1.0 Introduction and Purpose and Need

The U.S. Bureau of Land Management (BLM) has prepared this Environmental Impact Statement (EIS) to analyze potential environmental impacts associated with the Crescent Dunes Solar Energy Project. Tonopah Solar Energy, LLC (TSE), the Proponent, has proposed construction of this solar power generation facility in Nye County, Nevada. The solar facility would have the following features:

- a large field of heliostats or mirrors to reflect the sun's energy onto a central receiver or tower
- a conventional steam turbine to generate electricity
- thermal storage tanks to store the hot and cold liquid salt
- a hybrid cooling system (i.e., an air cooled condenser [ACC] with a wet cooling augmentation system designed to minimize water consumption by use only during times of high electricity demand)
- associated equipment such as pumps, transformers, heat exchangers, and buildings
- associated linear facilities including a transmission line (TL) and access road

This EIS analyzes the environmental effects of the Proposed Action, the No Action Alternative, and two alternatives. The Proposed Action would:

- Approve a right-of-way (ROW) application submitted by TSE to construct and operate a 100-megawatt (MW) solar power generating facility based on concentrating solar power technology (CSP), an approximately 9.5-mile 230 kilovolt (kV) TL, and the temporary use of a 40-acre borrow pit to extract aggregate for construction. The technology uses heliostats (reflecting mirrors) to redirect sunlight onto a receiver erected in the center of a solar field. The solar power facility is proposed to be located on BLM-managed lands in Nye County, Nevada.

1.1 Authority and Jurisdiction

This EIS addresses project-related impacts pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA), 42 United States Code (USC) §§ 4321 et seq., and subsequent implementing regulations issued by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations [CFR] 1500–1508). This EIS was also prepared in conformance with the BLM's NEPA Handbook H-1790-1 (BLM 2008a). The BLM Handbook provides instructions for compliance with the CEQ regulations for implementing the procedural provisions of NEPA and the U.S. Department of the Interior's (DOI) Manual on NEPA (516 DM 1-7).

BLM is the lead federal agency responsible for reviewing TSE's application. The Proposed Action would occur on public lands managed by BLM in the Tonopah Resource Management Plan (RMP) planning area. BLM has prepared a RMP to manage resources on these lands. The Proposed Action would conform to the current land use plan; no amendment of the plan would be needed in connection with implementation of the Proposed Action.

1.1.1 DOE Authority and Jurisdiction

Title XVII of Energy Policy Act (EPAct) authorizes the Secretary of Energy to make loan guarantees for eligible projects, including those that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases, and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." Tonopah Solar Energy, LLC has applied to the U.S. Department of Energy (DOE) for a loan guarantee pursuant to Title XVII of the EPAct. DOE is participating in the review of this NEPA document as a cooperating agency (40 CFR §1508.5) to ensure that analyses needed to support its decision making on whether to provide a loan guarantee to Tonopah Solar Energy, LLC are provided in the EIS.

1.2 Project Overview

The proposed solar facility will use CSP. This specific technology uses heliostat/reflecting mirrors to redirect sunlight on a receiver erected in the center of the solar field (called the central receiver). The facility is expected to produce approximately 110 MW of power.

The central receiver consists of a series of tubes. Liquid salt—which has the viscosity and appearance of water when heated—is routed to the receiver when solar energy is to be collected. The liquid salt passes through the receiver, where it is heated by the concentrated solar energy, and then is routed to a large insulated tank, where it can be stored with minimal energy loss. When electricity is to be generated, the heated salt is circulated through a series of heat exchangers to generate high-pressure superheated steam. The steam is then used to power a conventional Rankine cycle steam turbine/generator, which produces electricity. The exhaust steam from the turbine is condensed and returned via feedwater pumps to the heat exchangers, where the high-pressure superheated steam is generated again. The energy in the heated salt is depleted after generating steam and routed to the cold salt tank for reuse the next day.

Energy produced from the facility would interconnect through a new TL to the existing NV Energy Anaconda Moly Substation (ROW 033242), approximately 6 miles north of the site. The length of the proposed new TL would be approximately 9.5 miles.

Major project components include:

- a solar field consisting of a large area of heliostats (reflective mirrors that reflect the sun's energy into a central receiver or tower)
- a conventional steam turbine to generate electricity
- thermal storage tanks to store the hot and cold liquid salt
- a hybrid cooling system (i.e., an air-cooled condenser with a wet cooling augmentation system designed to minimize water consumption by use only during times of high electricity demand)
- a water treatment system and evaporation ponds to remove impurities from the groundwater, thereby protecting the turbine
- associated equipment such as pumps, transformers, heat exchangers, and buildings
- associated linear facilities, including a TL and access road
- a borrow pit for aggregate

1.3 Project Location

The proposed project would be built on lands administered by BLM. According to the National Renewable Energy Laboratory United States Solar Atlas, the proposed project site maintains high insolation levels on a year-round basis, creating ideal conditions for solar energy generation (Figure 1-1). While many undeveloped parcels of land exist in Nevada, it can be difficult to acquire parcels from private parties and assemble the acreage needed for a CSP plant. If enough private land were acquired, permitting issues at a local level within a jurisdiction with no policy on solar development can be difficult. BLM's general solar policy is to facilitate environmentally responsible commercial development of solar energy projects on public lands and to use solar energy systems on BLM facilities where feasible (BLM 2007). Given BLM's solar policy and the advantage of the BLM controlling large areas of land in the southwestern United States, the Proponent is proposing this project on BLM-administered lands as opposed to private lands.

The proposed project site, transmission line (TL), and borrow pit (temporary during construction) are located in south-central Nevada, west of Tonopah, in Nye County. The proposed project encompasses approximately 2,950 acres (Figure 1-2), as located in the following lands when described by aliquot parts:

Proposed Project Site (N-86292)

- in Township 4 North, Range 41 East:
    - western half of Sections 12 and 13
    - Sections 11 and 14
    - northwestern, northeastern, and southeastern quarters of Section 15
    - southwestern, northeastern, and southeastern quarters of Section 10
    - southern half of the northwestern quarter of Section 10
    - eastern half of the southwestern quarter of Section 15

TL and Substation (N-87933)

- in Township 4 North, Range 41 East:
    - eastern half of Section 9
    - northwestern, southwestern, and southeastern quarters of Section 4
- in Township 5 North, Range 41 East:
    - northwestern, southwestern, and northeastern quarters of Section 33
    - eastern half of Section 28
    - Section 22
    - southeastern quarter of Section 15
    - western half of Section 14
    - southwestern, southeastern, and northeastern quarters of Section 11
    - eastern half of Section 2
    - northwestern quarter of Section 27

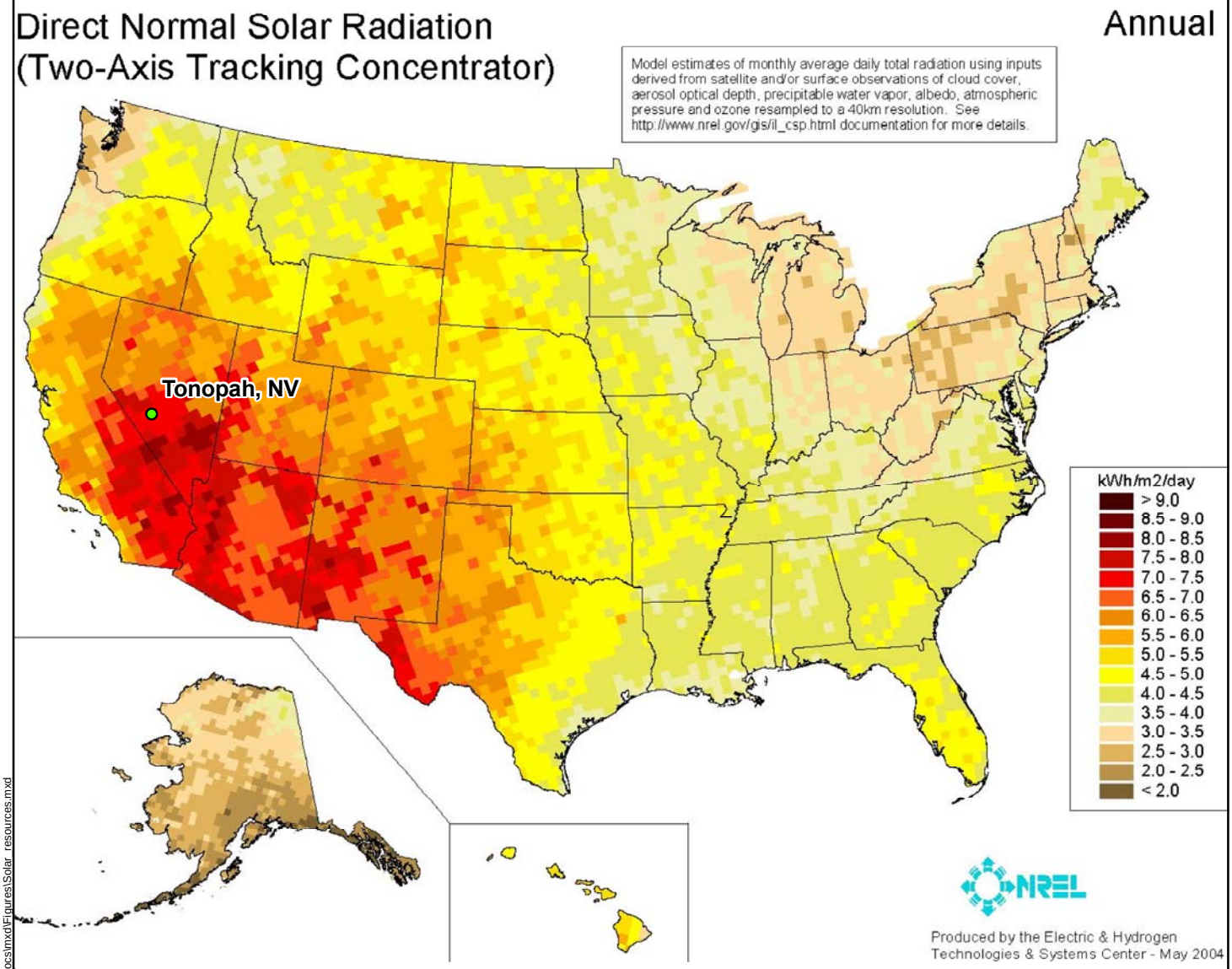

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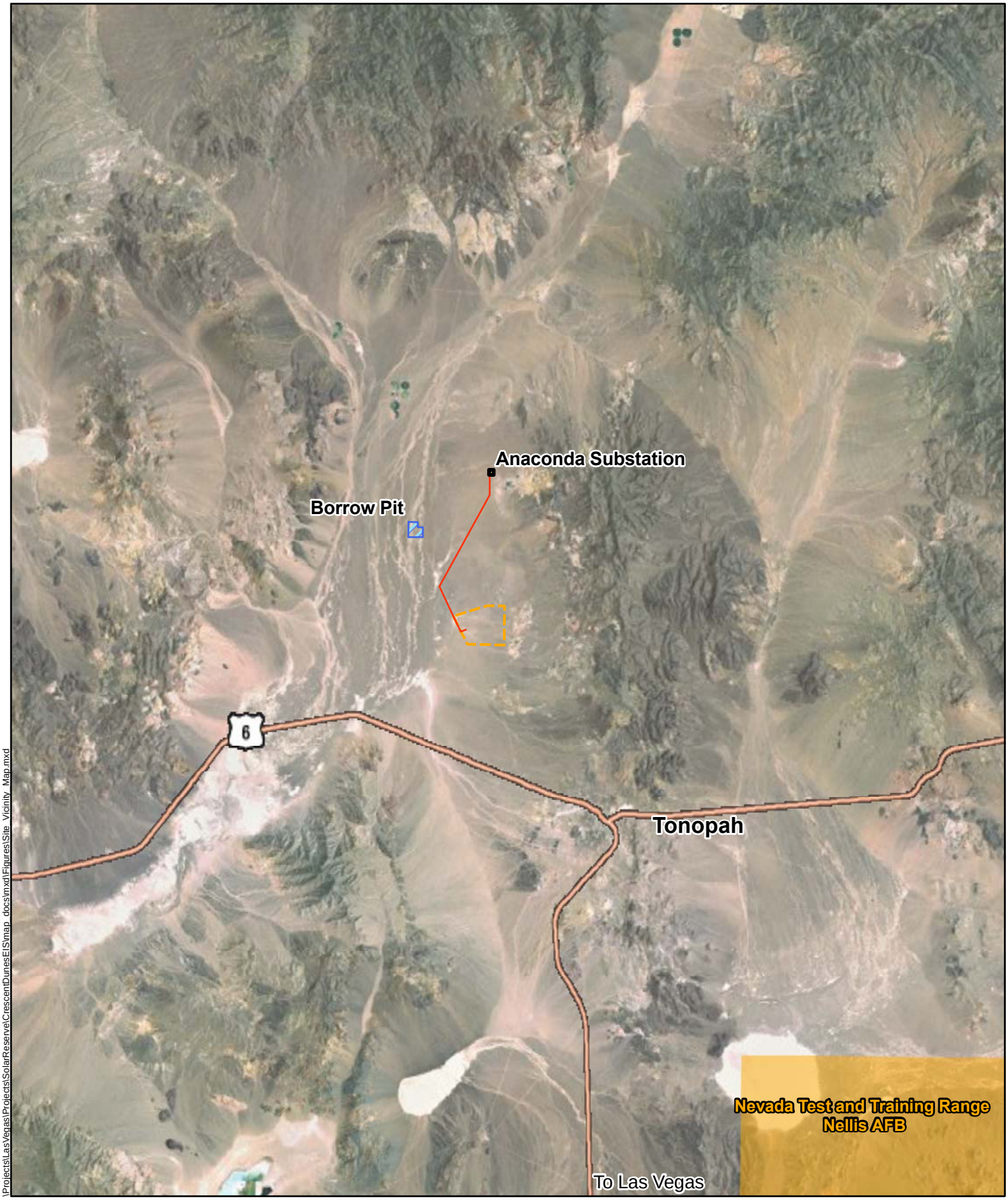
Figure 1-1 Solar Resources Map

Crescent Dunes Solar Energy Project

Source: National Renewable Energy Laboratory, May 2004



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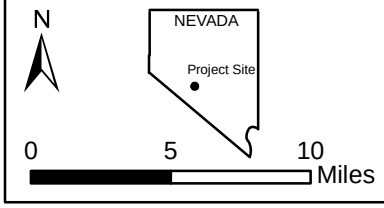


Legend

Transmission line

Proposed Site

Borrow Pit

Figure 1-2 Site Vicinity Map

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

Potential Borrow/Gravel Pit

- in Township 5 North, Range 41 East:
    - northeastern quarter of Section 19
    - western half of the northwestern quarter of Section 20
    - southern half of the southeastern quarter of Section 18

The areas for the project site, TL, and substation are shown in more detail in Chapter 2.0, Alternatives Including the Proposed Action. The solar field, administration building areas, evaporation pond areas, TL, substation, and other ancillary facilities would be located within the approximately 2,950 acres identified above; temporary and permanent construction impacts would not affect this entire area. The estimated area of permanent disturbance and temporary disturbance within the proposed final ROW boundary is approximately 1,673 acres (permanent) and 213 acres (temporary), the remainder of the 2,950 acres would remain undisturbed.

During the scoping phase for this EIS, two alternative site locations were identified (see Figure 2-1). Alternative 1 is located approximately 1.85 miles north of the proposed project site, and Alternative 2 is located approximately 2.4 miles northwest of the proposed project site. The two alternatives would use the same technology as described in Section 1.2, Project Overview, and occupy approximately the same acreage on lands administered by BLM.

1.4 Purpose and Need for the Proposed Project

1.4.1 Purpose

The BLM Tonopah Field Office (TFO) has received a ROW application from TSE (Proponent) and must consider permitting the solar facility. The Proponent proposes to construct, operate, and decommission a solar power electric generation facility and associated infrastructure on lands managed by the TFO. The TFO's purpose is to respond to the Proponent's ROW grant application under Title V of the Federal Land Policy and Management Act (FLPMA) (43 USC 1761) for completeness and in compliance with the FLPMA, BLM ROW regulations, and other applicable federal and state laws.

1.4.2 Need

The TFO's need is to consider permitting TSE's application under the BLM's CFR 2800 while, based on the BLM's EIS, limiting undue or unnecessary degradation of public lands.

1.4.3 DOE Purpose and Need

The purpose and need for DOE action is to comply with DOE's mandate under EPAct 2005 by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan guarantee to Tonopah Solar Energy, LLC to support the proposed project.

1.4.4 Proponent Purpose and Need

The Proponent has filed a ROW application for consideration to construct, operate, and decommission a solar power generation facility and associated infrastructure.

The State of Nevada has enacted a renewable portfolio standard (RPS) as part of its 1997 restructuring legislation. Under the standard, the state's investor-owned utilities must use eligible renewable energy resources to supply a minimum percentage of the total electricity they sell. Nevada's RPS increased July 1, 2009, to 25 percent of retail sales in 2025. In its most recent Integrated Resource Plan filed with and approved by the Public Utilities Commission (PUC) of Nevada, NV Energy will spend approximately $2 billion to purchase and invest in new renewable energy by 2015. The Proponent's construction and operation of the proposed project would contribute to achieving Nevada's RPS goals.

The proposed project would contribute much needed on-peak power to the electrical grid that serves the western United States as demand for power continues to grow in these states. The thermal storage capability of this technology allows renewable electricity to be produced even when the peak demand period extends into the late evening hours. As older technology fossil-fuel plants reach the end of their useful lives, replacing them with clean, reliable energy sources is a net benefit. The proposed project would respond to this need, as the Proponent has executed a Power Purchase Agreement with NV Energy as of November 4, 2009, for sale of the electricity produced from the facility.

The purpose of the facility is to:

- provide solar-generated electricity to the national electric grid
- help reduce both Nevada's and the nation's reliance on fossil-fuel generated electricity
- expand Nevada's and the nation's use of non-fossil, renewable energy
- expand Nevada's renewable energy portfolio

The Proponent's need for the project is to:

- deliver approximately 485,000 MW hour (MWh) of cost-effective renewable energy annually to the Nevada electricity grid
- develop a solar energy project that provides a stable source of renewable energy to the grid through the use of thermal storage
- develop a renewable energy project that can produce renewable energy during Nevada's peak electricity demand periods, including evenings in summer, when solar projects without storage can no longer generate solar energy

1.5 Relationship to Bureau of Land Management and Non-Bureau of Land Management Policies, Plans, and Programs

This EIS addresses project-related impacts pursuant to the requirements of NEPA, 42 USC §§ 4321 et seq., and subsequent implementing regulations issued by the CEQ (40 CFR 1500–1508). The EIS was also prepared in conformance with the BLM's NEPA Handbook (BLM 2008a). The BLM Handbook provides instructions for compliance with the CEQ regulations for implementing the procedural provisions of NEPA and the DOI Manual on NEPA (516 DM 1-7).

The BLM NEPA Handbook also provides guidance on monitoring. Three distinct types of monitoring are identified and, if the Proposed Action were approved, would be applicable:

- Compliance Monitoring: As part of the Record of Decision (ROD) on the proposed project, committed mitigation measures and related monitoring and enforcement activities, if any, for the selected alternative will be identified. Stipulations that will become part of BLM's authorization will be attached to the ROD or incorporated by reference from this EIS or other applicable requirements. Any measures to avoid or reduce environmental harm identified in this EIS that are not adopted will also be identified with an explanation of why the measures were not adopted. NEPA requires that decisions on a project be implemented in accordance with the ROD. BLM will perform compliance monitoring to ensure that actions taken comply with the terms, conditions, and mitigation measures identified in the ROD.
- Effectiveness or Success Monitoring: Determining whether decisions made in the ROD are achieving intended environmental objectives may require monitoring the effectiveness or success of the actions or decisions. Effectiveness monitoring is not required by NEPA unless specified in the ROD. However, monitoring requirements specified in this EIS will be incorporated into the ROD. Effectiveness monitoring will typically be required to determine the effectiveness or success of identified mitigation measures.
- Evaluation of Validity Monitoring: Determining if a decision continues to be correct or appropriate over time is another purpose of monitoring. Evaluation of decision validity monitoring is not required by NEPA, and it is usually not routinely needed for all decisions covered by an EIS. Evaluation monitoring goes beyond effectiveness monitoring and focuses on examining the validity of the environmental objectives. Evaluation monitoring would be used to determine whether the terms, conditions, and mitigation measures prescribed by the ROD are still needed to achieve environmental objectives or if they are greater or less than necessary to achieve environmental objectives.

In Executive Order (EO) 13212 of May 18, 2001 (Actions to Expedite Energy-related Projects), President George W. Bush ordered that executive departments and agencies take appropriate actions "to expedite projects that will increase the production, transmission, or conservation of energy." Section 211, of the Energy Policy Act of 2005 (EPAct), (Public Law [PL] 109-58) states "…that the Secretary of the Interior should, before the end of the 10-year period beginning on enactment of this Act, seek to have approved non-hydropower renewable energy projects located on public land with a generation capacity of at least 10,000 MW of electricity."

DOI manages approximately 520 million acres of land, one-fifth of the land mass of the United States. On March 11, 2009, Secretary of the Interior Ken Salazar issued a Secretarial Order that made facilitating the production, development, and delivery of renewable energy on public land a top priority for DOI. Within DOI, BLM administers approximately 253 million surface acres of public land in the United States. BLM has identified approximately 23 million acres in the Southwest as containing high solar energy potential.

The BLM Solar Energy Development Policy establishes a framework to process applications for rights-of-way, and directs BLM to be responsive to solar energy project applicants, while maintaining its commitment to resource protection. In 2007, BLM issued Instructional Memorandum Number 2007-097, which established policy for processing of ROW applications for solar energy development

projects on public land administered by BLM. BLM would strive to balance the financial and social benefits from this Proposed Action while minimizing impacts to other resources.

Table 1-1 provides a representative list of federal, state, and local laws, statutes, and EOs that may apply to the Proposed Action.

Table 1-1. Federal, state, and local laws, statutes, and EOs applicable to the Proposed Project and Alternatives

Federal Laws and Statutes
Archaeological and Historic Data Preservation Act of 1974 (Public Law [PL] 86-253, as amended by PL 93291; 16 United States Code [USC] 469)
Bald and Golden Eagle Protection Act of 1940 (16 USC 668-668d, 54 Stat. 250) as amended (PL 95-616 [92 Stat. 3114]) November 8, 1978
Archaeological Resources Protection Act of 1979 (PL 96-95; 16 USC 470aa-mm)
Clean Air Act of 1990 (as amended by PL 92-574; 42 USC 4901)
Department of Transportation Act of 1966 (PL 89-670; 49 USC Section 303)
Endangered Species Act of 1973 (PL 85-624; 16 USC 661, 664 1008)
Energy Policy Act of 2005 (PL 109-58)
Federal Land Policy and Management Act of 1976, Section 201(a) (PL 94-579; 43 USC 1701 et seq.)
Federal Water Pollution Control Act of 1972, Section 404 (PL 92-500; 33 USC 1344, as amended)
Historic Sites Act of 1935 (PL 292-74; 16 USC 461-467)
Land and Water Conservation Fund Act of 1965 (PL 88-578)
Migratory Bird Treaty Act of 1918 (16 USC 703-712, as amended)
National Environmental Policy Act of 1969 (PL 91-190; 42 USC 4321)
National Historic Preservation Act of 1966, Section 106 [PL 89-665; 16 USC 407(f)]
Paleontological Resources Preservation Act 2009
Executive Orders
Executive Order (EO) 11296 Flood Hazard Evaluation Guidelines
EO 11514 Protection and Enhancement of Environmental Quality
EO 11593 Protection and Enhancement of the Cultural Environment
EO 11988 Floodplain Management (43 Code of Federal Regulations [CFR] 6030)
EO 11990 Protection of Wetlands
EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations
EO 13007 Indian Sacred Sites
EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds
EO 13212 Actions to Expedite Energy-related Projects
EO 13287 Preserve America
EO 123772 Intergovernmental Review of Federal Programs
Federal Regulations
10 CFR Parts 1022-1022, Department of Energy NEPA Implementing Procedures
40 CFR Parts 1500-1508, Council on Environmental Quality implementation of NEPA
33 CFR 320-331 and 40 CFR Part 230, Section 404 of the Clean Water Act and its Implementing Regulations
36 CFR Part 800, as amended, Protection of Historic Properties
43 CFR Part 2800, as amended, Right-of-Way Principles and Procedures

Table 1-1. Federal, state, and local laws, statutes, and EOs applicable to the Proposed Project and Alternatives

State Laws and Statutes
Nevada Revised Statue (NRS) 502.390 Permit required to develop or maintain certain bodies of water, fees and assessments; penalties.
NRS 527.060-120 Protection and Preservation of Timbered Lands, Trees, and Flora – Definitions Cactus and Yucca
NRS 527.270 List of species declared to be threatened with extinction; special permit required for removal or destruction
NRS 533.030 Adjudication of Vested Water Rights; Appropriation of Public Waters – Appropriation for beneficial use; use for recreational purpose declared beneficial; limitations and exceptions
NRS 533.035 Adjudication of Vested Water Rights; Appropriation of Public Waters – Beneficial use: Basis, measure and limit of right to use
NRS 534.020 Underground waters that belong to the public and are subject to appropriation for beneficial use; declaration of legislative intent
NRS 555.005 Agriculture – Control of Insects, Pests, and Noxious Weeds

1.6 Authorizing Actions and Permits

In addition to the EIS, implementing the Proposed Action would require authorizing actions from other federal, state, and local agencies with jurisdiction over certain aspects of the proposed project. Table 1-2 lists potential permits or approvals that may be required before and during construction, and during operations. The Proponent or contractor would be responsible for amending existing permits, applying for, and acquiring additional permits, as needed.

