultural Resources

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Land Use and Access

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. However, if at the end of the 30-year lease term the land is made available by BLM for purchase, TSE may purchase the land, and it would be converted to permanent private ownership. BLM would not have control over any reclamation of the land, and it would be removed from public use.

Social and Economics

It is likely that development of this project—combined with development of reasonably foreseeable future projects—may have impacts on socioeconomics in the CESA. To date, insufficient information is available on the reasonably foreseeable future projects to make such an impact analysis and determine the potential cumulative effects.

Visual Resources

The cumulative area, or viewshed, is defined as the area wherein the project facilities, including the solar field and TLs, are visible. The viewshed has an approximate radius of 10 miles in any direction from the project site. The proposed project would not be a dominant visual feature beyond 5 miles, and views beyond 10 miles of the project would be very difficult to discern. No other projects exist within the 10-mile radius of this project; therefore, this project would not contribute to any visual cumulative impacts.

Hazardous Materials

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Range Resources

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.

Recreation and Wilderness

At this time, there are no known or reasonably foreseeable future projects within the CESA that would create a cumulative effect. Therefore, the proposed Crescent Dunes Solar Energy Project is unlikely to have impacts that would combine cumulatively with other related past, present, and reasonably foreseeable future projects.