Table 1-2. Potential authorizations and permits

Agency	Permit or Approval	Regulated Activity
Federal Permits and Approvals		
U.S. Bureau of Land Management (BLM)	National Environmental Policy Act Record of Decision	Major federal action significantly affecting the quality of the human environment
BLM	Right of Way Permit and/or Temporary Use Permit (BLM SF 299 application)	Required for permanent and temporary (example construction) use of BLM administered lands (facilities, water pipelines, transmission, access roads, gas pipeline, and other ancillary items)
U.S. Fish and Wildlife Service	Endangered Species Act Section 7 Consultation and Biological Opinion	Required for potential direct or indirect impacts to federally listed species and/or associated habitats
U.S. Environmental Protection Agency (EPA)	Section 402 National Pollutant Discharge Elimination System (NPDES) Notification	Required for stormwater management during construction
Tribal Authorities		
Nevada Tribal Councils	Section 106 Review and Native American Consultation	Required to address impacts on Native American or cultural resources

Table 1-2. Potential authorizations and permits

Agency	Permit or Approval	Regulated Activity
Nevada State Permits and Approvals		
Nevada State Historic Preservation Office	Section 106 Review and Concurrence	Federally funded projects are to take into account potential impacts on cultural and historical resources
Nevada Department of Wildlife (NDOW)	Southern Region Project Review	Wildlife and habitat consultation for disturbance on BLM-managed land
NDOW	Implementation of terms and conditions of the Biological Opinion	Potential impacts on common and special-status wildlife species (document compliance with the terms and conditions of the Biological Opinion)
NDOW	Industrial Artificial Pond Permit	Potential injuries and mortalities to wildlife caused by ponds
NDOW	Consent for Alteration of Protected Species	Required for taking any wildlife classified as protected
Nevada Division of Environmental Protection (NDEP)	Prevention of Significant Deterioration Program Major Source Permit	Required to consolidate potential air quality impacts of a proposed major project
NDEP	General Stormwater Permit for Construction Activities (Notice of Intent and General Permit)	Construction activities disturbing more than 1 acre
NDEP Bureau of Air Pollution Control	Operating Permit to Construct	Nevada Administrative Code 445B.22037 requires fugitive dust to be controlled
NDEP Bureau of Air Pollution Control	Surface Area Disturbance/Dust Mitigation Control Plan	Required for a surface area disturbance is greater then 20 acres
NDEP Bureau of Air Pollution Control	Sand and Gravel Processing Plant	Required for construction/operation of new asphaltic concrete plants, concrete batch plants, and sand and gravel processing plants (Nevada Revised Statute [NRS] 445B.155)
NDEP Bureau of Safe Drinking Water	Concurrence Letter or Letter of Approval to Construct	Need permit to operate the water system upon satisfaction of the requirements set forth in NRS 445A.885 to 445A.915, inclusive, and the requirements set forth in the regulations adopted by the Commission
NDEP Bureau of Water Pollution Control	Temporary Discharge Permit	Required for discharge to surface waters, for all purposes except working in waterways, maximum of 180 days
NDEP Bureau of Water Quality Pollution Control	Section 401 Water Quality Certification	Required for impacts on water quality caused by discharges to a water body by construction activities
NDEP Bureau of Water Pollution Control	General Stormwater Discharge Permit	Required for stormwater discharge associated with construction activities disturbing at least 1 acre
Nevada Department of Water Resources	Water Right Permit	Required for the issuance of water rights
Nevada Public Utilities Commission	Utility Environmental Protection Act	Required for the construction of a utility facility

Table 1-2. Potential authorizations and permits

Agency	Permit or Approval	Regulated Activity
Nevada Division of Forestry	Native Cacti and Yucca Commercial Salvaging and Transportation Permit	Required for the salvage and removal, transport or sale of five or more native cacti or yucca from private or federal land
Nevada Division of Forestry	Permit for the Take of Critically Endangered Flora	Required for the disturbance of plant species listed as Critically Endangered (NRS 527.260 to 527.300)
Nevada Department of Motor Vehicles and Public Safety	Nevada State Hazardous Materials Permit or Roving Permit	Required for storage of flammable and combustible liquids (includes fuel storage areas and fuel depot used more than 30 days)
Nye County Permits and Approvals		
Nye County Bureau of Fire Prevention	Fire Safety Compliance Certification	Building and operation fire safety
Nye County Planning Department	Flood Damage Prevention Permit	Certification of flood zone location
Building Permit	County Building Division	Construction of facilities
Other Permits and Approvals		
NV Energy Interconnection	Approval for Interconnection	Proposed project connection to an existing NV Energy transmission line

1.7 Agency Coordination

1.7.1 Agency Communication

After the publication of the Notice of Intent (NOI) for the Proposed Action, BLM contacted relevant federal, state, and local government agencies to initiate coordination. Because of this coordination effort, the following agencies and officials were identified as having an interest in the project and were asked to submit comments:

Federal

- U.S. Bureau of Reclamation
- U.S. Army Corps of Engineers
- U.S. Air Force
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Environmental Protection Agency (EPA)
- National Park Service
- U.S. Senator Harry Reid
- U.S. Senator John Ensign
- U.S. Congressman Dean Heller

State

- Nevada Department of Transportation
- NV Energy Lands Service Department
- Nevada State Office Planning and Environmental
- Nevada Department of Wildlife (NDOW) – Southern Region Office

Local

- Southern Nevada Water Authority
- Esmeralda County Commissioners
- Nye County Commissioners
- Town of Tonopah

1.7.2 Cooperating Agencies

A cooperating agency is any federal, state, or local government agency that has jurisdiction either by law or special expertise regarding environmental impacts of a proposed action or a reasonable alternative for a federal action. The benefits of cooperating agency participation in the analysis for and preparation of an EIS include:

- disclosure of relevant information early in the analytical process
- application of available technological expertise and staff support
- avoidance of duplication of other federal, state, local, or tribal procedures
- establishment of a formal process for addressing intergovernmental issues

The following is the list of federal, state, and local agencies that were invited to be a cooperating agency for the project. Please see Appendix E in the Scoping Report for copies of the invitation letters.

Federal

- U.S. Department of Transportation
- USFWS
- U.S. Forrest Service
- National Park Service
- National Park Service: Death Valley National Park
- U.S. Department of Defense (DOD)
- U.S. Department of Energy (DOE)
- U.S. Department of Transportation Federal Aviation Administration
- EPA

State

- State of Nevada
- Nevada Department of Transportation
- NDOW
- Nevada Division of Environmental Protection (NDEP)
- State of Nevada Department of Conservation and Natural Resources
- PUC of Nevada
- Nevada State Historic Preservation Office (SHPO)
- State of Nevada Commission on Mineral Resources

Local

- Nye County Board of Commissioners
- Esmeralda County Board of Commissioners
- Town of Tonopah

Upon receipt of the invitation letter, each agency had 45 days to accept or decline the opportunity to become a cooperating agency. Cooperating agencies may contribute baseline information and/or provide input into the environmental document, as well as review the draft and final versions of the EIS.

The following agencies accepted the invitation to become a cooperating agency:

- NDOW
- National Park Service – Death Valley National Park
- Nye County, Esmeralda County, Town of Tonopah
- DOD, U.S. Air Force

On September 14, 2009, the Proponent submitted a Part I application to the DOE Loan Guarantee Program seeking a guarantee for the Proposed Project in response to the Loan Guarantee Solicitation Announcement (DE-FOA-0000140) issued on July 29, 2009. The Proponent then submitted a Part II application in December 2009. The DOE invited the Proponent to enter into the due diligence process on June 25, 2010 and initiated NEPA review for the Proposed Project. In July 2010, The DOE requested to participate as a cooperating agency pursuant to an MOU between DOE and BLM signed in April 2010.

In July 2010 the National Park Service – Death Valley National Park opted out of being a cooperating agency.

1.8 Summary of Public Scoping and Issue Identification

Scoping is an integral part of the NEPA process and provides "an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action" (40 CFR 1501.7). During this scoping process, BLM solicited comments from pertinent agencies and the public. These comments will be organized and analyzed so that the relevant issues can be addressed during the environmental analysis and the preparation of the EIS. Comments will help BLM define the scope of analysis for the EIS.

1.8.1 Federal Register

The *Federal Register* NOI was published on November 24, 2009, marking the beginning of the scoping period for the project. The scoping period ended on December 24, 2009. This period fulfills the BLM minimum requirement of a 30-day scoping period.

1.8.2 Announcements, and Media Releases

Announcements for the public scoping meetings were published in a variety of local and regional newspapers (see Table 1-3). Additionally, scoping meeting dates, times, and locations were posted on

the BLM TFO Web site (www.BLM.gov/nc/st/en/fo/Battle_Mountain_Field.html). A public service announcement was also made on News 88.9 KNPR Nevada Public Radio on November 24, 2009.

Table 1-3. Publications for the proposed Crescent Dunes Solar Energy Project

Newspaper	Dates Published
Pahrump Mirror	December 2, 9, and 16, 2009
Pahrump Valley Times	December 3, 10 and 17, 2010
Las Vegas Review-Journal	December 2, 9, and 16, 2010
Reno Gazette-Journal	December 2, 9, and 16, 2010

Copies of these announcements can be found in the Scoping Report in the Administrative Record.

1.8.3 Public Meetings

Public meetings are required where "there may be substantial environmental controversy concerning the environmental effects of the proposed action, a substantial interested in holding the meeting, or a request for a meeting by another agency with jurisdiction over the action" (40 CFR 1506.6). Public scoping meetings locations, dates, and number of attendees are provided in Table 1-4. In accordance with BLM requirements, sign-in sheets were provided and attendees were encouraged to sign in. Copies of the sign-in sheets are provided in the Administrative Records.

Table 1-4. Public meeting information

Meeting Location	Date	Number of Attendees
Tonopah Convention Center 301 Brougher Ave, Tonopah, Nevada	Thursday, December 17, 2009	42
BLM Southern Nevada District Office 4701 N. Torrey Pines Drive, Las Vegas, Nevada	Friday, December 18, 2009	6

Note: All meetings were held from 6 to 8 p.m.

Both meetings began with a brief presentation of the project and an overview of the NEPA process. Additionally, posters summarizing the proposed project location, proposed technology, and an overview of the NEPA process were displayed for public review (Appendix D). BLM, TSE, and HDR Engineering, Inc. (HDR, the EIS consultant), representatives were available to answer questions. Project fact sheets and comment cards were provided at each meeting. Comment cards were provided so members of the public could submit comments regarding issues or concerns, reasonable changes or additions to the proposed project, or any other comments or questions. Comment cards could be submitted at the meeting, mailed, or faxed to the BLM TFO. Additionally, any written comments could be submitted by fax, mail, or e-mail to the BLM TFO.

1.8.4 Summary of Public and Agency Comments

Twenty-four comments on the proposed project were submitted (Table 1-5). Comments included concerns and questions regarding public lands, threatened and endangered species, water resources, cultural resources, dark skies, socioeconomic impacts, and cumulative impacts and connected actions.

Table 1-5. Summary of public and agency comments received

Organization/Name	Comment	Comment Type
U.S. Environmental Protection Agency Tom Plenys	DEIS should clearly identify the underlying purpose and need to which BLM is responding in proposing the alternatives. The DEIS should describe how each alternative was developed, how it addresses each project objective, and how it would be implemented. The DEIS should estimate the quantity of water the project will require and describe the source of this water and potential effects on other water users and natural resources in the project's area of influence. The DEIS should identify all petitioned and listed threatened and endangered species and critical habitat that might occur within the project area. EO 13112, mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. The cumulative impacts analysis should provide context for understanding the magnitude of the impacts of the alternatives by analyzing the impacts of other past, present, and reasonably foreseeable projects or actions and then considering those cumulative impacts in their entirety. The DEIS should consider how climate change could potentially influence the proposed project, specifically within sensitive areas, and assess how the projected impacts could be exacerbated by climate change. The DEIS should provide a detailed discussion of ambient air conditions (baseline or existing conditions), NAAQS, criteria pollutant nonattainment areas, and potential air quality impacts of the proposed project. Consultation for tribal cultural resources is required under Section 106 of the NHPA. EO 12898 directs federal agencies to identify and address disproportionately high and adverse human health or environmental effects on minority and low-income populations. The DEIS should address potential direct, indirect, and cumulative impacts of hazardous waste from construction and operation of the proposed project. The DEIS should discuss how the proposed action would support or conflict with the objectives of federal, state, tribal or local land use plans, policies and controls in the project area.	General Water resources Land use Threatened and endangered species Cumulative impacts Climate change Air quality Hazardous materials

Table 1-5. Summary of public and agency comments received

Organization/Name	Comment	Comment Type
U.S. Fish and Wildlife Service Nevada Fish and Wildlife Office Kathleen Erwin	The Nevada Fish and Wildlife Office has received your November 24, 2009 scoping notice for this project. Based on our workload we are unable to provide you with comments at this time. However, we would appreciate remaining on your mailing list to review the draft EIS when complete. Please contact our office if you have any questions regarding listed or proposed species or migratory birds.	General
U.S. Geological Survey Brenda Johnson	Has reviewed plan and has no comment.	General
Duckwater Shoshone Tribe Virginia M. Sanche	At the present time, Duckwater Shoshone Tribe has no concerns with the project. However, the Tribe recommends that the Tonopah Field Office contact the Yomba Shoshone Tribe, as the project is closer to their traditional homelands.	Native American concerns
Timbisha Shoshone Tribe Barbara Durha	Concern that their tribe has not seen cultural reports, have not had opportunity to provide input and would like extension of deadline for comment.	Cultural resources
Nevada State Clearinghouse Robert K. Martinez, P.E.	All waters of the State belong to the public and may be appropriated for beneficial use pursuant to the provisions of Chapters 533 and 534 of the Nevada Revised Statutes (NRS) and not otherwise. No use of surface water or groundwater is to occur unless a permit is issued.	Water resources
Nevada State Clearinghouse Skip Canfield	Regarding dark sky attributes, solar facilities should have shields placed on all lights; a comprehensive look at visual impacts should be considered when the BLM reviews any development plans on public lands in Nevada and nationally.	Dark skies
Nevada Department of Wildlife D. Bradford Hardenbrook	Concern for wildlife and birds under the migratory bird treaty act, desert kangaroo rat, pale kangaroo mouse, kit fox, pronghorn antelope, scarab beetle, etc.	Wildlife

Table 1-5. Summary of public and agency comments received

Organization/Name	Comment	Comment Type
Nevada Division of Mines Alan Coye	The EIS should consider the following: 1. The proposed project will apparently withdraw 1,600 acres of land from the operation of the mining law and the staking of mining claims. 2. The proposed project is located in an area of pediment adjacent to two highly mineralized mountain ranges, the Royston Hills to the west and the San Antonio Mountains to the east. Many new mineral deposits in Nevada are being discovered beneath the pediment adjacent to mineralized mountain ranges. 3. The San Antonio Mining District which contains the significant molybdenum deposit (Liberty Deposit) controlled by General Moly occurs approximately six miles from the proposed location. 4. The proposed project may occur in an area prospective for lithium-bearing brines, which are being actively explored for in nearby areas. 5. The area of the proposed project may be prospective for geothermal energy. The EIS needs to analyze and carefully consider the impacts from the proposed project to the development of other possible natural resources in the area.	Land use Cumulative effects Mineral rights
Nye County Nuclear Waste Repository Office Lewis Darrell Lacy, Jr.	One of the main issues is the availability of water for current and future use, given that the local basins have limited recharge and existing water supplies are over allocated based on the current amount of water rights issued, any transfers of water rights for this project will be adjudicated by the Nevada State Engineer; however, the cumulative impact of water use technologies should be comprehensively addressed during the EIS process. Nye County requests that the BLM and Solar Reserve cooperate with our staff and local communities during the EIS process to identify all impacts-direct, indirect, and cumulative-from the construction and operation of this facility. Once the impacts from the plant are identified, we desire to consult within the EIS process to help develop appropriate mitigation measures as well as ensure that appropriate buffers and equipment designs are incorporated to minimize disturbance to the area.	Water resources Cumulative impacts

Table 1-5. Summary of public and agency comments received

Organization/Name	Comment	Comment Type
Town of Tonopah Terry Rivero, Chairman	Any comments or concerns that the Town of Tonopah staff had in regard to the site location for this project were addressed directly with Solar Reserve or are being addressed by Nye County's renewable energy team. Resource or service deficiencies are being identified in the areas of: housing, schools, water, waste water, and emergency services. Solar Reserve also seriously considered our area's most precious and finite resource, water, by deciding to implement a dry, rather than wet, cooling process.	Community resources Water resources
Tonopah Town Board Horace Carlyle	Strong supporter with attached letter! Would like to be added to mailing list.	General
Tonopah Astronomical Society Thomas W. Cohen	Concern for the Dark Sky – please conform to lighting recommendations.	Dark skies
Nevada Wilderness Project John C. Tull	Concerns for wildlife – scarab beetle, milkvetch, pale kangaroo mouse.	Wildlife
Center for Biological Diversity Rob Mrowka	Concern for impact on rare species and habitats, off-road vehicle use impacts, cumulative and connected actions (consider other projects and cumulative impact of this project in conjunction), conflicting land uses (area is an ORV park, which could lead to dirty solar panels and a lot of extra water to clean them!), privatization of site, decommissioning and restoration. Also, want to be an active stakeholder.	Threatened and endangered species Off-highway vehicle impacts Cumulative effects Water resources
Tonopah Sand and Gravel Carl Wright	We would like to be permitted to become a preferred vendor and participate in the initial bidding process so that we may be allotted the opportunity to provide our local services to this well-founded energy project	General
Western Lithium Corporation Dennis P. Bryan	Could a geothermal well fit on the property too? What about underground metal deposits? Would like to see multiple uses for property.	Land use
Individual John Mudge	My sense is that we should not "break our pick" on this one. 1,600 acres is pretty small and, of course, we don't want to be seen as opposing renewables. I do endorse keeping our eyes and ears open to land use proposals as they come along so that we can comment appropriately. The updated RMPs that are going on in Winnemucca and that are scheduled for Battle Mountain and then Elko are key examples.	Land use
Individual Richard Delong	I think it is good to make sure that the BLM continues to consider all resources when making discretionary decisions.	General

Table 1-5. Summary of public and agency comments received

Organization/Name	Comment	Comment Type
Individual Brad Mamer	How do I obtain specific information on the government lease of these public lands?	Public lands
Individual David Haig	I attended the public forum in Tonopah for the Crescent Dunes project and was quite impressed by the presentation. Being in a desert region, there were concerns about water supply and they seem to have that planned for. There were also concerns about night-time lighting affecting Tonopah's dark sky environment and they have planned for that with minimal lighting needed and with the use of shielded light fixtures. I think this is an excellent project to help diversify Nevada's energy supply with minimal impact to the environment. This project will also bring much needed jobs to the area and will also help diversify the local tax base and may even be a boost to local tourism.	General Water resources Dark skies Socioeconomic conditions
Individual Dan Lingelbach	I am in favor of this project as it is large enough to produce some realistic data regarding the feasibility of concentrating solar thermal electric power production. Hopefully, they will account for the energy that must be used to produce such a facility including the site preparation, faulting all the equipment to the site, installation, man-hours, checkout costs, etc. I assume that those costs will be available soon after completion and then later on the total power production for at least a year of operation. I would appreciate being kept informed.	General
Individual John E. Hiatt	Lack of ground water, rare plants, drainage plan, concern about size of tower and whether this is going to be successful or experimental, mitigation for impact to lost resources, wildlife migration routes, bird attraction to panels and the results of this cumulative impact to the dunes, socioeconomic impact of influx of construction workers, reclamation bonding.	Water resources Wildlife Cumulative effects Socioeconomic conditions
Individual John Snow	Would the current pre-existing mineral rights policies cover the mining and geothermal concerns if the withdrawal is apparent and not prescribed in the EIS?	Mineral rights

Note: Full versions of comments are included in Appendix F of the Public Scoping Report.

Because reasonably foreseeable future actions contribute to the cumulative effects of the proposed project, these actions are discussed in Chapter 4.0.

1.9 Organization of the Environmental Impact Statement

This EIS follows the CEQ recommended organization, in accordance with 40 CFR 1502.10, and BLM guidelines described in the BLM Handbook H-1790-1. The Chapters and their content are described in Table 1-6.

Table 1-6. Description of EIS chapters

Chapter	Description
Chapter 1 – Introduction and Purpose and Need	This chapter provides a description of the purpose of, and need for, the Proposed Action, the role of the U.S. Bureau of Land Management in the Environmental Impact Statement (EIS) process, required regulatory actions for the proposed project, and the public and agency scoping summary.
Chapter 2 – Alternatives Including the Proposed Action	This chapter describes the Proposed Action and alternatives analyzed in the EIS, including the No Action Alternative. Alternatives that were considered but eliminated from further analysis are described, with a discussion of why they were not considered further.
Chapter 3 – Affected Environment	This chapter describes the existing environment that could be affected by granting the rights-of-way requested by the Proponent.
Chapter 4 – Environmental Consequences	This chapter describes possible environmental consequences of the Proposed Action and alternatives analyzed in the EIS. Direct, indirect, and cumulative effects of the Proposed Action and alternatives are assessed and described in order to allow for comparative impact evaluation. Impacts are compared to the social and natural environment that would be expected to exist if no action were taken (the No Action Alternative).
Chapter 5 – Consultation and Coordination	This chapter describes public participation undertaken to date. It also lists agencies and organizations that will receive copies of the Draft EIS for review and lists the preparers of the document.
Chapter 6 – References	This chapter includes a list of references used in the preparation of the EIS.
Chapter 7 – Glossary	This chapter includes a glossary of technical terms used in the EIS.
Chapter 8 – Index	This chapter includes an index listing of key words used in the EIS.

2.0 Alternatives Including the Proposed Action

2.1 Introduction

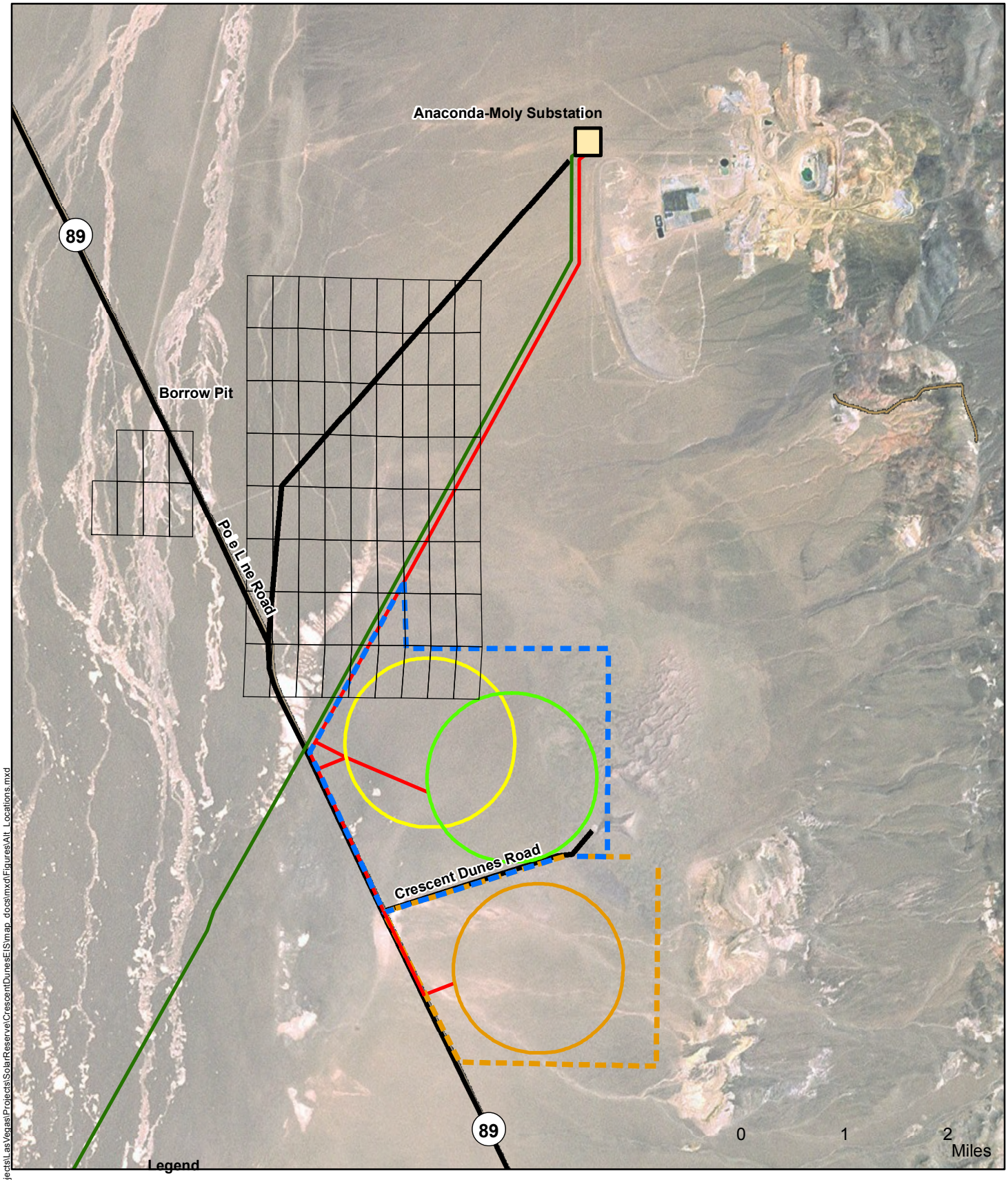
The Proposed Action for BLM is to evaluate a ROW application submitted by TSE to construct and operate a 110 MW solar power generating facility (proposed project) based on CSP. This technology uses heliostats (reflecting mirrors) to redirect sunlight on a receiver erected in the center of a solar field. The solar power facility is proposed to be located on BLM property located in Nye County, Nevada. The BLM ROW grant would be for a term of 30 years and would be renewable. Additionally, two alternative sites are being considered as possible locations for the proposed solar power facility, and these are shown in Figure 2-1 and described in detail in Section 2.6, Alternatives to the Proposed Action. This chapter provides a description of the alternatives analyzed in this EIS and includes the Proposed Action, the No Action Alternative, and the two alternative sites. This chapter also includes a comparative analysis of alternatives studied in detail; other alternatives considered but eliminated from further evaluation; and the identification of the BLM-preferred alternative. Under the No Action Alternative, no solar facility would be constructed, and the environmental and social setting would continue to be consistent with the current conditions.

2.2 Project Background

SolarReserve, doing business as TSE, is a Santa Monica, California, based energy company formed by US Renewables Group, a private equity firm focused exclusively on renewable energy. SolarReserve now holds the exclusive worldwide license to build solar plants that use equipment manufactured by United Technology Corporation's subsidiary, Pratt & Whitney, through its Rocketdyne division.

As illustrated in Figure 1-2, the nearest community to the proposed project site is the town of Tonopah, Nevada, which is located approximately 13 miles to the southeast of the site (from the proposed project site, 8.5 miles south along Pole Line Road [State Route 89] to State Highway [SH] 95/6, and then 4.5 miles east along SH 95/6 to Tonopah). The project overlaps or bisects several existing mining claims in the region (Figure 2-1) The land necessary for construction of the proposed solar power plant, including the heliostat array, power block, and associated facilities, consists of 1,673 acres located within the land boundaries described in Section 1.3, Project Location, and shown on Figure 2-2. The proposed boundaries as filed in the SF-299 application are currently in excess of the minimum needed to site the physical equipment. The project is in the preliminary project design stage, and the additional land will allow the Proponent the flexibility to (1) adjust the location of the central tower based on the results of soils/geotechnical, cultural, and biological baseline studies and (2) determine an adequate buffer between plant facilities and any adjacent uses before finalizing the equipment location within the ROW and finalizing the plant boundaries.

TSE performed preliminary screening on additional BLM land near NV Energy's Anaconda Moly Substation. TSE's technology has specific siting requirements, including a large open space of approximately 4 square miles, minimal slope, transmission access, water availability, road access, and high solar incidence. TSE is also limited to sites not already claimed by other developers.



Legend

N

NEVADA

Project Site

Transmission line

Existing

Planned

Borrow Pit

Alternative Area

Proposed Area

Alternative 1

Alternative 2

Proposed Alternative

Mining Claims

Substation

2-1 Alternative Locations and Mining Claims

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

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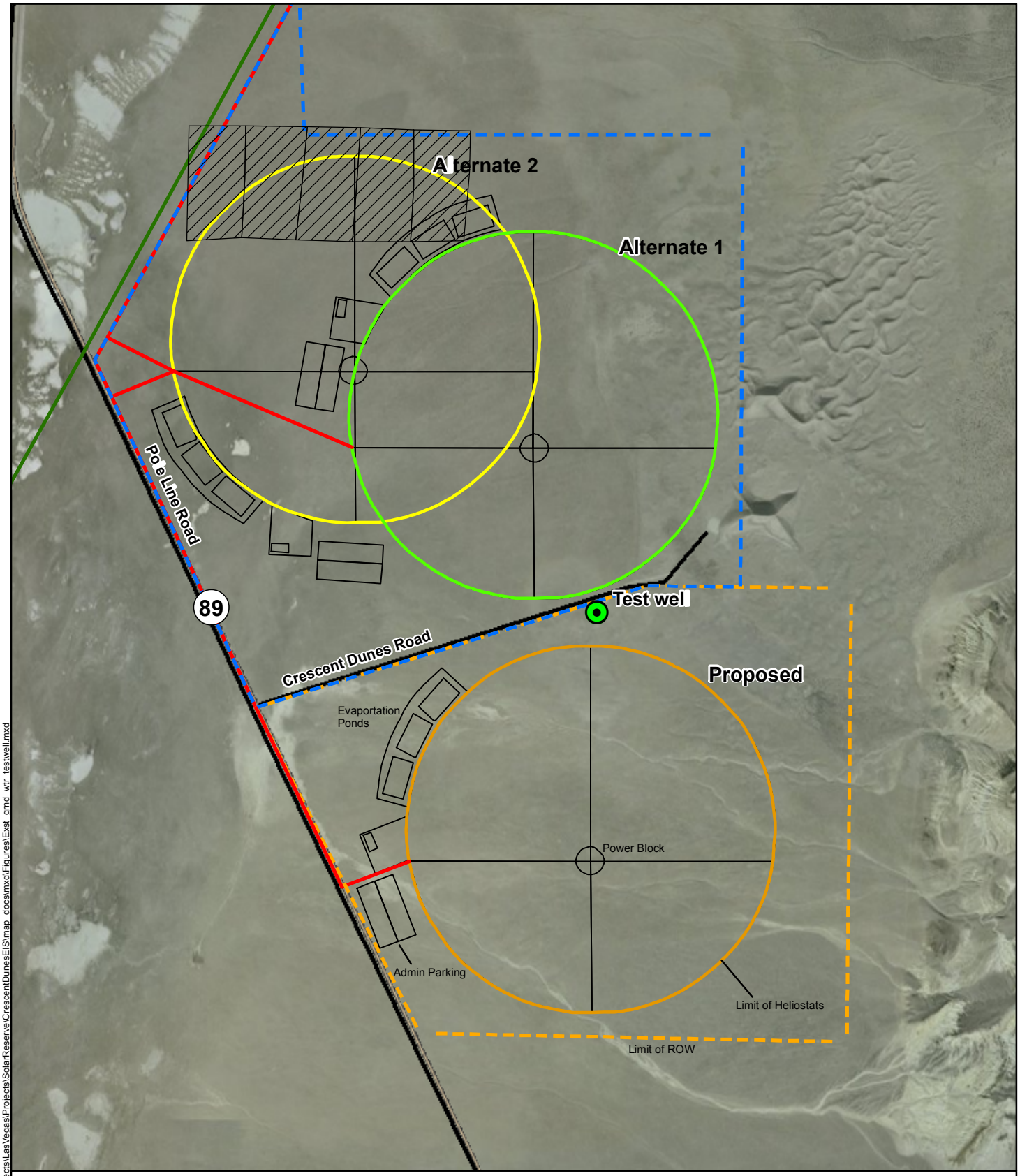

N

NEVADA

Project Site

0 0.25 0.5 Miles

Legend

Test well

Roads

Transmission line

Existing

Planned

Alternative Area

Proposed Area

Existing Mining Claims

Alternative 1

Alternative 2

Proposed Action Alternative

Figure 2-2 Alternatives Site Layout

Crescent Dunes
Solar Energy Project

Aerial Source: ESRI 2010

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The site selection process for the proposed project involved screening sites based on the following parameters:

- siting area with minimum area of 4 square miles, contiguous in configuration
- solar resource
- distance from TLs and substations
- land ownership
- water data
- topography
- wind data
- airport locations
- highways/roads
- faults
- population centers
- military bases
- BLM SF-299 applications pending
- various environmental constraints

Based on these criteria and BLM land available, the proposed project site was identified. The proposed project site is situated on a relatively flat piece of BLM-managed land covering approximately 2,950 acres. The annual average direct normal solar resource for this site averages 7.4 Watt-hours (Wh) per square meter (m^2) per day. NV Energy's Anaconda Moly Substation is located to the north of the proposed project site. Additionally, the proposed project site is not located in Areas of Critical Environmental Concern (ACECs) or areas of potential impact to military operations based on the DOD online screening tool. Other regional sites had the requisite minimum 4 square miles of contiguous BLM lands but were farther away from transmission substations of interest compared to the proposed project site. These other regional sites are discussed in more detail in Section 2.6.2, Alternatives Considered but Eliminated from Detailed Analysis.

The project is proposed on lands administered by BLM for several reasons. According to the National Renewable Energy Laboratory United States Solar Atlas, the proposed project site maintains high insolation levels on a year-round basis, creating ideal conditions for solar energy generation. While undeveloped parcels of land exist in Nevada, it can be difficult to acquire parcels from private parties and assemble the acreage needed for a CSP plant. If enough private land were acquired, permitting issues at a local level within a jurisdiction with no policy on solar development can be difficult. The BLM's general solar policy is to facilitate environmentally responsible commercial development of solar energy projects on public lands and to use solar energy systems on BLM facilities where feasible (BLM 2007). Given the BLM's solar policy and the advantage of the BLM controlling large areas of land in the Southwest, the Proponent is proposing this project on BLM-administered lands as opposed to on private lands.

2.3 Regulatory Framework of Alternatives

BLM is required by NEPA to evaluate not only the Proposed Action, but reasonable alternatives including the No Action Alternative (40 CFR § 1502.14). Section 1502.14(a) requires federal agencies to explore a reasonable range of alternatives, "and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated." The CEQ guidance concerning NEPA regulations adds that reasonable alternatives include those that are "practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant" (CEQ 1981).

When granting a ROW, FLPMA Title V requires BLM to include in the ROW terms and conditions that minimize environmental impacts. Specifically, such terms shall "minimize damage to scenic and esthetic values and fish and wildlife habitat and otherwise protect the environment… require compliance with applicable air and water quality standards established by or pursuant to applicable federal or state law; and … require compliance with State standards for public health and safety, environmental protection, and siting, construction, operation and maintenance of" the ROW (43 U.S.C. § 176(a)) Consideration of such terms and conditions will be part of the alternatives analyzed in this Draft EIS.

2.4 Existing Facilities

The only existing facility in the area associated with this proposed project is a groundwater well (BLM No. 88177, expires 12/31/2013) that was established in 2010 to substantiate the presence and quantity of groundwater in the area in support of permit requests for use of the water and to support evaluating environmental impacts (Figure 2-2). The well is approximately 500 feet deep and 6 inches in diameter. The well would be used as a water source during construction of the facility. Development of the project would include establishing a pump house and associated infrastructure as described later in this chapter. Upon completion of construction the well will be plugged and abandoned in accordance with provisions contained in Nevada Administrative Code (NAC) 534.4365 (WorleyParsons 2010a). The project proposes to construct a new well closer to the center of the project (the power block) as the source of water for the proposed operation of the facility.

2.5 Proposed Action

2.5.1 Project Overview

The proposed solar power project uses CSP technology, which uses heliostats/reflecting mirrors to redirect sunlight on a receiver erected in the center of the solar field (the power tower or central receiver). A heat transfer fluid (HTF) is heated as it passes through the receiver and then is circulated through a series of heat exchangers to generate high-pressure superheated steam. The steam is then used to power a conventional Rankine cycle steam turbine/generator, which produces electricity. The exhaust steam from the turbine is condensed and returned via feedwater pumps to the heat exchangers, where the high-pressure superheated steam is generated again. Hybrid cooling processes are to be used for this project to minimize water use while continuing to maintain efficient power generation. Figure 2-3 presents a conceptual diagram of the process.

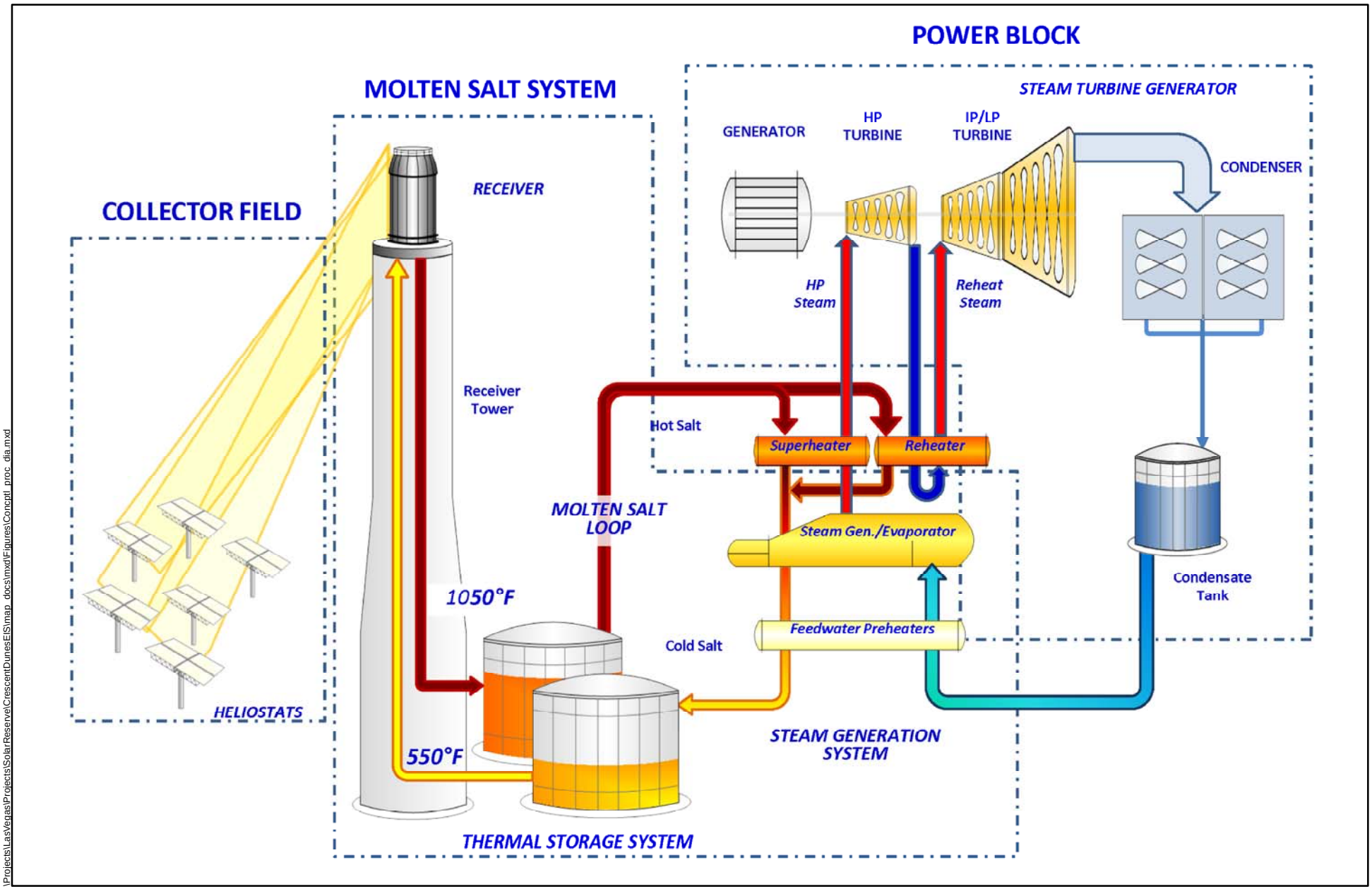

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Figure 2-3 Conceptual Process Diagram
Crescent Dunes Solar Energy Project

Source: Solar Reserve

Both the central receiver and type of HTF used in the cycle distinguish TSE technology from other CSP technologies. The salt is a combination of sodium and potassium nitrate ($NaNO_3$ and KNO_3) (similar to commercial fertilizer), with a melting temperature of approximately 460°F. It is melted to a liquid form and circulated through the tubes in the central receiver, collecting the energy gathered from the sun. The heated salt is then routed to an insulated storage tank (hot thermal storage tank) where the energy can be stored with minimal energy loss. When electricity is to be generated, the hot salt is routed to the heat exchanger (or steam generator) and used to produce steam at high temperature. After exiting the steam generator, the salt is sent to a "cold" salt thermal storage tank and the cycle is repeated.

The other key characteristic of the TSE's technology is a central tower. The approximately 653-foot-tall tower and the size of the solar array or heliostat field have been optimized by TSE in conjunction with Rocketdyne to operate at a commercial scale and produce renewable energy at a competitive price.

A brief summary of the various components and aspects of the proposed project is provided below in Section 2.5.2, Project Component Summary, and additional detail on each is provided in Section 2.5.3, Project Component Additional Detail.

2.5.2 Project Component Summary

Generating Facility Components

- Solar Collecting Tower (Figure 2-4) – The concrete tower would be approximately 538 feet tall and would house a 100-foot-tall cylindrical solar receiver and a 15-foot maintenance crane. The total height would be approximately 653 feet, and would have appropriate lighting for aviation safety and lightning protection.
- Solar Array (Figure 2-5) – The array would consist of a circular field encompassing an area with a radius of 4,300 feet (approximately 330 acres) where the heliostats (or mirrors) would be located.
- Power Block (Figure 2-6) - The power block, in a circular area with a radius of about 400 feet, would house the central receiver tower, storage tanks, steam turbine, ACC, transformers, heat exchangers, power block buildings, and other ancillary equipment.
- Osmosis Water Treatment System and Evaporation Ponds – These facilities would purify the groundwater to be used in the production of electricity.
- Hybrid Cooling System – The system would include an evaporative cooling tower and ACC.
- Thermal Storage System – The storage system would include two large, insulated storage tanks and associated piping for the liquefied salt, one "hot" tank for the storage of the materials prior to use in generating the steam, and a "cool" tank for storing salt prior to resending it to the central tower for heating.

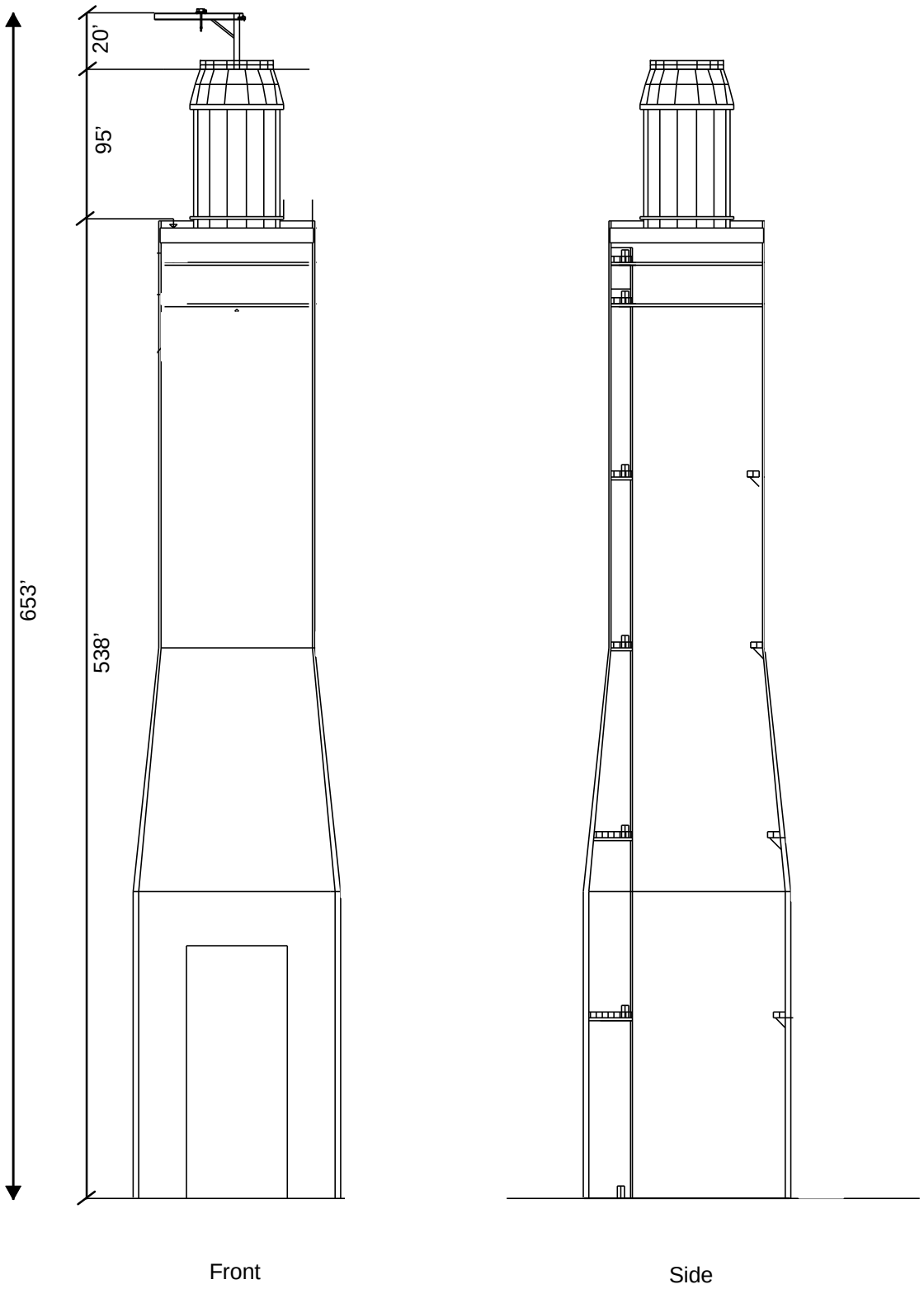

Figure 2-4 Central Receiving Tower
Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

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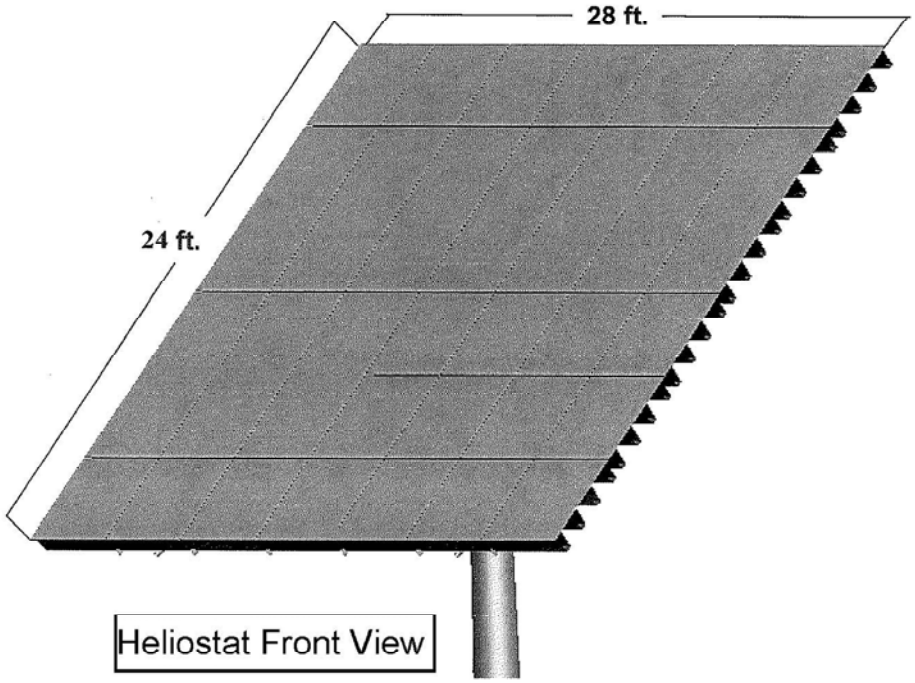
62m² Heliostat – "Pathfinder 2"



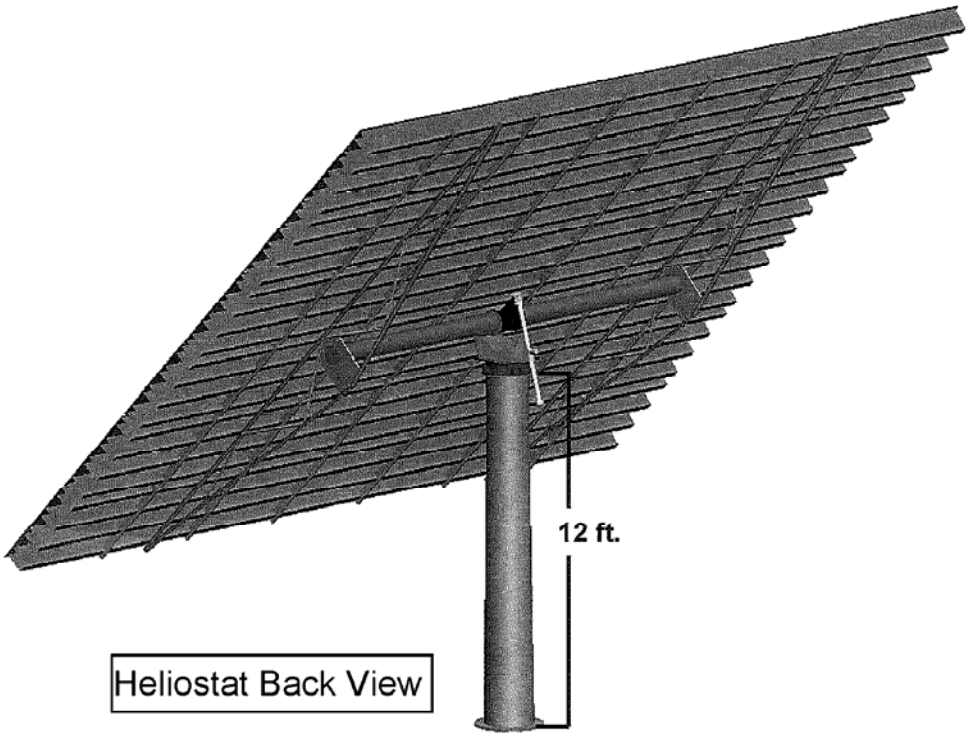


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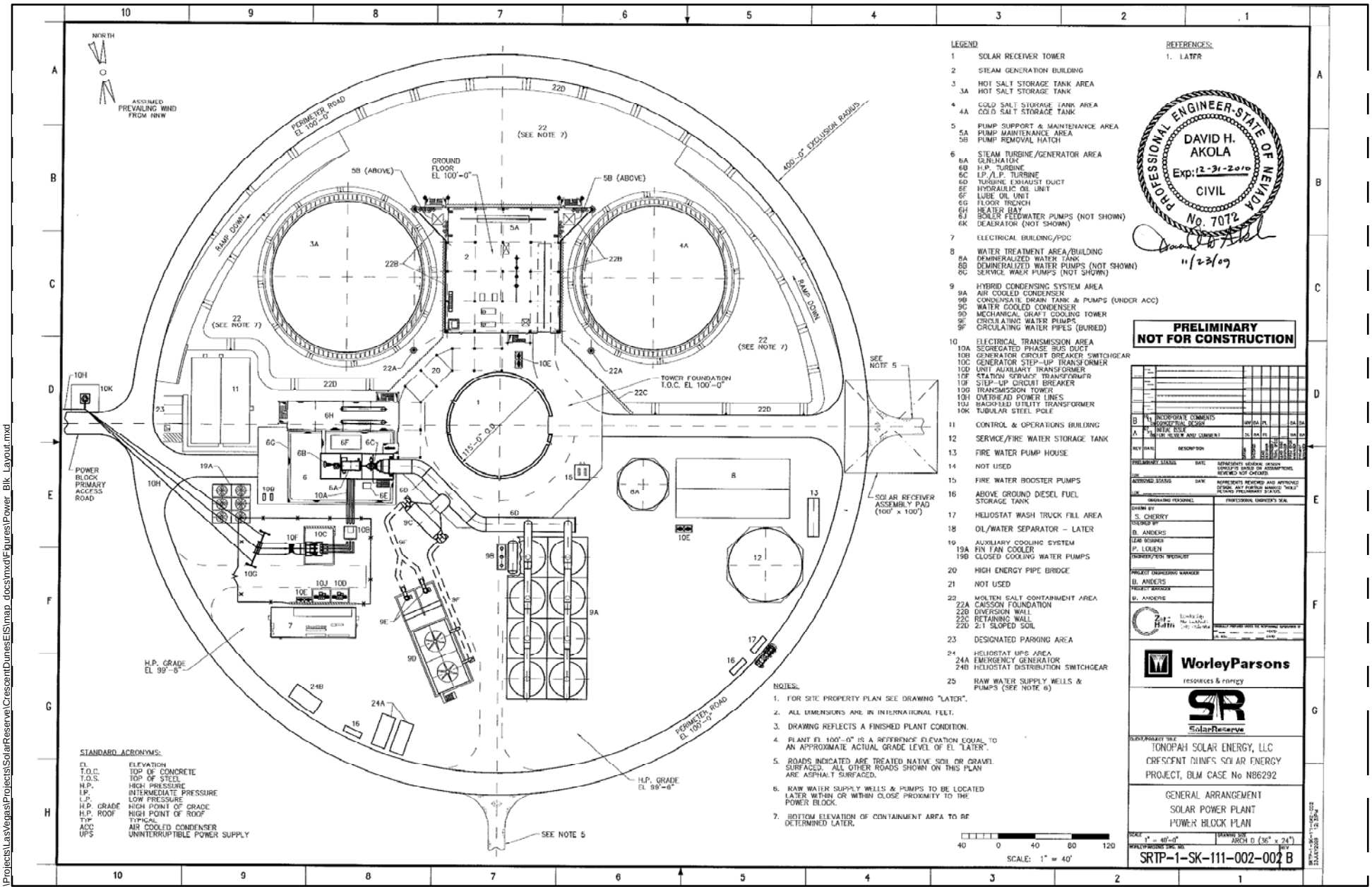
Figure 2-5 Heliostat
Crescent Dunes
Solar Energy Project

Source: TSE Plan of Development



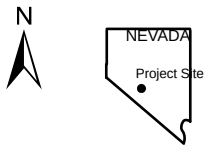


Figure 2-6 Power Block Layout
Crescent Dunes
Solar Energy Project

Source: TSE Plan of Development

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Major Electrical Systems and Equipment

- Generator Step-Up (GSU) Transformer – A GSU Transformer would be designed and installed in accordance with current standards and guidelines for a project of this size. The GSU steps up the voltage to 230 kV for delivery to the electrical grid.
- Unit Auxiliary Transformers (UATs) – UATs would be used to convert electricity to a lower voltage for use in the plant auxiliary systems.
- Electrical Building – A small building would be constructed in the power block to house switchgears, motor controllers, control panels, power and lighting panels, control equipment, a battery back-up system, and other similar items.
- Emergency Power Generator(s) – Diesel-powered generator(s) would be used to provide emergency power in addition to the battery back-up system.
- Lighting Systems – The lighting system for the facility would be limited to those areas required for safe operation of the facility. Where lighting is required, it would be designed and installed to minimize visual impacts in the region.
- Communication Systems – The Supervisory Control and Data Acquisition (SCADA) system, which controls power generation and transmission processes, would use fiber-optic or copper lines in the facility. Other communications during construction and operation would occur through new fiber-optic or copper lines installed in the TL corridors, or through a satellite (dish) system.

Transmission Systems and Interconnections

- Transmission Route (Figure 2-7) – The outgoing TL would follow the proposed project site access road to Pole Line Road, head north along Pole Line Road to where the Millers to Anaconda TL is located, and then parallel the Millers to Anaconda TL to the Anaconda Moly Substation, for a distance of approximately 9.5 miles.
- Interconnections (Figures 2-8, 2-9, and 2-10) – The project would interconnect to the Anaconda Moly Substation located approximately 6 miles due north of the generating facility location.
- A temporary 60 kV transmission line for construction power, to be located within the permanent ROW.

Civil/Structural Features

- Access Roads (Figures 2-11 and 2-12) – A paved, two-lane access road would extend approximately 1,500 feet from Pole Line Road to the facility. An existing access road that follows the Millers to Anaconda TL, would be used for access during construction and for maintenance of the TL. Pole Line Road would also be used for access to the TL where the TL would follow Pole Line Road.
- Building and Enclosures – A control building, a warehouse, and other buildings would be developed within the project area to support operations of the facility.
- Storage Tanks – Tanks would be constructed to store demineralized water, non-demineralized water, salt or HTF, lube oil, and other materials for the power block.

- Site Drainage (Figures 2-13 and 2-14) – The heliostat array would be graded such that existing drainage patterns will be maintained, but the area in the power block will graded to divert stormwater to ditches.

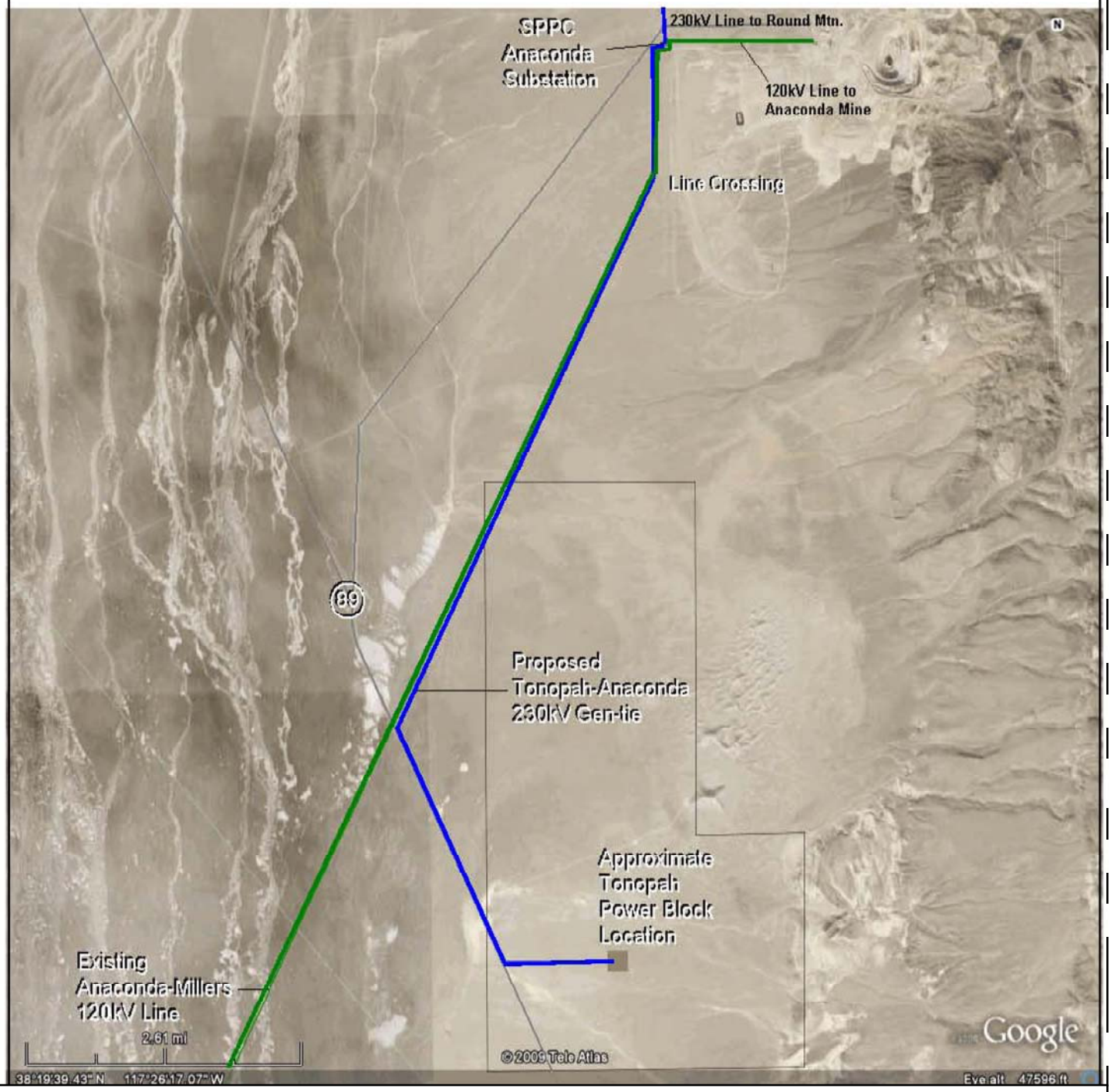

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Figure 2-7 Transmission Route
Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

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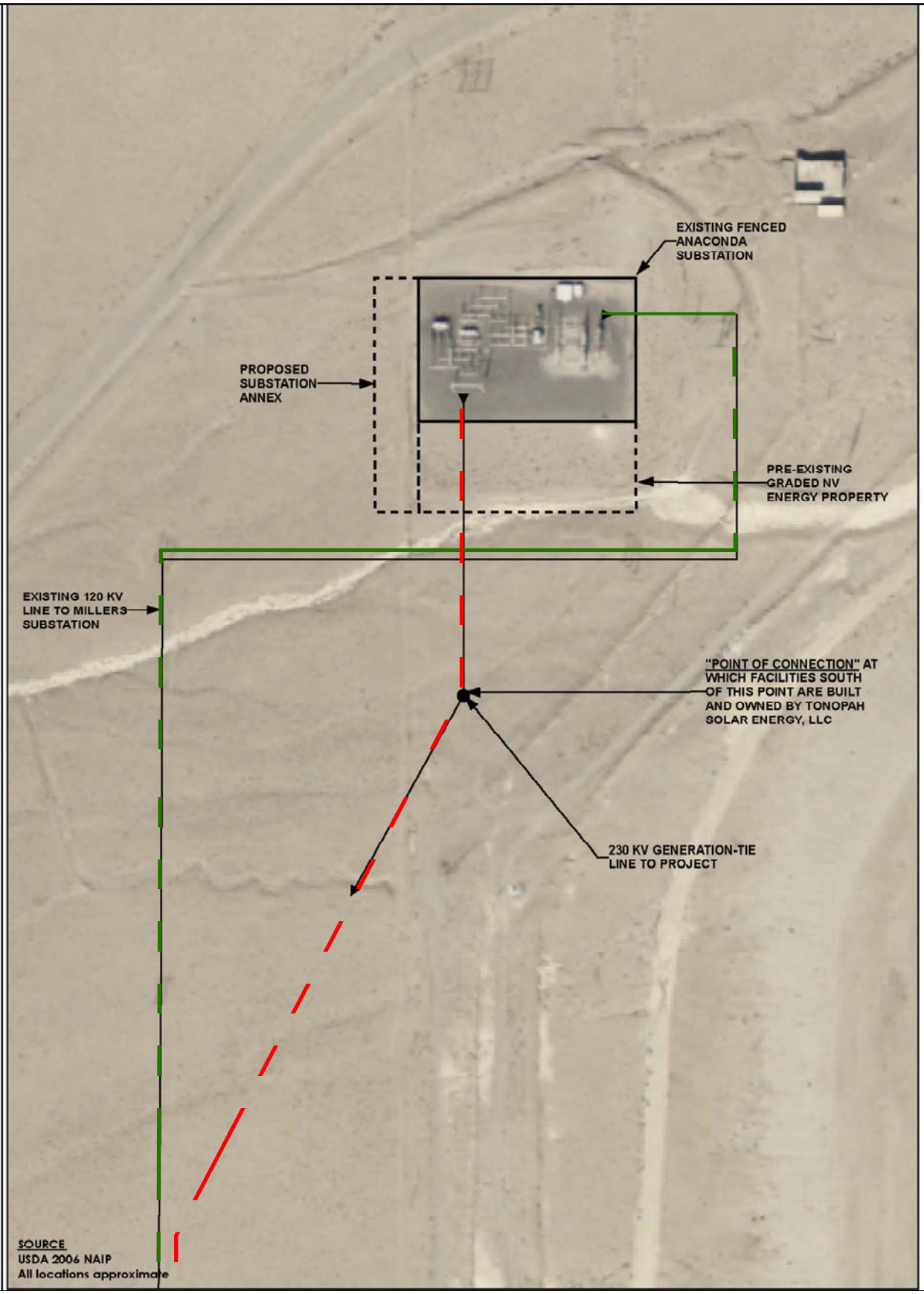

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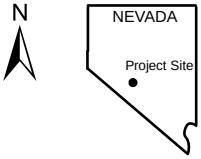

Figure 2-8 Substation Layout

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

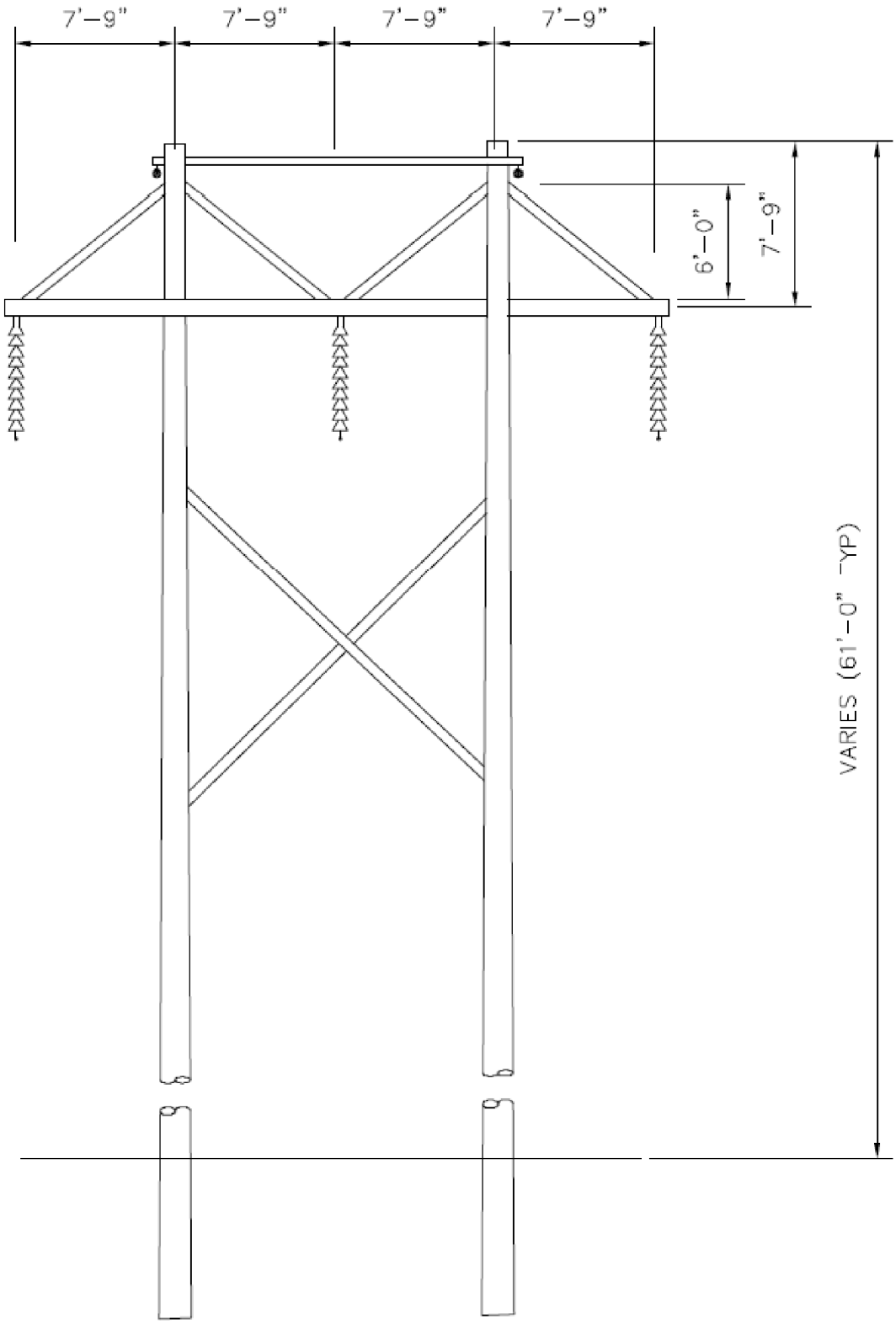

Figure 2-9 Pole Elevation
Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

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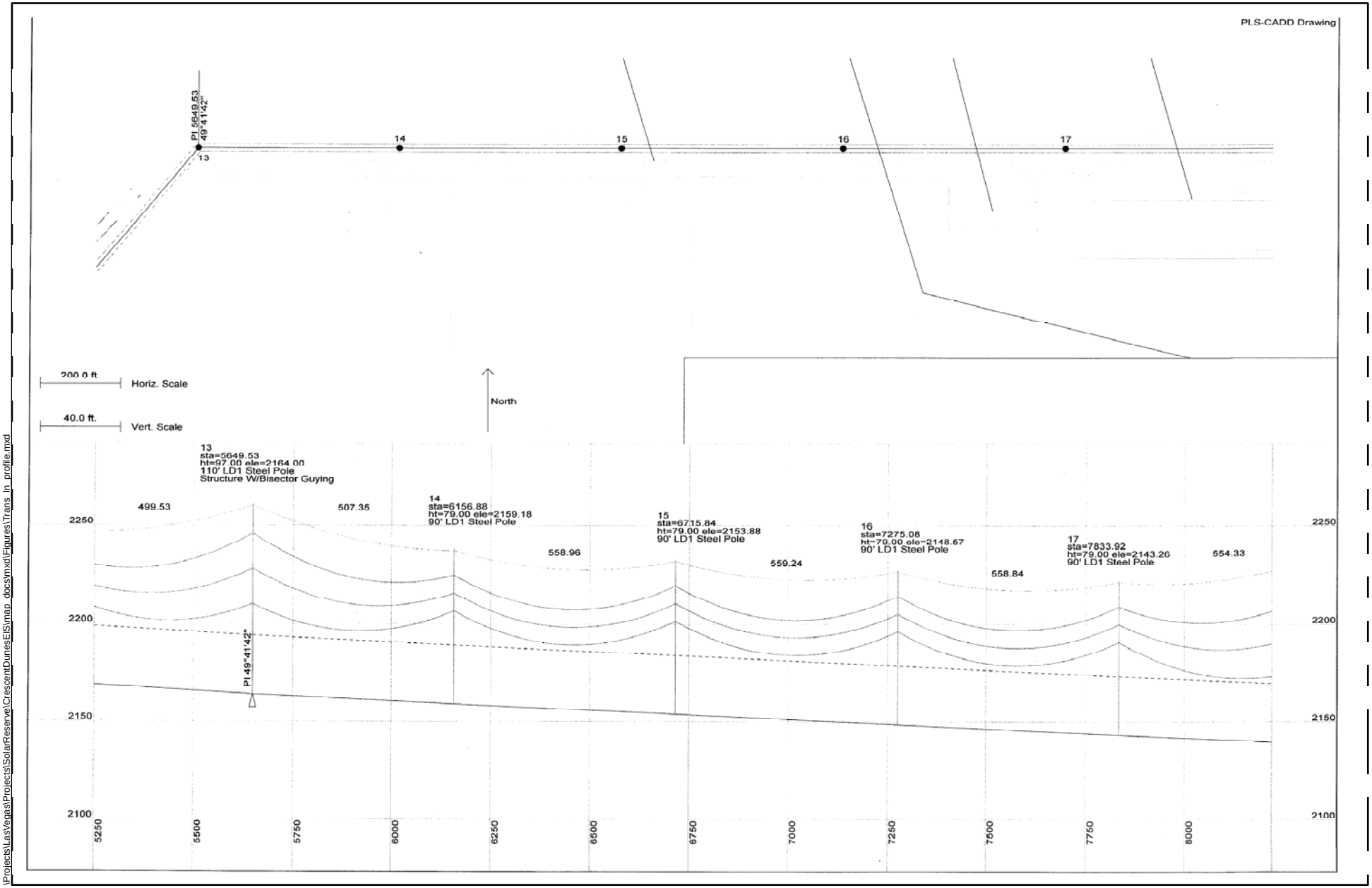

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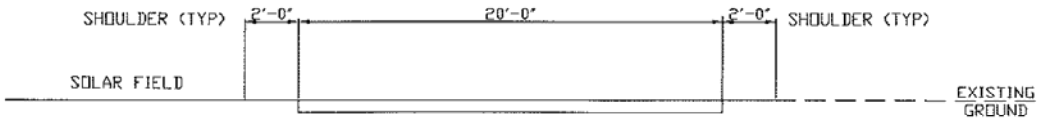
Figure 2-10 Transmission Line Profile

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development



1 PERIMETER ROAD- AGGREGATE SURFACE DETAIL

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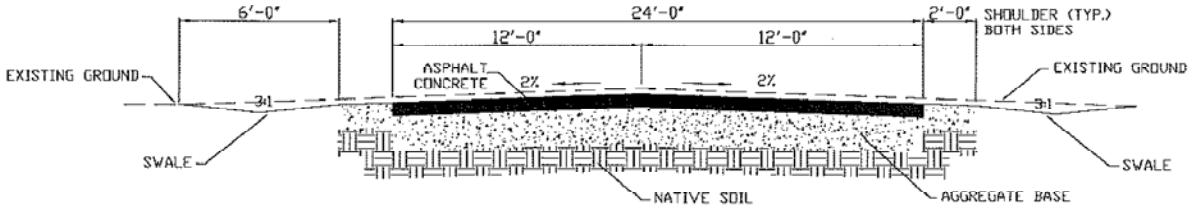

2 ACCESS ROAD SECTION (TYP.)

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DRAWN BY: C. MAHER

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Figure 2-11 Road Sections

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

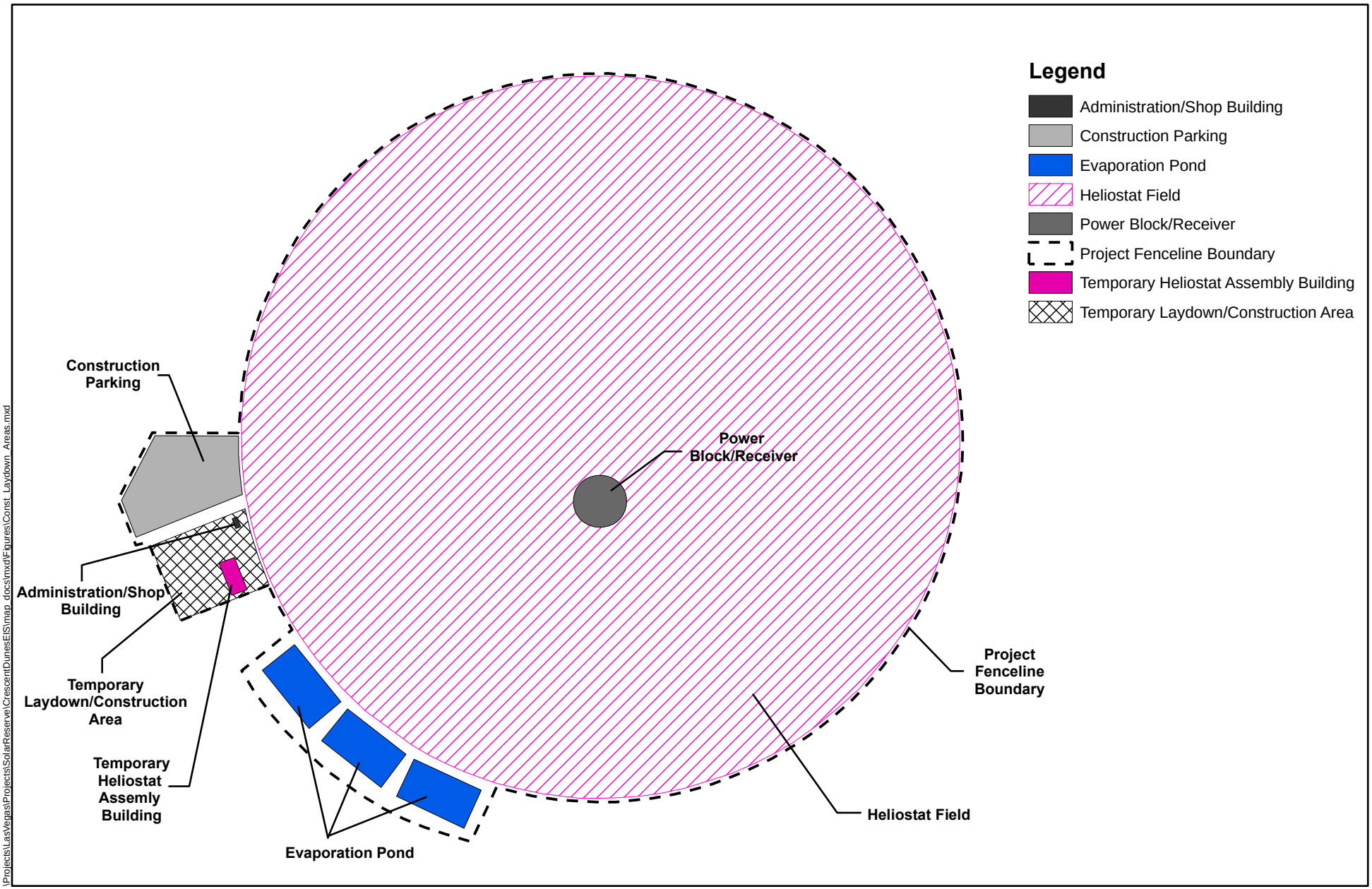

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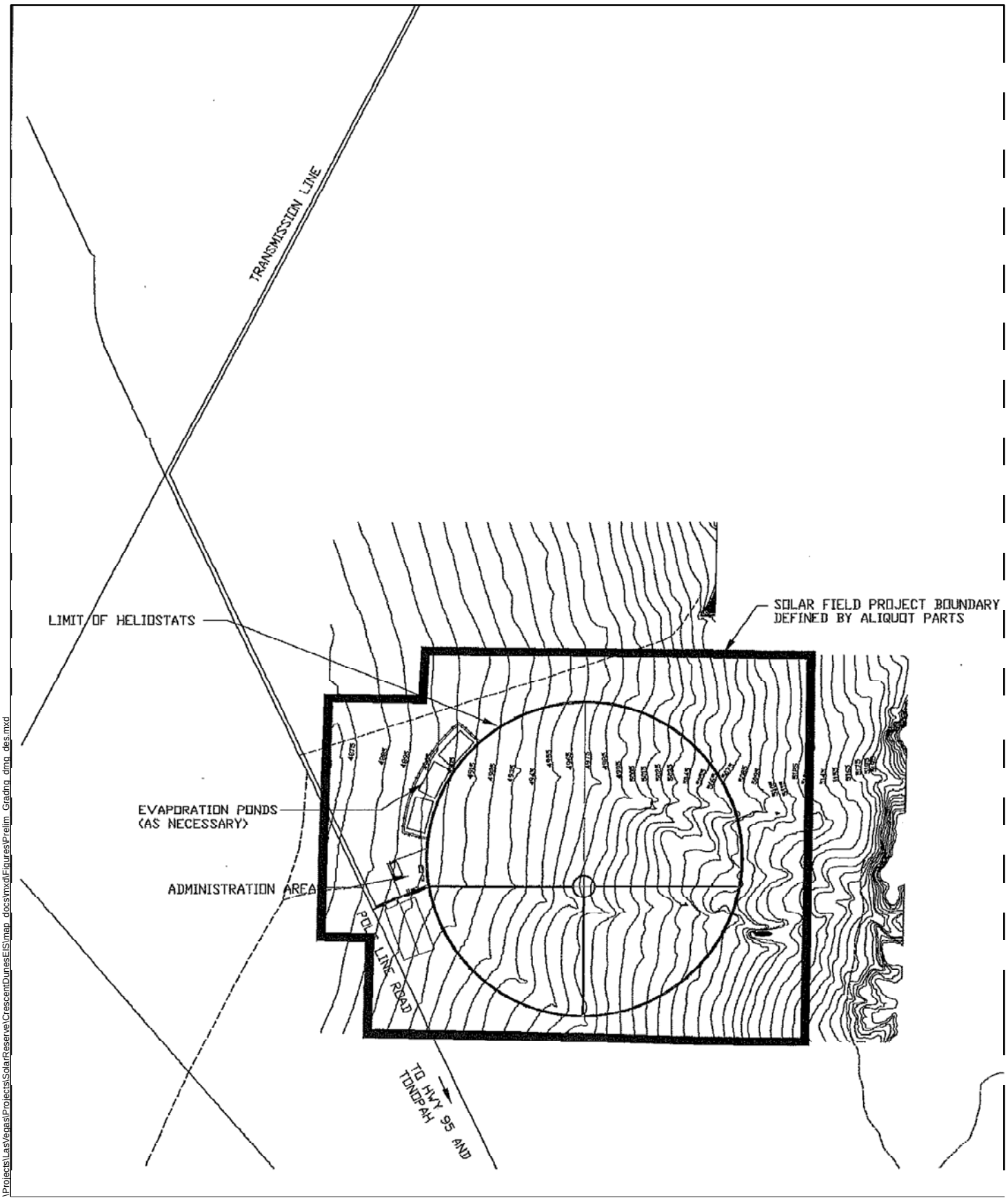
Figure 2-12 Example Temporary Constuction Areas
Crescent Dunes
Solar Energy Project

Source: Solar Reserve



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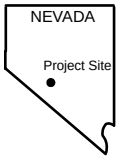
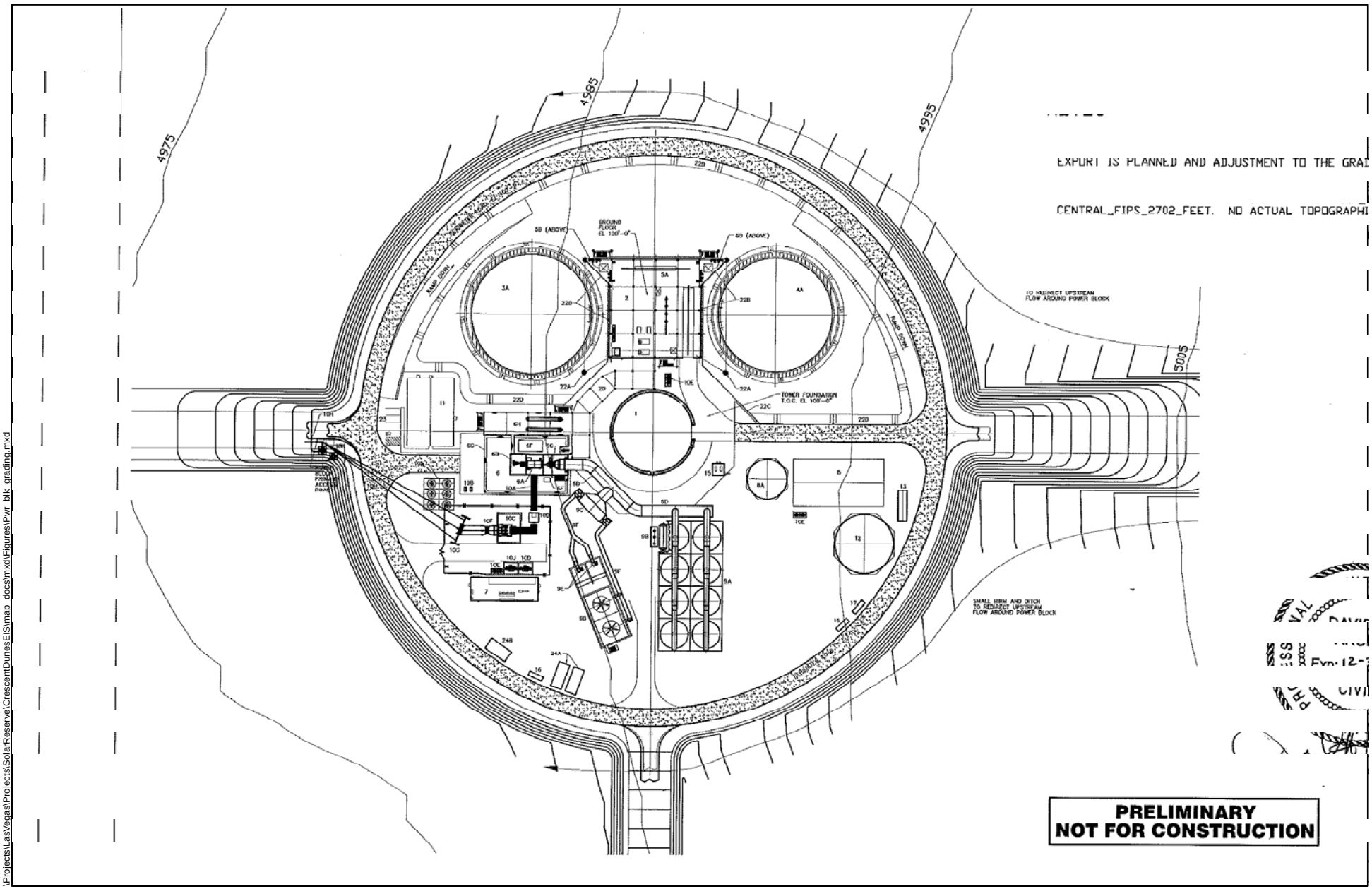


Figure 2-13 Preliminary Grading & Drainage Design for Proposed Project

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development



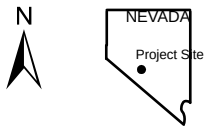


Figure 2-14 Power Block Grading and Drainage

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

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Construction Activities

- Construction Facilities – Facilities would include an office trailer, material lay down areas (Figure 2-12), rock processing equipment, portable concrete batch plant, temporary aboveground storage tank for diesel fuel, portable sanitary toilets, and a temporary septic system.
- Borrow Site – A material borrow site would be required for extracting aggregate for the construction of the access road and the base of the proposed facility. This material would come from a borrow site located next to an existing pit used by Nye County Public Works.
- Construction Process and Conceptual Schedule – Construction is scheduled to last 30 months, with teams expected to work 10 hours per day, 5 days per week. Work activities may be up to 24 hours per day and up to 7 days per week to make up on schedule, perform certain tasks at night, and to prepare for specific activities for the next day.
- Construction Work Force and Equipment – The work force would vary throughout the construction process, with a maximum expected to reach 400–500 workers.

Operations and Maintenance

- Operation – The plant would be operated 7 days per week for 10 or more hours per day using a workforce of 40–45 full-time employees. The plant would be staffed 24 hours per day.
- Maintenance – Routine inspection and maintenance would be implemented on all components of the project.

Water Sources and Water Demand

- Water Demand – During construction, water requirements are estimated at 500 acre-feet per year (AFY) for the first year and 150 AFY in the remaining construction years. During operation, water demand is not expected to exceed more than 600 AFY.
- Water Sources – Approximately 854 AFY of existing water rights in the basin would be acquired and used for this project, subject to approval from the Nevada Division of Water Resources (NDWR).

Other Components

- Hazardous Materials/Waste Management – Various hazardous materials that are relatively standard for industrial facilities would be used during construction and operation of the facility. All materials and the resulting wastes (hazardous and non-hazardous) would be stored, used, and managed in accordance with local, state, and federal regulations, guidelines, and Best Management Practices.
- Wastewater – Two types of wastewater will be generated, industrial and domestic. The industrial wastewater will be generated from the cooling tower blow down and from the first pass reverse osmosis system. The wastewater from this process will be piped to three 10-acre lined evaporation ponds. Domestic wastewater will be generated from toilets, showers, kitchens and sinks, and will be directed to an onsite sanitary septic system and onsite leach field.
- Fire Protection and Security – A Fire Protection and Prevention Plan will be prepared for construction and operation of the facility. The plans will include measures relating to

safeguarding human life, preventing personnel injury, preservation of property and minimizing downtime due to fire or explosion. Fire protection measures will include fire prevention methods to prevent the inception of fires. Of concern are adequate exits, fire-safe construction, reduction of ignition sources, control of fuel sources, and proper maintenance of fire water supply and sprinkler systems.

Decommissioning and Reclamation

- Decommissioning – The project would likely operate for 30 to 50 years, after which time the facilities and materials would be removed from the site using Best Management Practices and be made available for reuse elsewhere or disposed of in accordance with appropriate regulations.
- Reclamation – The area would be recontoured to reflect the preconstruction condition, topsoils would be redistributed, and disturbed areas would be revegetated according to a reclamation plan established in coordination with BLM (being developed by the proponent).

2.5.3 Project Component Additional Detail

The overall site layout for the proposed facility is shown on Figure 2-2. Additional details on the project components may be found in the project Plan of Development (TSE 2009).

2.5.3.1 Generating Facility Components

2.5.3.1.1 Solar Collecting Tower

The solar power tower would be a concrete or steel structure, approximately 538 feet high, which would support a cylindrical receiver, approximately 100 feet tall, mounted on the top of the tower (Figure 2-4). The receiver would consist of tube panels through which the liquid salt or HTF would flow. Therefore, the top of the receiver would be at a height of approximately 638 feet. A maintenance crane would also be mounted on top of the receiver, which is expected to be 15 feet tall. Structures in excess of 200 feet would require a filing with the Federal Aviation Administration (FAA) to obtain a determination of no hazard prior to construction.

2.5.3.1.2 Heliostat (Mirror) Array

The solar collecting tower/central receiver system would generate electric power from sunlight by focusing concentrated solar radiation on a tower-mounted receiver. The system would use thousands of sun-tracking mirrors called heliostats, which would be arranged concentrically around the central receiver tower and reflect the incident sunlight onto the receiver.

The proposed facility would consist of up to approximately 17,500 heliostats occupying approximately 1,400 acres. Each heliostat would be approximately 670 square feet (ft^2) in size, yielding a total reflecting surface of about 12,000,000 ft^2 (1,100,000 m^2). The size and shape of the heliostats are shown in Figure 2-5.

The arrangement of the heliostats within the array would be optimized to maximize the amount of solar energy that could be collected by the field, and would be arranged to avoid interference among

heliostats as they track the sun during the day. The heliostats would be arranged in arcs around the solar receiver asymmetrically:

- The first row or line of heliostats would have a radius of approximately 420 feet.
- The longest arc/line of heliostats, with a radius of approximately 5,100 feet, would be in the northern section of the heliostat array. This is due to the greater collection efficiency of heliostats located north of the receiver tower for sites in the northern hemisphere of the world. With the sun predominantly in the southern sky, the cosine effect of incidence and reflection angles would be less in the northern heliostats than in the southern ones. The converse—lower collection efficiency in the southern section—is also true; therefore, the maximum southern arc radius would be the shortest (3,580 feet), and the southern heliostat field would be the smallest.
- The eastern sector of the heliostat would be more valuable than the western sector for energy collection because afternoon energy collection, during on-peak utility hours, is more valuable than morning energy collection, during part-peak or off-peak hours. Therefore, the maximum eastern row arc radius may be greater than the maximum western row arc radius.

2.5.3.1.3 Power Block

The power block would include a steam turbine generator (STG), multiple feedwater heaters, steam superheaters, lubricating oil system, hydraulic control system, valving, and feedwater pumps. Steam would be generated at a temperature of 1,050°F and a pressure of 1,685 absolute pounds per square inch (psia) before entering the high-pressure section of the turbine. Steam exiting the high-pressure section of the turbine would be reheated to increase its temperature before entering the immediate-pressure section of the turbine. Exhaust steam from the turbine would be directed to the cooling system. The turbine would drive a generator, which would deliver electrical power via a main step-up transformer in the on-site substation to the utility grid. Extraction steam from the steam turbine would be used to preheat the feedwater and for deaerating the feedwater.

This high-efficiency turbine would be designed for reliable operation under conditions of daily start up and shutdown over the life of the plant. The solar field and power generation equipment may be started each morning after sunrise and insolation build-up. The solar field would be shut down in the evening as the sun sets, although the integral thermal energy storage system would allow the steam turbine to continue operating if there is demand for electricity.

The primary components of the power block include (see Figure 2-6):

- Solar Steam Generator System – The steam generator would be the core of the steam supply system for the power block. The steam generator system would include a preheater, evaporator, superheater, reheater, and steam drum. High-pressure feedwater would enter the steam generator from the preheaters and would leave as saturated steam that subsequently flows to the superheaters.

- Solar Preheater – The solar preheaters would have a shell and tube design. High-pressure feedwater would enter the preheaters from the low-pressure feedwater heaters and would leave as high-pressure feedwater.
- Evaporator – The evaporator would receive heated, high-pressure water from the preheater and would evaporate the water into saturated steam. The evaporator would have a shell and tube design.
- Solar Superheaters/Reheaters – The saturated steam would flow to a shell and tube superheater to reach the desired steam-turbine temperature and pressure-operating conditions. The reheater would receive "cold" outlet steam from the high-pressure turbine stage and reheat the steam before being reintroduced into the intermediate-pressure stage of the turbine.
- Steam Turbine – Once the pressurized steam had reached the optimum temperature in the superheater, it would flow to the steam turbine, which would extract thermal energy from the steam.
- Feedwater Heaters – The feedwater would be heated to the required conditions using conventional turbine extraction steam in low-pressure feedwater heaters.
- Deaerator – A direct contact steam deaerator would be included to eliminate dissolved oxygen in the condensate and steam.

2.5.3.1.4 Cooling System (Hybrid)

Heat rejection in the facility would use a hybrid cooling system (wet cooling combined with dry cooling). The cooling system would consist of a steam turbine, exhaust transfer duct exiting the steam turbine, air-cooled condenser, small evaporative cooler, condensate tank, and condensate pump. The system would receive saturated turbine exhaust from the steam turbine, where it would be piped through a transfer duct to a finned-tube air-cooled condenser. The air-cooled condenser would blow ambient air across a heat-transfer surface area, which cools and condenses steam. The finned tubes are usually arranged in the form of an "A-frame" over forced draft fans to reduce land area requirements. The evaporative cooling system would take the form of a small cooling tower to augment the heat rejection system of the air-cooled condenser. The evaporative cooling system would operate only during periods of high electrical demand and would increase the electricity generated and cycle efficiency during periods. The condensed steam would be gathered in a condensate tank and be provided to the feedwater circuit through a condensate pump. A typical air-cooled condenser can condense steam within 30°F to 50°F of the ambient dry-bulb temperature.

2.5.3.1.5 Thermal Storage System

The thermal storage system would use hot and cold liquid salt tanks to store solar heat energy for later steam generation as well as associated pumps and piping. Thermal storage would provide the facility with several enhancements. The solar field would be nominally sized to provide excess solar energy to the system during summer months, and such sizing would intentionally result in collection of excess heat that could not be used instantly by the power block. The thermal storage capability would allow the excess heat to be stored until used for power generation. Thermal storage can also extend the generation day of TSE power plants. The heated salt can be stored in insulated tanks to provide a steam heating source after the sun sets, allowing the facility to more closely satisfy the load demands of the

electricity grid system, which typically peak in the late afternoon and evening hours. The thermal storage system would include an auxiliary electric heat source to keep the salt in a molten state through protracted maintenance outages.

The thermal storage system would contain two storage tanks—one "cold" tank storing liquid salt at 550°F and one "hot" tank storing liquid salt at 1,050°F. As the sun rose, cold liquid salt (or HTF) would be pumped from the cold liquid salt tank through the tubes inside the receiver. After absorbing energy from the concentrated sunlight, the temperature of the HTF would be increased to the design outlet temperature of 1,050°F. Part of the heated HTF would then be pumped to a hot liquid salt tank for storage and part to a steam generating system that would produce superheated steam for use in the conventional Rankine cycle turbine/generator system. After exiting the steam generator, the HTF would be returned to the cold tank where it would be stored and eventually reheated in the receiver. This arrangement would allow excess heat to be stored for power generation outside of the direct solar-heating period of the day. The system would also include piping, valves, pumps, expansion tanks, and heaters.

The HTF would consist of $NaNO_3$ and KNO_3 in a "eutectic" mixture designed to remain liquid or molten over a wide temperature range. The HTF mixture has a melting point of 460°F and must be preheated and maintained above this minimum temperature in order to remain in liquid form.

2.5.3.2 Major Electrical Systems and Equipment

The bulk of the electric power produced by the facility would be transmitted to the electric grid under the control of Sierra Pacific Power Company, doing business as NV Energy. During operation, a small amount of electric power would be used to power station auxiliary loads such as pumps and fans, control systems, and general facility loads including lighting, heating, air conditioning, heliostat movement, and other uses. Additionally, electric power would be used for heat tracing, which would provide energy to maintain the salt in a fluid state during protracted maintenance outages. Some power would be converted from alternating current (AC) to direct current (DC), which would be used as backup power for control systems.

2.5.3.2.1 Electrical Components

Power would be generated by the STG and stepped up through the GSU transformer to the utility high voltage system. The generator would be connected to the step-up transformer by isolated phase bus duct. A low-side generator breaker would be provided between the generator and the GSU transformer.

2.5.3.2.2 Generator Step-Up Transformers

A two winding, delta-wye GSU transformer would be designed according to the Institute of Electrical and Electronics Engineers Standards (IEEE) C57.12.00-2000 and supplied for the STG. The neutral point of each high voltage winding would be solidly grounded. The GSU transformer would have metal oxide surge arresters adjacent to the high-voltage terminals.

Accessories would include a local visual annunciator, magnetic liquid-level gauge, pressure-relief device, sudden pressure relay, oil preservation device, valves for top and bottom filter press connections,

drain/sampling valves, grounding pads, bushing-mounted current transformers, combustible gas detector, on-line dissolved gas/water monitor with 4–20 milliamp signal out to the controller, and hot spot winding temperature elements.

The GSU would include manual de-energized tap changers located in the high-voltage windings with taps ranging from 5 percent above normal to 5 percent below normal in 2.5 percent increments. GSU transformer auxiliaries would be powered from two 480-volt (V), three-phase, three-wire sources for each transformer. Each power supply would be fed from separate sources and routed in separate conduits.

2.5.3.2.3 Unit Auxiliary Transformers

One or more two winding, delta-wye UATs would be designed according to the IEEE Standards C57.12.00-2000 and supplied for 4,160 V service. The UAT would be rated to supply facility startup and maximum operating power requirements. A system calculation showing all connected equipment loads for the UAT would be used to determine the requirements prior to procurement of the UAT. The neutral point of the UAT low voltage winding would be 1,000-amp, low-resistance grounded.

2.5.3.2.4 Electrical Building

A plant electrical building would house the 4,160 V switchgear, 4,160 V motor controllers, low voltage switchgear, low voltage motor control centers, control panels, power and lighting panels, uninterruptible power supply (UPS), DC station batteries, DC switchboard, other miscellaneous equipment, steam turbine control equipment, and the control Input/Output (I/O) cabinets. The electrical building would be a single-story facility, approximately 4,000 ft^2 in size, 94 feet long and 34 feet wide.

2.5.3.2.5 Medium Voltage Switchgear

The medium voltage switchgear would be single-ended, rated 4,160 V nominal, three-phase, three-wire with ratings not to exceed 3,000 amps, continuous, and the calculated fault current duty. The medium voltage switchgear would receive power from the UAT through non-segregated phase bus duct.

The medium voltage switchgear lineups would be located indoors, would use vacuum interrupters, and would be rated to allow continuous distribution of the full auxiliary load. Each lineup would contain auxiliary power metering and voltage transformers, a main incoming breaker, and feeder breakers as necessary to distribute the load. All medium voltage breakers would be electrically operated from the control system and equipped with a stored energy mechanism. Breakers would be provided with remote racking mechanisms.

2.5.3.2.6 Emergency Power Systems

The emergency power for the facility switchyard and many other plant critical loads would be supplied by the 125-V DC station battery system. Additionally, emergency generator(s) (diesel) would be employed to provide emergency power to the facility.

2.5.3.2.7 Lighting Systems

The facility's lighting system would provide operation and maintenance personnel with illumination for both normal and emergency conditions. Lighting would be designed to minimize light pollution by using sensor lights and directional lighting in cases where this would not compromise safety or security. Although the proposed project site is in a remote area, lighting on-site would be limited to areas required for safety and would be shielded from public view to the extent possible. Outdoor lighting would be photocell controlled through contacts that control the outdoor lighting.

Lighting will not be provided for the solar field, but is expected to be provided in the following areas:

- building interior equipment, office, control, maintenance, and warehouse
- tower
- building exterior entrances
- outdoor equipment within the power block and tank area
- power transformers
- power block roadway
- parking areas within the power block area
- tank area
- entrance gate
- water treatment area
- ACC

2.5.3.2.8 Communication Systems

Mirror tracking and plant process control would be accomplished by a Distributed Control System (DCS), which would interface Programmable Logic Controllers (PLC), field instrumentation, a meteorological station, and communications devices designed for site monitoring, control, and historical trending of the solar power plant.

All data collected from the field would be transmitted to the site control room via a fiber or copper communications infrastructure. The control room would also contain a router for the point of connection to a T1 line or equivalent as well as phone lines for communication to the outside.

During construction, communication systems would be either hard wire or satellite communication system (dish). For the plant operations, it is expected that a hardwired communication source would be designed and installed to support the project. The hardwired communication line would be routed along the existing TL near the plant, and the new transmission corridor along Pole Line Road. This line would be designed and installed in cooperation with the applicable communications provider.

Communications would be provided by satellite if a hardwired communication line cannot be brought to the site along existing overhead power line structures. Additionally, a communication line would be constructed on the generation-tie line transmission poles between the proposed project site and the Anaconda Moly Substation. The purpose of this fiber optics line would be to provide NV Energy the ability to "communicate" between the Anaconda Moly Substation and the facilities on-site. Additionally,

it is anticipated that a new communications dish would need to be installed on an existing tower at the Millers Substation, located southwest of the proposed project site. The purpose of this new dish would be to provide a second means of communication between the Anaconda Moly Substation and the proposed project site.

2.5.3.3 Construction Power Supply

A 60 kV power line is located adjacent to and west of the existing Millers to Anaconda TL. This power line is owned and operated by NV Energy and would be used to provide a source of temporary power for construction and for a backup to auxiliary plant/house power load requirements. A separate overhead power line would be installed adjacent to the project TL to deliver power from this 60 kV line to the plant site. Transformers would be installed to step down the power to the voltage necessary for use.

2.5.3.4 Transmission Systems and Interconnection

2.5.3.4.1 Interconnection

The proposed project is planned to interconnect to the existing NV Energy Anaconda Moly Substation (ROW 033242) that is located north of the proposed project site. In this case, a new TL would be constructed between the proposed project site and the substation. The proposed route for the new TL would follow the site access road to Pole Line Road, head north along Pole Line Road to where the existing Millers to Anaconda TL is located, and then parallel the Millers to Anaconda TL to the Anaconda Moly Substation, to interconnect with the electricity grid (see Figures 2-7 and 2-8).

Therefore, for a majority of the distance between the proposed project site and the Anaconda Moly Substation, the new TL would parallel the existing TL (ROW 033242) (see Figure 2-7).

The facility switchyard and the TL between the facility switchyard and electrical system interconnection would be engineered, procured, and constructed as part of this project. The high voltage interconnect from the facility to the electric utility would be made via an SF6-insulated, high-voltage breaker with a single-circuit, overhead line from the facility switchyard to the utility substation.

The anticipated pole configuration used for the new TL would be a steel “mono” pole or H-frame; a monopole structure is shown on Figure 2-9. The point of interconnection (POI) is at a “termination pole structure” located approximately 500 feet south of the existing Anaconda Moly Substation at N38^{o} 19' 20.281" and W117^{o} 20' 10.143". A preliminary layout representing the location and components involved in the interconnection is shown in Figure 2-8.

The Proponent is in discussions with NV Energy regarding construction and ownership of the new TL. At this time, it is expected that the new TL would be owned by the Proponent up to the POI, and NV Energy would own interconnection facilities between the POI and the substation.

2.5.3.4.2 Potential Transmission Route

The TL route to the NV Energy Anaconda Moly Substation is shown in Figure 2-7. The interconnection line would exit the power block and follow the access road to Pole Line Road. At this location, it would parallel Pole Line Road to the point where the existing Millers to Anaconda TL is located. The line would

then turn northeast and follow the existing TL to the existing Anaconda Moly Substation. A typical TL profile is illustrated on Figure 2-10.

2.5.3.5 Civil/Structural Features

2.5.3.5.1 Access Roads

Access to the proposed project site would be provided from Pole Line Road. Pole Line Road is a Nye County owned and maintained road and is asphalt surfaced from its intersection with SH 6/95 to north of the proposed project site. A short section of Pole Line Road from its intersection with SH 95 to a location south of the site 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. Pole Line Road is anticipated to continue to be maintained by Nye County.

The access road to the proposed project site would be connected directly to Pole Line Road near the southwestern corner of the site (see Figure 2-2). The paved surface of this road would be a two-lane road, constructed with adequate width for two directions of travel with a minimum of 2-foot shoulders on each side of the road. This paved road would be extended to provide access to the power block. All roads within the power block would be surfaced with asphalt. The entry gate location would be located a short distance east of Pole Line Road in order to eliminate a backup queue on Pole Line Road. The proposed minimum road width is 24 feet for the main access road and 20 feet for the internal (within fenced area) perimeter road—see Figure 2-11.

The predominant traffic to/from the proposed project site would occur during construction and would primarily be construction crew commuter traffic. Vehicle trips to and from the site would use SH 95 to access the site from the north (Reno) and south (Las Vegas), and SH 6 to SH 95 may be used for traffic coming from east of the town of Tonopah. The traffic associated with the project is not expected to produce permanent traffic impacts to SH 95 because the peak traffic is expected to be approximately 90 trucks per day and 400 cars per day and would be temporary. The proposed project site would receive deliveries of materials from local, regional, and possibly international points of origin including bulk commodity materials, engineered equipment and machinery, and general materials of construction. The proposed project site is not currently served by rail, so materials would be transported to the site by truck, including those materials brought in to the region by rail or ship. These materials would be loaded onto trucks at various ports and depots for delivery to site.

Heavy and oversize loads would be delivered using trucks and trailers equipped to handle specialized loads. Oversized loads would be individually permitted to transport each such load to the site. Heavy and oversized loads for the project are typical of a common power plant or process facility and may include items such as the step-up transformer, the solar receiver panels, steam turbine, generator, and tanks.

Additionally, unpaved roads would be constructed from the power block to the eastern and southern edges of the solar field. The unpaved solar field perimeter road would be constructed around the solar field, and would be surfaced with rock or treated native soil. A typical section of this road is shown on Figure 2-11.

2.5.3.5.2 Building and Enclosures

The following buildings and enclosures are planned as part of the project, and their locations are described below:

- Steam Generator Area Building (approximately 30,000 ft^2). This structure would be located between the HTF storage tanks within the power block. The building would provide structural support and protection for the equipment associated with the heat exchange process.
- Steam Turbine Area/Enclosure (not considered a building). This structure would house the STG and associated equipment, and would be located within the power block. The STG may be enclosed in a building for protection, or it may be located outdoors.
- Electrical Building (approximately 2,500 ft^2). This structure would be located within the power block area and would house the switchgear, motor control centers, battery power supply, and other primary plant electrical components.
- Administration/Maintenance Building (approximately 10,000 ft^2). This building would serve as the center for support staff for the project during operations. This facility is planned to be located outside the heliostat field, near the access road.
- Heliostat Assembly Building (approximately 80,000 ft^2). This building would be used as a protected environment for the assembly/construction of heliostats during construction of the plant. It would be converted to other uses upon completion of project construction.
- Permanent Warehouse (approximately 6,000 ft^2). This building would provide permanent warehouse space for the facility and would be located near the administrative/maintenance building.
- Control Room Building (approximately 6,000 ft^2). This building would be located within the power block and would provide the control room functions for the project. It would be located west of the Steam Turbine Area.
- Building Sanitation Facilities. The administrative/maintenance building located on the perimeter of the heliostat field and the control building located within the power block would each be served by a permanent septic system (tank and leach field).
- Water Treatment Building (approximately 12,000 ft^2). The building would house the water treatment facilities.

2.5.3.5.3 Material Storage

On-site storage for spare field and power block components would be required for maintenance uses. In addition, on-site storage facilities for water pretreatment chemicals, cooling water treatment chemicals, and boiler water treatment chemicals would be necessary. The HTF material (salt) would be delivered to the project as dry, solid pellets. The material 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 were heated, liquefied, and sent to the storage tanks.

Potentially polluting substances would be managed in accordance with all applicable laws, ordinances, regulations, and standards to protect worker health, prevent leaks and spills, and protect stormwater quality as discussed further in Section 2.5.8, Hazardous Materials Management.

Construction lay down and storage would occur throughout the permanently disturbed areas. The power block and the heliostat field immediately adjacent to the power block would be used for lay down and storage of the power block components. Equipment would be stored within the power block, and would include cranes, loaders, fork lifts, generators, boom trucks, water trucks, etc. The earthmoving equipment would be stored in a central location each night near the area where the work is being undertaken, or near the western side of the heliostat field, where all the equipment can be most easily fueled. All these locations would be within the perimeter of the permanent project facilities. Additionally, a small temporary lay down area, worker parking area, and construction trailer area would be used during facility construction. The areas are shown in Figure 2-12. The features shown may be relocated during final project planning but would remain within the total area identified. The heliostat assembly building may be constructed permanently to be used during the life of the project, or may be removed after construction. Areas along the TL corridor and near the substation (less than 5 acres) may be used for storage of power poles during construction. These areas would remain within the area identified for temporary disturbance.

2.5.3.5.4 Storage Tanks

The following storage tanks would be located on-site:

- Demineralized Water Storage Tank: One demineralized water storage tank would be constructed to store demineralized water for use as mirror wash water, steam cycle make up, and for use in the hybrid cooling system.
- Fire/Service Water Storage Tank: One fire/service water tank would be constructed to store water for fire protection, service water needs, and for raw water storage prior to treatment.
- HTF Storage Tanks: Two tanks would be constructed to contain the HTF. One would house the hot HTF (1,050°F), and the other would house the cold HTF (550°F).
- Lube oil and hydraulic oil storage tanks would be associated with the STG.
- Additional ancillary tanks, including aboveground diesel tanks, would be on-site for a variety of liquids within the power block area.

2.5.3.5.5 Pipelines

Project operational water would be obtained from on-site wells; therefore, an off-site pipeline would not be required. The CSP technology proposed for the project would not require a natural gas source. During construction of the project, there would be a high water demand for soil moisture conditioning and dust control, and on-site wells would provide construction water. Water demand and sources are further discussed in Section 2.5.6, Water Demand and Source.

2.5.3.5.6 Site Drainage

The proposed project site is located on a portion of the Smoky Valley that slopes to the west at approximately 2 percent. The stormwater drainage system would be designed to allow the storm flow to

follow its preexisting drainage paths. Currently, storm flows drain from the San Antonio Mountains to the east and infiltrate across the nearly flat site on their way to Peavine Creek. Within the proposed project site, the storm flows broaden out and do not follow individual drainage courses. This allows increased infiltration as the flows move to the west toward Peavine Creek. Near the eastern end of the facility, two gentle drainage paths are visible in the topographic survey of the site. These would be maintained, and the flows would be allowed to continue to fan out across the heliostat field or may be routed around the exterior of the heliostat field.

The grading plan within the heliostat field would be such that storm flows follow preexisting paths. The majority of the proposed project site, within the perimeter fence, would not be graded but would be smoothed to allow truck access throughout heliostat field.

Preliminary storm drainage for the overall facility can be seen on the grading plan included as Figure 2-13. More details of the power block are shown in Figure 2-14. Small ditches would be constructed along roadways, as necessary, to provide a path of travel for water and to allow infiltration of rainfall.

Grading near the power block, to the east side or uphill side of the power block, would include a small berm and ditch to divert upstream flows around the power block. Additionally, the finished floor elevations of buildings and other structures subject to damage from stormwater would be built a minimum of 12 inches above anticipated 100-year storm levels in accordance with all applicable laws, ordinances, regulations, and standards.

Preliminary hydrology calculations were performed using the TR-55 (SCS Method). It is proposed that the stormwater drainage system be designed using the Natural Resource Conservation Service (NRCS) method (TR-55) to determine the amount of rainfall during a specific rainfall event, and in accordance with the Nye County stormwater design requirements. A detailed technical drainage study may have to be submitted for approval to Nye County's Tonopah Public Works Office for construction of the facility.

All surface water runoff during and after construction would be controlled in accordance with the requirements of the National Pollutant Discharge Elimination System (NPDES) stormwater runoff permit and all other applicable laws, ordinances, regulations, and standards.

The power island would be graded such that all rainfall within the power island would be directed to the containment ponds adjacent to the on-site salt tanks or to the western heliostat field and would be allowed to infiltrate. Pipe culverts would be used, as required, where storm channels cross roads.

2.5.3.5.7 Evaporation Ponds

There are two types of wastewater generated at the Project; industrial and domestic. In the industrial process, wastewater is generated from the cooling tower blow down, and occasionally from the first pass reverse osmosis system (pre-treatment of groundwater) and the steam cycle blow down (in summer months, these streams are diverted into the cooling tower and evaporated). Wastewater from these industrial processes will be piped to three 10-acre evaporation ponds (total combined pond top area of up to 30 acres) for disposal. Evaporations ponds would be adaptively managed to minimize risks

to wildlife near the site. When ponds are filled with water, a porous screen would cover the entire pond so that wildlife would not be attracted to the water surface. Additional information on the design and operation of the evaporation ponds is provided in the Wastewater Plan (WorleyParsons 2010b).

The expected chemistry of the wastewater discharge is provided in Chapter 4. The concentrations of chemical constituents in the wastewater discharge are compared to Toxicity Characteristic Leaching Procedure (TCLP) values as reported in the Code of Federal Regulations 40 CFR 261 (Title 40, Part 261). None of the predicted chemical constituents in the wastewater has TCLP limits, and therefore the wastewater is not considered a hazardous waste under Federal regulations.

In the domestic process, all wastewater generated from toilets, showers, kitchens and sinks will be directed into an onsite sanitary septic system and on-site leach field.

2.5.4 Construction Activities

2.5.4.1 Temporary Construction Facilities

The project construction contractor would mobilize and develop temporary construction facilities and lay down areas adjacent to the power block and outside the heliostat field (see Figure 2-12). Once a final design has been established, the contractor would prepare site maps showing the construction project in detail. Temporary construction facilities would include construction staging areas; employee parking areas; temporary shop buildings; an office trailer with electrical, telephone, and Internet service; temporary sanitary facilities; a temporary guard shack; and on-site dumpsters. Additionally, rock processing equipment and a portable batch plant would be mobilized for site development. A temporary concrete batch plant would be mobilized for use during project execution. The temporary batch plant would include cement storage and a batching operation where the cement, water, and aggregate could be proportioned and mixed. This facility would be located in the temporary lay down area or in the heliostat field, just east of the temporary lay down area. The majority of these temporary facilities would be located within the construction logistics/lay down/parking areas and/or within the heliostat field (see Figure 2-12).

Construction equipment would be staged near the location of active work, primarily within the power block near the center of the heliostat field. Additionally, temporary sanitary facilities would be located throughout the proposed project site for use by construction personnel; they would be sized and located in accordance with Occupational Safety and Health Administration (OSHA) requirements. Several areas internal to the solar field would also be set up to temporarily store materials for construction of the power block facilities, for construction of the heliostats, and for temporary storage and heat conditioning of solid HTF. This would locate material closer to the point of installation.

A geotechnical investigation was performed in April 2010 of an area located next to an existing borrow site located along Pole Line Road, near Peavine Creek. The existing pit is used by Nye County Public Works. The investigation found that the aggregate is suitable for use for project construction. The total area needed to supply an adequate amount of material is 40 acres. A Mineral Materials Negotiated Sale (BLM Form 3600-9) has been submitted to BLM for the 40-acre site, located immediately north of the Nye County pit.

All on-site construction operations can be completed within the limits of the SF-299 filed for the proposed project, and within the two additional SF-299 applications previously discussed (one for transmission and one for gravel/aggregate).

A temporary 10,000 gallon (gal) aboveground storage tank would be used to supply diesel fuel during facility construction. This 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 sanitary needs of the construction work force within the heliostats and power block area would be met with the use of portable toilets. The temporary construction trailers would use a temporary septic system that would be abandoned upon completion of construction.

2.5.4.2 Construction Process and Conceptual Schedule

Construction of the generating facility, from site preparation and grading to commercial operation, would be expected to take approximately 30 months. Typically, construction would be scheduled to occur between 5 a.m. and 7 p.m. on weekdays and Saturdays (approximately 14 hours per day, 6 days per week). Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (e.g., pouring of concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities would continue 24 hours per day, 7 days per week. The items of work that may occur 24 hours per day would include, but are not limited to, placing and finishing concrete (because of cooler nighttime temperatures), welding on critical pipe systems (these may be critical path items and need to be expedited), radiation testing of the welds on certain pipes (completed when staff is vacated from the area), electrical terminations, DCS wiring and programming, heliostat assembly (if this seems to be falling behind schedule), and preparation for start-up testing. Because this is a solar plant, testing of the facility requires adequate energy supply (i.e., the sun). Therefore, preparations may take place overnight to ready the facility for start-up tests the following day, when the sun would provide the energy to power the start-up testing.

Table 2-1. Conceptual project schedule, with activities representative of typical TSE projects

Activity	Time Frame
Start construction.	Month 1
Begin mobilization.	Month 1
Delineate and mark the boundaries of the construction zone.	Month 1
Stabilize construction entrance/exit and roadway. Install tire wash.	Month 1
Establish parking and staging areas for vehicle and equipment storage and maintenance.	Month 1
Establish lay down area(s) for materials storage and staging.	Month 1
Establish concrete washout area.	Month 1
Clear and grub, strip topsoil.	Months 1–2
Install certified weed-free fiber rolls or silt fence at the base of slopes adjacent to delineated sensitive areas (e.g., wetlands), if any.	Months 1–2
Construct stormwater infiltration/evaporation area.	Months 3–6
Assemble and erect heliostats.	Months 10–20
Power block construction.	Months 6–24
Construct reinforced concrete foundations.	Months 6–24
Construction administrative/warehouse building.	Months 20–22
Final stabilization of site.	Month 27
Commission and testing.	Months 27–30

2.5.4.3 Construction Work Force and Equipment

The construction work force would consist of approximately 400 to 500 personnel at peak for construction, including supervisors and management personnel, with an average of approximately 250 crewmembers on-site at any given time. Project construction would require additional support staff, including construction inspectors, surveyors, project managers, and environmental inspectors.

Prior to commencing construction, crews would mobilize to the site. During this time, equipment and construction materials would be transported to the designated construction staging areas, and trailers and temporary shop buildings would be established. In addition, personnel would receive appropriate safety and environmental training. Also, signs may be erected at this time to designate approved access, fueling, smoking, concrete washout, and exclusion areas. Table 2-2 outlines the construction process.

Table 2-2. Conceptual construction process

Construction Phase	Description	Approximate Number and Type of Construction Equipment and Vehicles
Rough Grading	Grubbing, clearing, and bulk grading, including approximately 500,000 cubic yards of cut and compacted fill	Approximately five scrapers, two compactors, three graders, two loaders, four dozers, five water trucks, and three water pulls
Finish Grading	Final grading to finish grade at a rate of approximately 960,000 square feet per day (22 acres)	Approximately two scrapers, three graders, one dozer, four water trucks
Roads, Foundations, Flatwork, and Site Utilities	Construction of roads, excavation and construction of foundations for heliostats and utilities	Approximately 20 to 40 pieces of equipment would be present at any one time, including concrete trucks, concrete pumps, backhoes, excavators, loaders, graders, foundation drills, paving machines, drum rollers, fork lifts, tractors, dump trucks, small cranes, and additional support vehicles
Heliostat Assembly and Deployment	Field assembly of heliostats in temporary shop buildings constructed at the site, installation of assemblies on cast-in-place piers or other foundations	Approximately eight to ten crews, each with one or two pieces of equipment including small cranes, forklifts, welding machines, trucks, and tractors
Power Block Construction	Construction of foundations, structural frames and buildings, installation of utilities and equipment including the steam turbine generator, condenser, pumps, buildings, air cooled condenser cooling structure, TES tanks, and central receiver tower	An average of 12 to 18 pieces of equipment would be used for power block construction over the duration of the project, with more equipment being used during the early stages of foundation construction and frame erection. Equipment would include backhoes, excavators, foundation drills, concrete trucks, concrete pumps, forklifts, boom trucks, lifts, cranes, welders, trucks, and other support vehicles
Liquid Salt Preparation	Melting of the delivered dry salt product	Temporary propane, electric, or gas (propane) fired auxiliary boiler, forklifts, loaders, and trucks

2.5.5 Operations and Maintenance

2.5.5.1 Overview

Management, engineering, administrative, skilled workers, and operators would serve the solar plant. The plant is expected to employ up to 40–50 full-time employees during operation. The facility may be operated up to 7 days per week, and 10 or more hours per day. The facility would be staffed 24 hours per day.

The facility would be expected to have an annual operational availability of up to 92 to 95 percent (of no cloudy, daylight hours). The facility may be operated in one of the following modes:

- The facility could be operated up to its maximum output as dictated by the available solar insolation and the available thermal storage, for as many hours per year as possible.
- The facility would be placed in standby mode every night when the solar insolation or thermal energy storage level drops to a point that results in the STG dropping below its minimum design low-load.

- A full shutdown would occur if required by equipment malfunction, TL disconnect, or scheduled maintenance.

2.5.5.2 Maintenance

Long-term operation of the facility would include periodic maintenance and overhaul of all balance-of-plant and solar facility equipment such as the STG, pumps, piping, etc., in accordance with manufacturer recommended schedules. Periodic cleaning of the heliostats with demineralized water would be necessary to maintain the desired mirror reflectivity.

Routine inspections of the substation and electric TL would be conducted by certified site personnel on a monthly basis or as needed under emergency conditions. All of the substation structures would be inspected from the ground on an annual basis for corrosion, misalignment, and foundation condition. Ground inspection would include the inspection of hardware, insulator keys, and conductors.

Regular inspection of electric lines, support systems, and instrumentation and controls is critical for the safe, efficient, and economical operation of the project. Various inspection processes, including aerial inspection, ground inspection, and climbing may be conducted. Ground inspection includes checking of the hardware, insulators, and conductors for corrosion, breaks, broken insulators, and failing splices. The frequency of inspection may vary depending on factors such as the age of the system, structure type, and vegetation conditions.

2.5.5.3 Work Force and Equipment

It is planned that plant personnel would be on-site in two 12-hour shifts or three 8-hour shifts, 7 days per week to ensure that the facility is staffed at all times. A full-time staff would be required for operations and maintenance of the facility, anticipated to include one operator for every 12-hour rotating shift, four relief operators, four maintenance technicians, four mirror washers, one to two process/performance engineers, one maintenance manager, and five to seven administrative staff members per day. An additional part-time staff of 5 to 15 subcontractor personnel would be on-site daily to conduct occasional maintenance of the facility, including cleaning or repairing equipment; system testing; removing, repairing, and/or installing insulation before and after maintenance; scaffold installation and removal; and personnel facility-related activities.

2.5.6 Water Demand and Sources

2.5.6.1 Water Sources

The proposed source of water would be groundwater, extracted through one of two on-site wells. Two wells, one for primary and one for back-up, would be drilled within the project area. Well data from the NDWR well log database and the U.S. Geological Survey National Water Information System indicate the depth to water in the vicinity of the proposed project site ranges from approximately 55 to 104 feet below ground surface (bgs) and well depths range from approximately 100 to 200 feet bgs. This information was confirmed by a test well drilled adjacent to the proposed project area to substantiate water availability. Wells in the vicinity of the proposed project site were installed in unconsolidated

alluvial materials, and similar materials were observed in the test well on-site. Only the test well is within the proposed project site.

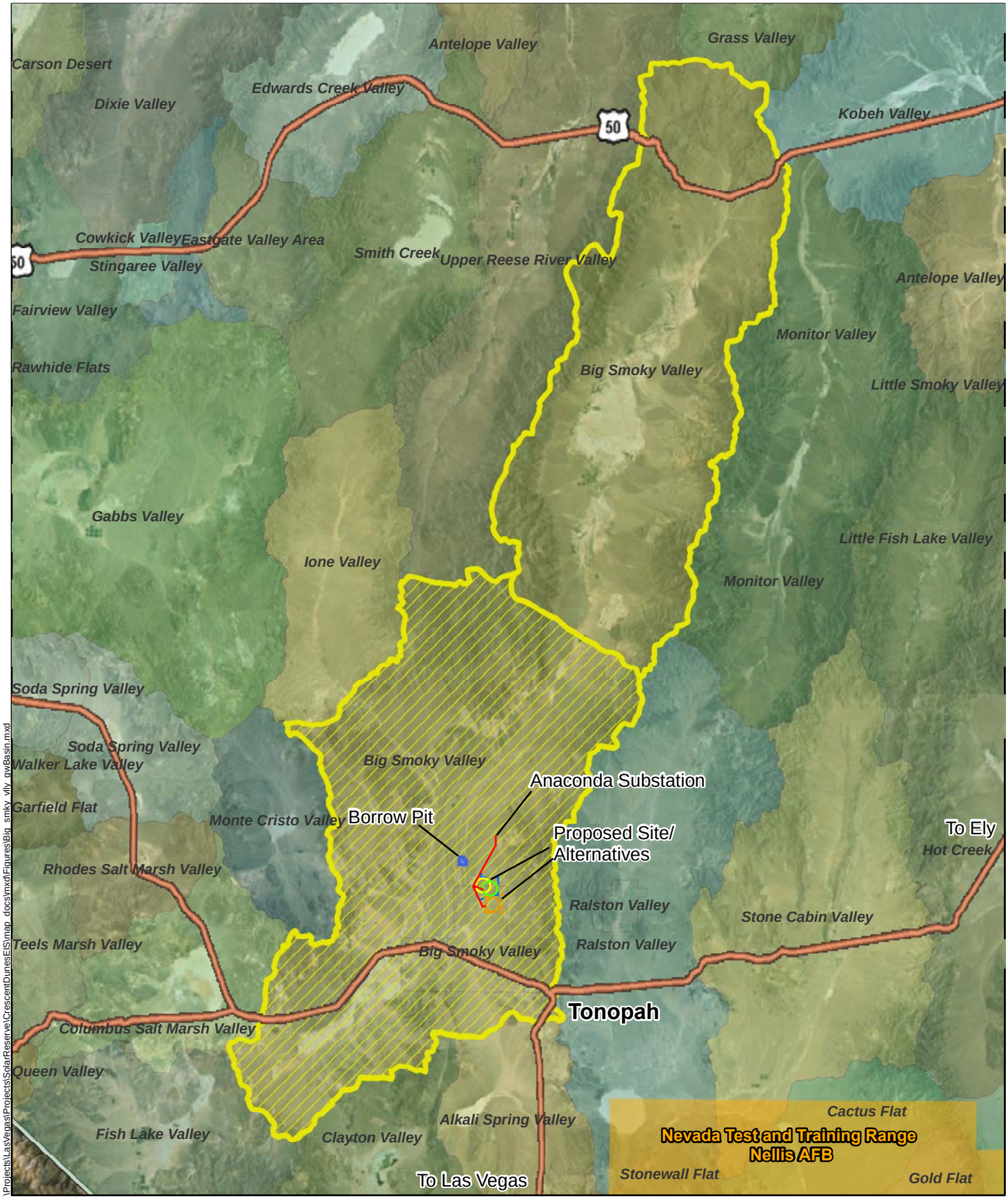
The proposed project site is located within the southeastern portion of the Tonopah Flat subarea of the Big Smoky Valley groundwater basin, which is within the Central Hydrologic Region of Nevada (Figure 2-15). The Tonopah Flat subarea is a designated basin, and the southern half of the proposed project site (Township 4 North, Range 41 East, Sections 2, 3, and 10–15) is located in a preferred use area.

Limited data are available on groundwater quality in the basin. The general quality of groundwater in Nye County is suitable to marginally suitable, with total dissolved solids concentrations exceeding the state or federal general drinking water standards in portions of the Big Smoky Valley groundwater basin (Buqo 2004). Testing of water collected from the test wells drilled on-site are consistent with the previous data.

For operational use, water would be pumped into a raw water storage tank. Raw water would be treated through a reverse osmosis water treatment facility and converted to demineralized water for use in the steam cycle, for mirror washing, and for use in the hybrid cooling system. The need for additional pretreatment such as water softening or ion exchange, if any, would be determined based on analytical data obtained during the groundwater investigation.

2.5.6.2 Water Demand

Water would be necessary for both construction and operation of the project. During construction, water would be required for soil moisture conditioning during the earthmoving activities and for dust control. Based on the expected soil conditions (existing moisture content and the optimal moisture of the soil necessary to achieve proper compaction), approximately 500 AF of water likely would be needed the first year of construction, when the major earthwork occurs. Approximately 150 AF of water would be needed each subsequent year of construction for ongoing dust control during construction and moisture conditioning of soils for ongoing backfilling operations.



N

NEVADA

Project Site

0 10 20 Miles

Legend

- Borrow Pit
- Alternative Area
- Proposed Site
- Big Smoky Valley
- Tonopah Flat sub area
- Alternate 1
- Alternate 2
- Proposed

Figure 2-15 Big Smoky Valley Groundwater Basin

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

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Water needs of the operating plant would include three primary uses:

- steam cycle makeup water – estimated at 100 AFY
- mirror wash water – estimated at 70 AFY
- hybrid cooling system augmentation – estimated at 430 AFY

Incidental use that would be included in the 600 AF:

- potable water – estimated at less than 3 AFY

Although the steam cycle is a "closed system," some water would be lost during operational steam blow down. The addition of "makeup water" would be required throughout the operating time frame to compensate for this loss.

The heliostat mirrors' reflectivity would decrease in efficiency and, therefore, the ability to generate electricity would decrease as the mirrors collect dust and other particles. A mirror wash program would be implemented to wash the mirrors on a continual basis. This program may run up to 7 days or nights per week.

During periods of high temperatures or electrical demand, the cooling system would be operated in "hybrid" mode. The "hybrid" mode of operation would include heat rejection through the ACC as well as heat rejection through the small evaporative cooler (cooling tower). The hybrid mode of operation would increase the efficiency of the plant and allow for the production of additional electricity during these times when electricity is in highest demand.

Potable water would be used for sanitary purposes in the facilities, as well as drinking water. Water would be stored on-site and used for fire protection.

2.5.7 Land Ownership and Mining Claims

The proposed project site is located on unincorporated lands administered by BLM within Nye County, Nevada, and guided by the Tonopah RMP (BLM 1997). Based on a review of the 1997 RMP and other BLM records, the proposed project site is not within wild horse and burro herd management area boundaries, ROW avoidance areas, land withdrawals, ACECs, fluid mineral potential area, mineral leasing restriction areas, or fire management zones. The area is within the relatively large San Antone Grazing Allotment. During the analysis, three mining claims had been filed (April 2010) in Section 34 of the TSE ROW application area. Several other existing mining exist along the transmission route (Figure 2-1)

2.5.8 Hazardous Materials Management

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 (see Table 2-3).

Table 2-3. Hazardous waste laws, ordinances, and regulations

Laws, Ordinances, and Regulations	Applicability
Federal	
Comprehensive Environmental Response, Compensation, and Liability Act, 42 United States Code (USC) § 9601 et seq., 40 Code of Federal Regulations (CFR) Part 302, as amended by the Superfund Amendments and Reauthorization Act of 1986	Requires notification to various agencies when there is a release of hazardous substances from a facility
Emergency Planning and Community Right to Know Act, 42 USC § 11001 et seq., 40 CFR Parts 350, 355, and 370	Requires inventory reporting, planning, and reporting for hazardous and acutely hazardous materials
Occupational Safety and Health Standards, 29 USC Section 65129; 29 CFR 1910 et seq., and Safety and Health Regulations for Construction, 29 CFR 1926 et seq.	Specifies standards for hazardous materials storage, handling, and worker protection in emergencies
Oil Pollution Prevention, 40 CFR 112	Requires the preparation of a Spill Prevention Control and Countermeasures Plan
Chemical Facility Anti-Terrorism Standard, 6 CFR Part 27	Requires facilities that use or store certain hazardous materials to submit information to the Department of Homeland Security so that a vulnerability assessment can be conducted to determine what security measures should be implemented
State	
Stormwater Pollution Prevention, General Permit NVR100000	Requires the preparation of a Stormwater Pollution Prevention Plan for construction and industrial activities
Local	
International Fire Code, Nye County Code Section 15.16.010	Adopts the International Fire Code, 2003 Edition, into Nye County regulations
Industry Codes and Standards	
American Society of Mechanical Engineers, American National Standards Institute, and American Society of Testing Materials	Sets forth standards for power plant design, including mechanical systems, electrical, and piping
Uniform Fire Code, Articles 79, 80, and others	Sets forth requirements for the storage and handling of hazardous materials
National Fire Protection Agency	Establishes fire prevention standards and guidelines

The following project planning documents would specify procedures for the proper storage and management of these substances at the proposed project site.

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 proposed project 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 Material Safety Data Sheets (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 Operation Stormwater Pollution Prevention Plan (SWPPP) – 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 Business Plan (HMBP) – HMBPs would be filed with Nye County for the construction and operation of the facility. The HMBPs would inventory the hazardous materials and waste properties, quantities, storage containers and locations, and contingency planning and emergency response procedures.

Spill Prevention Control and Countermeasure (SPCC) Plans – SPCC Plans would be prepared for construction and operation of the facility. 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.

The chemicals and hazardous substances that would be used at the site and their storage locations are provided in Table 2-4. This list identifies each chemical by type, intended use, hazardous characteristics, and estimated quantity to be stored on-site.

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 proposed project site as the HTF. The salt would be melted once during project construction and would be used throughout the project life at temperatures between 550°F and 1050°F. To ensure worker safety and environmental protection, the hot and cold HTF tank areas would be designed such that any release would be contained in a basin. The construction SWPPP would specify procedures to prevent contact between HTF and stormwater during processing of this material prior to plant startup. In addition, the processing area would be cleaned to ensure residual HTF is removed from surface soil after processing.

Table 2-4. Potential Project Hazardous Materials

Material	Chemical Abstract Service Number (CAS No.)	Use	Hazardous Characteristics	Estimated Quantity On-Site
Carbon dioxide (gas)	124-38-9	Generator pumping	Asphyxiant, compressed gas	20,000 standard cubic feet (scf)
Carbon dioxide (liquid)	124-38-9	Fire suppression	Asphyxiant, compressed liquid, cryogen	25,000 pounds (lb)
Diesel fuel (No. 2)	68476-34-6	Fuel for emergency generator, fire water pump, and diesel storage for vehicle use	Toxic, combustible	21,500 gallons (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 cubic feet (cf)
Lubricating oil	Various	Mechanical equipment, lubrication	Toxic, combustible	25,000 gal
Hydraulic oil	Various	Steam valve actuation	Toxic, combustible	1,000 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	Reverse Osmosis (RO) feed pH control, possible water demineralizer media regeneration	Toxic, corrosive	5,000 gal

Domestic wastewater would be treated and disposed of at the proposed project site using a septic disposal system consisting of septic tanks and a leach field permitted by NDEP and Nye County. It is anticipated that separate septic and leach field systems would be constructed for each of the power block and administrative buildings. These would be designed in accordance with local and state regulations by a licensed engineer. A typical/proposed schematic is shown in Figure 2-16.

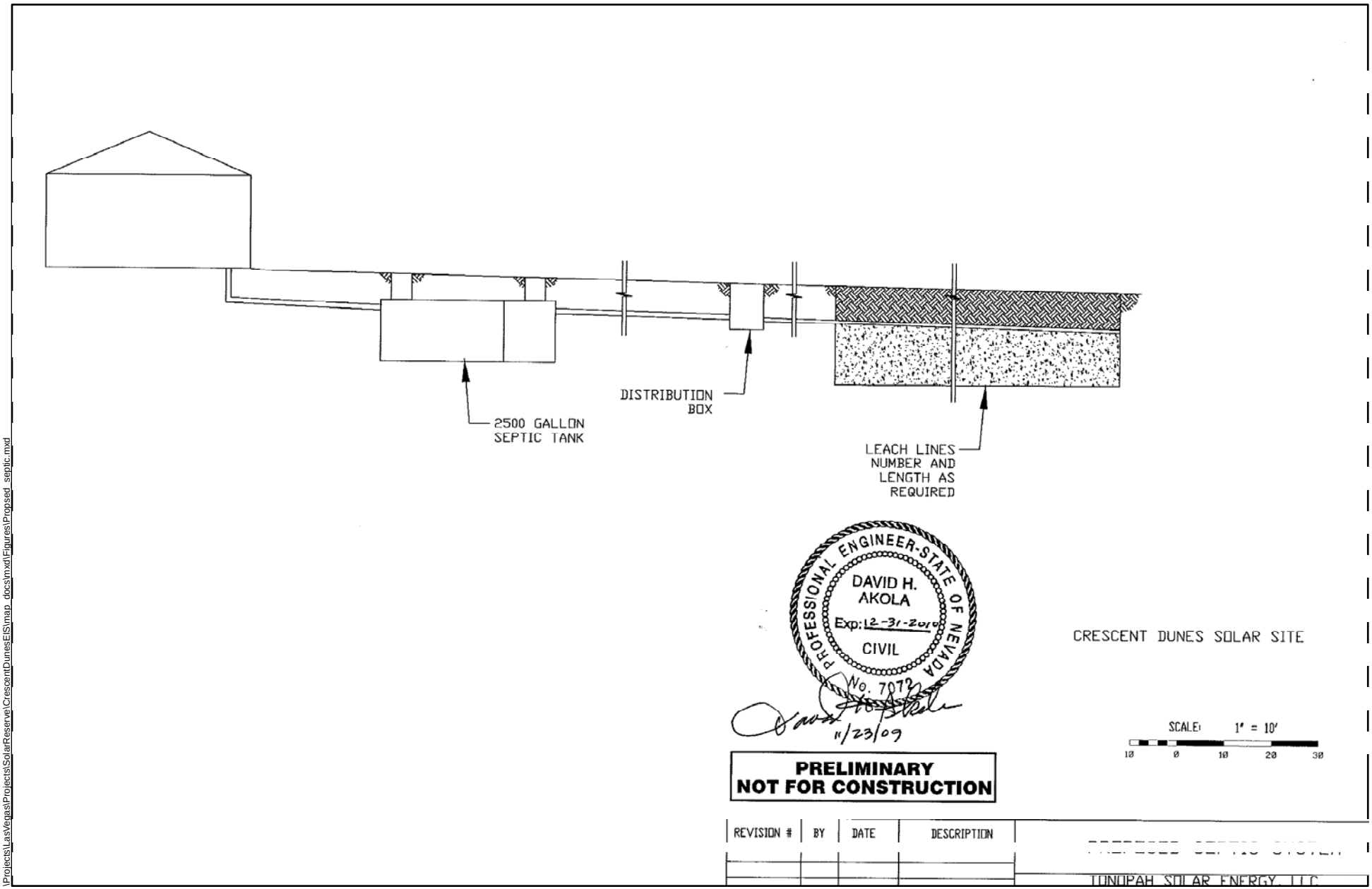


Figure 2-16 Proposed Septic Systems

Crescent Dunes Solar Energy Project

Source: TSE Plan of Development

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 to be developed before construction and operation of the facility. 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 of 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 proposed project 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 installed. 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.

2.5.9 Security, Fire Protection and Intentional Destructive Acts

2.5.9.1 Security

Chain link security fencing would be installed around the site perimeter, switchyard, and other areas requiring controlled access prior to beginning construction. The site perimeter fence would be up to 8 feet high and have an overall height of no more than 10 feet from the bottom of the wire mesh to the top barbed wire. The fence would have top rail, bottom tension wire, and three strands of barbed wire mounted on 45-degree extension arms. Posts would be set in concrete.

Controlled access gates would be located at the entrances to the facility. Access through the main gate would require an electronic swipe card, preventing unaccompanied visitors from accessing the facility. All visitors would be logged in and out of the facility during normal business hours. Visitors and non-employees would be allowed entry only with approval from a staff member at the facility. Visitors would be issued visitor passes to be worn during their visit and returned at the main office when leaving.

Personnel would staff the facility 24 hours per day, 7 days per week. Even when the solar power plant is not operating, personnel would be present as necessary for maintenance, to prepare the plant for startup, and/or for site security.

2.5.9.2 Fire Protection

The project would rely on both on-site fire protection systems and off-site fire protection services during both construction and operation of the facility. The on-site fire protection system would be designed to

protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water would be the service/fire water storage tank.

A Fire Protection and Prevention Plan would be prepared for construction and operation of the facility. The plan would include measures relating to safeguarding human life, preventing personnel injury, preserving property, and minimizing downtime attributable to fire or explosion. Fire protection measures would include the following:

- prevention of the inception of fires
- adequate exits
- fire-safe construction
- reduction of ignition sources
- control of fuel sources
- proper maintenance of fire water supply and sprinkler systems

During construction, the permanent facility fire suppression system would be placed in service as early as practicable. Prior to installation of the facility's permanent fire suppression system, fire extinguishers and other portable fire fighting equipment would be available on-site. These fire extinguishers would be maintained for the full construction duration, in accordance with local and federal OSHA requirements. During construction, water trucks would be first in and last out of the site for fire control purposes. Installation of a construction water source would be one of the first activities in order to provide an on-site source for construction and fire prevention water.

Locations of portable fire extinguishers would include, but not necessarily be limited to, portable office spaces, hot work areas, flammable chemical storage areas, and mobile equipment (e.g., passenger vehicles and earthmoving equipment). Fire-fighting equipment would be located to allow for unobstructed access to the equipment and would be conspicuously marked. Portable fire fighting equipment would be routinely inspected in accordance with regulatory requirements and replaced immediately if defective or in need of recharge.

The facilities operating fire protection water system would be supplied from a dedicated portion of the water storage tank located on the plant site. One electric and one diesel-fueled backup firewater pump, each with a capacity of approximately 3,000 gal per minute, would deliver water to the fire protection piping network. A smaller electric, motor-driven jockey pump would maintain pressure in the piping network. If the jockey pump were unable to maintain a set operating pressure in the piping network, the diesel fire pump would start automatically.

A piping network would be configured in a loop so that a piping failure could be isolated with shutoff valves without interrupting the supply of water to a majority of the loop. The piping network would supply fire hydrants located at intervals throughout the power plant site, possibly a sprinkler deluge system at each unit transformer, and sprinkler systems at the STG lube oil equipment. Sprinkler systems would also be installed in the administrative/control/warehouse/maintenance building and fire pump enclosure as required by National Fire Protection Association (NFPA) and local code requirements.

Handheld fire extinguishers of the appropriate size and rating would be located in accordance with NFPA 10 throughout the facility.

2.5.9.3 Intentional Destructive Acts

Solar generation projects can be the subject of intentional destructive acts ranging from random vandalism and theft to sabotage and acts of terrorism intended to disable the facility. Acts of vandalism and theft are far more likely to occur than sabotage or terrorism. Theft usually involves equipment at substations and switchyards that contain salvageable metal when metal prices are high. Vandalism usually occurs in remote areas and is more likely to involve spontaneous acts such as shooting at equipment.

As indicated above, in order to keep the project infrastructure secure from threats from intentional destructive acts, the project site would be surrounded by an eight foot perimeter fence, and would be staffed 24 hours a day, 7 days a week. Furthermore, to ensure that the facility is not the target of unauthorized access, electronic controlled-access gates would be utilized.

Pursuant to DOE's policy set out in a December 1, 2006, memorandum, "Need to Consider Intentional Destructive Acts in NEPA Documents," DOE has considered the potential environmental consequences of intentional destructive acts at the Crescent Dunes site. DOE concludes that the risk of damage to the proposed Project from intentional destructive acts would be considered very low, in line with or less than the risk to similar generation facilities in the U.S. Theft or opportunistic vandalism is more likely than sabotage or terrorist acts, which are considered to be a negligible risk.

Protection of widely dispersed electrical generation equipment, substations, and thousands of miles of transmission lines from destructive acts is not practical. Damaged equipment and transmission lines may be quickly repaired or replaced in the same manner that storm damaged equipment are returned to service. The results of any such acts could be expensive to repair, but no substantial impacts to continued electrical service would be anticipated. No significant environmental impacts would be expected from physical damage to the proposed Project or from loss of power delivery.

2.5.10 Applicant-Committed Environmental Protection Measures

Vegetation

Between 1,628 and 1,673 acres of natural vegetation would be removed because 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.

Wildlife Resources

Some wildlife such as small mammals and reptiles may still access the ponds, so ponds will be equipped with materials in each corner that would provide trapped wildlife with sufficient traction to be able to exit the ponds. 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.

Special Status Plant Species

A mitigation plan is being developed between BLM, NDOW, and TSE.

Special Status Wildlife Species

Mammals: Pale Kangaroo Mice and Bats

A mitigation plan is being developed between TSE, BLM, and NDOW. Mitigation would include raptor deterrent mechanisms on TLs and any vertical structures that could promote raptor predation. In addition, the proponent may undertake additional studies of the Pale Kangaroo mouse during construction, in coordination with NDOW.

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. A golden eagle monitoring plan for known nest locations would be developed between BLM, NDOW, and USFWS.

In order to mitigate potential effects of TLs on birds, all static TLs would be marked with wire marks. This should make the static lines easier to see and reduce bird/wire collisions. In order to minimize potential bird electrocutions, TL wires would be spaced to accommodate the wingspan of the largest bird in the project area.

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.

Water Quality and Quantity

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.

The construction plan would designate construction staging areas and approved access and exclusion areas. Wells identified for potential access or use impacts during the construction process would be appropriately included in the exclusion areas to maintain access at all times.

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.

Evaporation ponds would be covered with a porous screen, that would allow for evaporation, but also act as an avian deterrent. 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.

Air Quality

The proponent will implement the most current air emission technologies to maintain air emissions in accordance with state and federal regulations.

Cultural Resources

Further archaeological data collection will be needed to mitigate the adverse impacts to historic properties. A Historic Property Treatment Plan (HPTP) is being developed by TSE. The HPTP will list 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.

Native American Religious Concerns

During initial consultation, no Native American values were identified being impacted.

Land Use and Access

No mitigation has been identified as being needed to address impacts on Land Use or Access. Access will be maintained throughout the construction and operation of the project.

Soils

Erosion

The objectives of erosion mitigation are to reduce short-term erosion and sedimentation, as well as quickly restore topography and vegetation to pre-construction conditions in all areas required and

approved by the 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 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 via 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.
- Re-establish 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, will 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 will 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, re-grade and re-contour the area, replace topsoil, and reseed to achieve pre-construction native plant densities.

Diminished Reclamation/Re-vegetation

Vegetation removal and soil disturbances (including temporary road improvements) will be minimized. Where vegetation removal is required, mowing or cutting methods will be utilized to the greatest extent possible. Top soil removed during clear and grub activity and grading and excavation required for construction will be collected and stockpiled on-site. Stockpiles will 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 will be replaced across the site where topsoil was previously removed to provide a proper soil substrate for seeding or planting and enhance re-establishment of native vegetation to pre-construction conditions.

Social and Economics

Following is the proposed mitigation 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 temporary trailer park for relocating workforce in town or at the site.

Visual

To the extent possible, the project location will be integrated with the surrounding landscape to avoid conflict with significant aesthetic conditions. Subsequent to construction, restoration efforts will be made in areas that were temporarily disturbed.

Given the importance of maintaining dark sky conditions, conscious efforts will be made to protect the current dark skies from light pollution. The Federal Aviation Administration (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, should be fully shielded, low-pressure sodium lighting to reduce or eliminate detrimental lighting impact and prevent unnecessary light pollution.

The TL poles will be constructed of wood which tends to blend into the landscape with distance. Given the flat, expansive nature of the landscape, the wood poles will provide less structural contrast as they blend into the horizon and skyline. The appearance of the wood poles will be similar to the existing power line poles in the corridor.

Hazardous Materials

During facility construction, various hazardous materials and one regulated substance will be stored onsite. Construction service personnel will follow general industry health, safety, and environmental Best Management Practices (BMP) 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 will occur only in designated areas that are either bermed or covered with concrete, asphalt, or other impervious surfaces to control potential spills. Employees will be present during refueling activities.
- Vehicle and equipment service and maintenance will be conducted only by authorized personnel.
- Refueling will be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual fuel from the hoses.
- Vehicle engines will be shut down during refueling.
- No smoking, open flames, or welding will be allowed in refueling or service areas.
- Refueling will 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 will leave the project site.
- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil will be put in containers and disposed of as appropriate. All containers used to store hazardous materials will be inspected at least once per week for signs of leaking or failure. All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

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 will be contained and cleaned up

immediately by trained, onsite personnel. Larger spills will be reported via emergency phone numbers to obtain help from offsite containment and cleanup crews. All personnel working on the project during the construction phase will be trained in handling hazardous materials and the dangers associated with hazardous materials. An onsite health and safety person will be designated to implement health and If there is a large spill from a service or refueling truck, contaminated soil will be placed into barrels or trucks by service personnel for offsite disposal at an appropriate facility in accordance with law. If a spill involves hazardous materials quantities equal to or greater than the specific RQ (42 gallons for petroleum products), all federal, state, and local reporting requirements will be followed. In the event of a fire or injury, the local fire department will be called.

In addition to these BMPs to address accidental hazardous materials releases, a construction site security plan will be prepared to address hazardous materials security and will 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 as per 49 CFR 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks as per 49 CFR Part 172, Subpart I
- A protocol for security of nitrate salts in accordance with Department of Homeland Security (DHS) measures to protect listed Chemicals of Interest (risk: theft) as per 6 CFR Part 27

During facility operation, various hazardous materials and one regulated substance will be stored onsite as shown in Table 4-23. Material Safety Data Sheets (MSDS) for the chemicals likely to occur on site during operation of the proposed Project can be found in the POD (Tonopah Solar Energy 2009).

During operation of the facility, all hazardous materials will be handled and stored in accordance with applicable codes and regulations specified in Section 3.13 Affected Environment. Some general measures that will be implemented includes:

- 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 the Occupational Health and Safety Administration (OSHA) and the Nevada Division of Industrial Relations, health and safety programs will be established for construction and operations at the Site that will document potential hazards and requirements for establishing and maintaining a safe working environment during construction and operation. The programs will include identification of all hazardous substances and chemicals used at the site, including Material Safety Data Sheets (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 onsite for spill cleanup.

Construction and Operating Stormwater Pollution Prevention Plans (SWPPP) – The project will comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) through preparation and implementation of a SWPPP and filing of a Notice of Intent (NOI) to comply with the General Construction and General Industrial Stormwater NPDES Permit. The plans will 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 (HMMP) – Hazardous Materials Management Plans will be filed with Nye County for the construction and operation of the facility. The plans will inventory the hazardous materials and waste properties, quantities, storage containers and locations, and contingency planning and emergency response procedures.

Spill Prevention Control and Countermeasure Plans (SPCC) - SPCC Plans will be prepared for construction and operation of the Site. The plans will 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 will be reported to the BLM Hazardous Materials Coordinator.

Range Resources

The project will be designed to minimize impacts where possible and construction measures will 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 will 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 sustainable ecological condition.

Mitigation for temporary impacts will vary by the type and severity of the impact. Impacts requiring removal of vegetation will 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.

Recreation and Wilderness

Access to recreation areas will be maintained throughout the construction and operation of the facility. No wilderness areas were identified as impacted by the proposed project.

2.5.11 Decommissioning and Reclamation

The procedures described for decommissioning are designed to ensure public health and safety, environmental protection, and compliance with applicable regulations. It is assumed that decommissioning of the permanent plant facilities would begin 30–50 years after the commercial operation date of the solar plant. Decommissioning of temporary facilities, including but not limited to temporary septic systems, temporary underground conduit, temporary power poles, temporary concrete pads, and similar items would be completed during the plant commissioning time frame or within the first 6 months of facility operation following completion. The project goals for site decommissioning are as follows:

- Remove aboveground structures unless converted to other uses.
- Restore the lines and grades in the disturbed area of the site to match the natural gradients of the site.
- Reestablish native vegetation in the disturbed areas.

The proposed implementation strategy to achieve the goals for site decommissioning would include the following:

- Use industry standard demolition means and methods to decrease personnel and environmental safety exposures by minimizing time and keeping personnel from close proximity to actual demolition activities to the extent practical.
- Plan each component of the decommissioning project such that personnel and environmental safety are maintained while efficiently executing the work.
- Conduct pre-decommissioning activities such as final decommissioning and restoration planning that address the “as-found” site conditions at the start of the project.
- Remove all residual materials and chemicals from the site prior to demolition for reuse at other facilities or for proper disposal at licensed facilities.
- Demolish aboveground structures (dismantling and removal of improvements and materials) in a phased approach while still using some items until close to the end of the project. For instance, the water supply, administrative building, and some electrical power components would be modified to be used until very late in the decommissioning project.
- Demolish and remove belowground facilities (floor slabs, footings, and underground utilities) as needed to meet the decommissioning goals.

- Clean up soils, if needed, with special attention given to retention pond and hazardous materials use/storage areas to ensure that clean closure is achieved.
- Dispose of materials in appropriate facilities for treatment/disposal or recycling.
- Recontour lines and grades to match the natural gradient and function of the site.
- Revegetate with native plants.

Although various types of decommissioning and demolition equipment would be used to dismantle each type of structure or equipment, dismantling would proceed according to the following general staging process. The first stage would consist of dismantling and demolishing aboveground structures to be removed. The second stage would consist of concrete removal as needed to ensure that no concrete structure remained within 3 feet of final grade (i.e., floor slabs, belowground walls, and footings) as appropriate, and removal/dismantling of underground utilities within 3 feet of final grade. The third stage would be excavation and removal of contaminated soils. The final stage would include contouring to return the disturbed area of the site to near original conditions while disturbing as little of the other site areas as possible, revegetating the site, and conducting associated monitoring.

Stage 1. Aboveground demolition entails breakdown and removal of aboveground structures and facilities. Residual materials from these activities would be transported by heavy haul dump truck to a central recycling/staging area where the debris would be processed for transport to an off-site recycler. A project recycle center (at each power unit either as the work progresses or at the central administrative area) would be established to:

- Size-reduce and stage metals and mirrors for transport to an off-site recycler.
- Crush concrete and remove rebar.
- Stockpile concrete for later use at the site.
- Stage rebar for transport to an off-site recycler.
- Temporarily store and act as a shipping point for any hazardous materials to an approved Treatment, Storage, and Disposal (TSD) facility.

The strategy for demolition consists of using mechanized equipment and trained personnel for the safe dismantling and removal of the following aboveground structures:

- Remove heliostats and related equipment using low environmental impact equipment.
- Dismantle towers using explosives to put the towers on the ground, then use conventional heavy equipment to size reduce and transport for recycling (this is the industry standard for safe demolition of large towers and massive concrete structures).
- Remove the turbine generators, condensers and related equipment, TLs and towers, and aboveground pipelines using conventional demolition equipment and techniques.
- Near the very end of the project, remove site-related fencing.

Stage 2. The belowground facilities to be removed include concrete slabs and footings that would remain within 3 feet of final grade at the end of the project. It is anticipated that any and all site-related piping and utilities, including water lines, belowground electric/control/communication lines, and gas

lines would be completely removed, regardless of the depth below final grade. These materials would be excavated and transported to the recycling area(s) for processing and ultimate recycling. The resulting trenches would be backfilled with suitable material of similar consistency and permeability as the surrounding native materials and compacted to 85 percent relative compaction.

Stage 3. The need for, depth, and extent of contaminated soil excavation would be based on observation of conditions and analysis of soil samples after removal of the evaporation pond and hazardous materials storage areas, and upon closure of the recycling center(s) and waste storage areas using during decommissioning. At this time, removal of contaminated soil is assumed to be unnecessary. If required, removal would be conducted to the extent feasible and as required to meet regulatory cleanup criteria for the protection of groundwater and the environment. If contaminated soil removal were required, the resulting excavations would be backfilled with native soil of similar permeability and consistency as the surrounding materials and compacted to 85 percent relative compaction.

Stage 4. Recontouring of the site would be conducted using standard grading equipment to return the land to match, within reason, the previously existing surface and surrounding grade and function. Grading activities would be limited to previously disturbed areas that require recontouring. Efforts would be made to disturb as little of the natural drainage and vegetation as possible. Concrete rubble, crushed to approximately 2-inch minus size, would be placed in the lower portions of fills, at depths at least 3 feet below final grade. Fills would be compacted to approximately 85 percent relative compaction by wheel or track rolling to avoid over-compaction of the soils. To the extent feasible, efforts would be made to place a layer of coarser materials at the ground surface to add stability. After recontouring, the site would be revegetated where appropriate using native plants in accordance with a restoration plan developed in coordination with BLM.

2.6 Alternatives to the Proposed Action

Numerous alternative locations were considered for the Proposed Action using the siting criteria discussed in Section 2.2, Project Background.

2.6.1 Alternatives Considered in Detail (Including No Action)

Three alternatives to the Proposed Action were evaluated for potential impacts, including two alternative locations for the project and the No Action Alternative.

2.6.1.1 Alternative 1

The center of Alternative 1 would be located approximately 1.85 miles north of the center of the Proposed Action (see Figure 2-1). Alternative 1 was proposed during the scoping process by the U.S. Air Force to minimize impacts on instrumentation use to support the training mission on the Nevada Test and Training Range to the southeast of the Proposed Action. Many components of this alternative are similar to the Proposed Action. The sections below identify those items that differ from the Proposed Action.

2.6.1.1.1 Project Components

The overall site layout for the alternative facility is very similar to the Proposed Action, as shown in Figure 2-2, and would include an array of components that are described in this section of the document. Additional details on the project components may be found in the project Plan of Development (TSE 2009).

Generating Facility Components

The generating facility components required for Alternative 1 would be the same as for the Proposed Action. However, the location of the central receiving tower would be farther north, and the configuration of the mirror array would be slightly different, as depicted in Figure 2-2.

Major Electrical Systems and Equipment

The major electrical systems and associated equipment for Alternative 1 would be the same as described for the Proposed Action.

Transmission Systems and Interconnection

The transmission system and interconnection components for Alternative 1 would have only minor differences from those described for the Proposed Action.

Interconnection

The interconnection at the Anaconda Moly Substation would be the same as for the Proposed Action.

Potential Transmission Route

The transmission route would be similar to the route for the Proposed Action. The route would begin at the transformers on the facility and follow a path west to the existing transmission alignment (Figure 2-1). The total length of the new TL would be 7.5 miles.

Civil/Structural Features

The specifications and descriptions of the access roads, buildings and enclosures, material storage, storage tanks, and pipelines for Alternative 1 would be the same as for the Proposed Action. Details of the stormwater drainage plan for Alternative 1 would be designed specific to this site to accomplish the same objectives as the Proposed Action, and would be similar to the plan developed for the Proposed Action, which is shown in Figures 2-13 and 2-14.

Construction Activities

Temporary construction facilities, construction process and schedule, and construction work force and equipment for Alternative 1 would be the same as for the Proposed Action.

Operations and Maintenance

Operations and maintenance associated with Alternative 1 would be the same as for the Proposed Action.

2.6.1.1.2 Water Demand and Sources

Water Sources

The water source for Alternative 1 would come from a well located approximately at the center of the power block.

Water Demand

Water use for Alternative 1 would be the same as for the Proposed Action.

2.6.1.1.3 Hazardous Materials Management

Hazardous materials used and hazardous wastes generated for Alternative 1 would be the same as for the Proposed Action.

2.6.1.1.4 Security and Fire Protection

Security and fire protection for Alternative 1 would be the same as for the Proposed Action.

2.6.1.1.5 Applicant-Committed Environmental Protection Measures

Environmental protection measures would be the same as those for the proposed action.

2.6.1.1.6 Decommissioning and Reclamation

The general concepts and requirements of the decommissioning and reclamation for Alternative 1 would be the same as for the Proposed Action.

2.6.1.2 Alternative 2

The center of Alternative 2 would be located approximately 2.4 miles northwest of the center of the Proposed Action (see Figure 2-1). Alternative 2 was proposed to minimize potential impacts of Alternative 1 on the soils and associated resources near the Crescent Dunes. Many components of this alternative are similar to the Proposed Action and Alternative 1. The sections below identify those items that differ from the Proposed Action.

2.6.1.2.1 Project Components

The overall site layout for the Alternative 2 facility would be very similar to the Proposed Action, as shown in Figure 2-2, and would include an array of components described in this section of the document. Additional details on the project components may be found in the project Plan of Development (TSE 2009).

Generating Facility Components

The generating facility components required for Alternative 2 would be the same as for Proposed Action. However, the location of the central receiving tower would be northwest of the proposed project, and the configuration of the mirror array would be slightly different, as depicted in Figure 2-2.

Major Electrical Systems and Equipment

The major electrical systems and associated equipment for Alternative 2 would be the same as described for the Proposed Action.

Transmission Systems and Interconnection

The transmission system and interconnection components for Alternative 2 would have only minor differences from those for the Proposed Action.

Interconnection

The interconnection at the Anaconda Moly Substation would be the same as for the Proposed Action.

Potential Transmission Route

The transmission route would be similar to the route for the Proposed Action. The route would begin at the transformers on the facility and follows a path west to the existing transmission alignment (Figure 2-1). The total length of the new TL would be 6.9 miles.

Civil/Structural Features

The specifications and descriptions of the access roads, buildings and enclosures, material storage, storage tanks, and pipelines for Alternative 2 would be the same as for the Proposed Action. Details of the stormwater drainage plan for Alternative 2 would be designed specific to this site to accomplish the same objectives as the Proposed Action, and would be similar to the plan developed for the proposed project, which is shown on Figures 2-13 and 2-14.

Construction Activities

Temporary construction facilities, construction process and schedule, and construction work force and equipment for Alternative 2 would be the same as for the Proposed Action.

Operations and Maintenance

Operations and maintenance associated with Alternative 2 would be the same as for the Proposed Action.

2.6.1.2.2 Water Demand and Sources

Water Sources

The water source for Alternative 2 would come from a well located approximately at the center of the power block.

Water Demand

Water use for Alternative 2 would be the same as for the Proposed Action.

2.6.1.2.3 Hazardous Materials Management

Hazardous materials used and hazardous wastes generated for Alternative 2 would be the same as for the Proposed Action.

2.6.1.2.4 Security and Fire Protection

Security and fire protection for Alternative 2 would be the same as for the Proposed Action.

2.6.1.2.5 Applicant-Committed Environmental Protection Measures

Environmental protection measures would be the same as those for the proposed action.

2.6.1.2.6 Decommissioning and Reclamation

The general concepts and requirements of the decommissioning and reclamation for Alternative 2 would be the same as for the Proposed Action.

2.6.1.3 No Action Alternative

In accordance with CEQ [40 CFR 1502.14(d) and 1508.25(b)] and BLM guidelines (BLM 2008a), this EIS evaluates the No Action Alternative. The No Action Alternative describes the environmental consequences that would result if the Proposed Action were not implemented. The No Action Alternative forms the baseline from which the impacts of all other alternatives can be measured.

Under the No Action Alternative, BLM would not approve the SF-299 ROW grant, and the proposed solar facility would not be constructed. Not constructing the facility would require the state utilities to rely on other facilities to achieve the goals of the RPS.

2.6.2 Alternatives Considered but Eliminated from Detailed Analysis

In accordance with BLM's NEPA Handbook and associated guidelines, alternatives that do not meet the purpose and need of the project, are not technically or economically feasible, or are substantially similar to or have similar impacts as other alternatives being evaluated may be eliminated from detailed analysis. For this project, two additional alternative locations were initially considered and a different cooling technology was considered.

2.6.2.1 Alternative Locations

TSE performed preliminary screening of areas in the regional vicinity of Tonopah, Nevada, for consideration as potential locations for the Proposed Action. TSE's technology has specific siting requirements, including a large open space of approximately 4 square miles, minimal slope, transmission access, water availability, road access, and high solar incidence. TSE is also limited to sites not already claimed by other developers. The site selection process for the Proposed Action screened sites based on the following parameters:

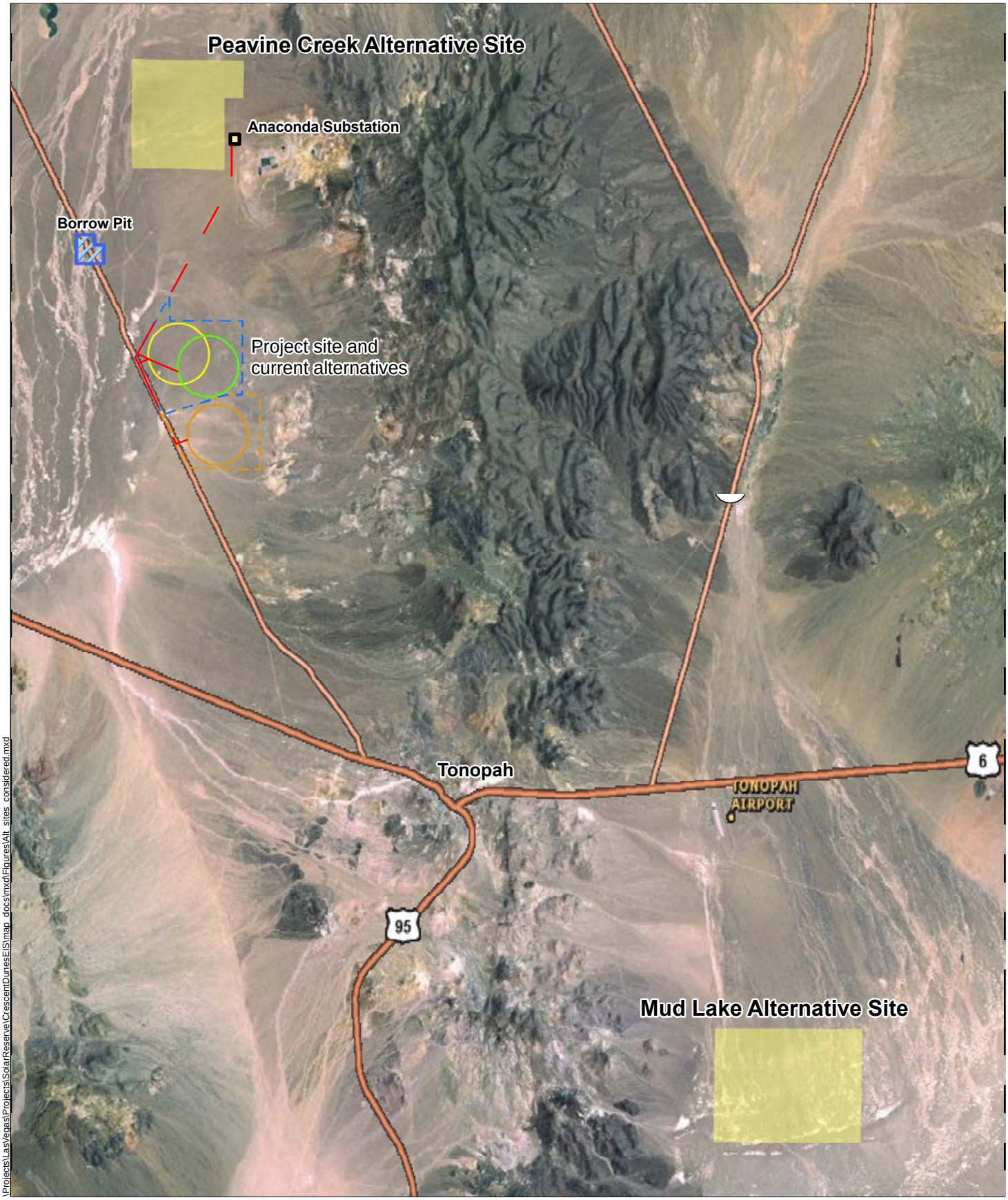
- siting area with minimum area of 4 square miles and contiguous in configuration
- solar resource
- distance from TLs and substations
- environmental considerations
- stormwater drainage channels/waters of the United States
- land ownership
- water resources
- topography
- airport locations
- highways/roads

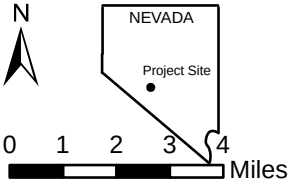
- faults
- population centers
- military interference issues

As a result of the effort, three sites were identified that met the screening criteria, and SF-299 applications were submitted on the three BLM-administered areas, including the proposed project site (Figure 2-17). The two additional sites were the Mud Lake Site, east of Tonopah, and the Peavine Creek Site, west of the proposed project site.

Each of these three sites met the criteria for solar resource, topography, proximity to interconnection, potential for water resources, and minimal interference with other land uses. After further review, the Mud Lake and Peavine Creek sites were ultimately eliminated from further consideration for one or more of the following reasons: a high potential for military and/or radar operations interference, potential for cultural resource occurrence and sensitivity, potential for substantial upgrades required for road access, potential for affecting areas with significant stormwater drainage channels, and the need for substantial interconnection capacity upgrades. In addition, interconnection studies showed that transmission would require extensive upgrades for the Mud Lake Site, including a new substation. Finally, given that the Mud Lake Site was being proposed in a dry lakebed, the area had a high potential for the presence of and impacts to sensitive cultural resources and values.

Based on discussions with personnel at Nellis Air Force Base and the DOD Preliminary Screening Tool (FAA 2010a), it was discovered that both the Mud Lake and Peavine Creek sites were located in areas where impacts on military training were highly probable.





Legend

- Planned
- Alternative sites considered
- Borrow Pit
- Alternative Area
- Proposed Site
- Alternate 1
- Alternate 2
- Proposed

Figure 2-17 Alternative Sites Considered but not Further Evaluated

Crescent Dunes Solar Energy Project

Aerial Source: ESRI 2010

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

2.6.2.1 Alternative Cooling Technology

The Proposed Action would include a hybrid wet-dry system for cooling. This system would optimize the efficiency of the power generation compared with water use. The following is a short description of the different cooling technologies; however, the hybrid cooling is the system carried forward in this EIS.

Wet Cooling

A wet cooling system consists primarily of a cooling tower, water recirculation pumps, and a wet surface condenser. Steam is condensed in the wet surface condenser with cooling water being pumped from the cold water basin. The warm water leaving the wet surface condenser returns to the cooling tower, where it is chilled by evaporative cooling. The cooling tower maintains a cold water basin temperature by turning fans on and off.

Cooling towers are typically the lowest cost system while providing the highest steam turbine efficiency. Higher turbine efficiencies are achieved because the cooling tower uses the wet bulb temperature instead of ambient temperature, thereby enabling cooler steam condensate. The downside to cooling towers is the high water use caused by the evaporative cooling.

By using wet cooling technology for the Proposed Action, it was estimated that approximately 1,000–1,200 AF of water would be needed per year. Because of this high water use and the option of using a hybrid technology using less water, this alternative was not carried forward in the analysis.

Dry Cooling

A dry cooling system consists primarily of an ACC. Steam is passed through a tube structure in the ACC and is cooled by air flowing over the tubes, similar to a car radiator.

ACC systems typically have higher costs than that of a cooling tower. The ACC itself is significantly more expensive than a cooling tower for the same power plant but removes the need for circulating pumps and a wet surface condenser. The most significant advantage of a dry cooled system is the lower water use than wet and hybrid cooling systems. The downside to an ACC is low turbine efficiency, which will relate to higher power costs because of lower power production for the same capital cost.

It is estimated that a dry cooled technology for this project would use 150–200 AF of water per year. However, because of the decrease in efficiency and, thereby, a higher power cost, the fully dry-cooled technology was not carried forward in the analysis.

2.7 Comparative Analysis of Alternatives

Table 2-5 provides a comparative analysis of the alternatives considered in detail in this EIS.

Table 2-5. Comparative analysis of alternatives considered in detail

Resource/Issue	Proposed Action	Alternative 1	Alternative 2	No Action Alternative
Land disturbance (acres)	**Permanent:** 1,704 acres **Temporary:** 102 acres **Total:** 1,806 acres	**Permanent:** 1,665 acres **Temporary:** 110 acres **Total:** 1,775 acres	**Permanent:** 1,652 acres **Temporary:** 110 acres **Total:** 1,762 acres	No land would be disturbed.
Vegetation (including noxious weeds)	**Construction:** Removal of 1,673 acres of common desert vegetation during construction of project facilities **Operation:** No effects	**Construction:** Removal of 1,640 acres of common desert vegetation during construction of project facilities, and removal of a large proportion (16 percent) of unique habitat (active and stabilized dunes) within the Cumulative Effect Study Area **Operation:** No effects	**Construction:** Removal of 1,628 acres of common desert vegetation during construction of project facilities **Operation:** Since vegetation would be removed during construction, no effects to vegetation	No vegetation would be affected.
Wildlife resources	**Construction:** Injury or mortality to wildlife during grading and construction activities, and removal of 1,673 acres of habitat **Operation:** Potential for wildlife injury or mortality related to operation of evaporation ponds	**Construction:** Injury or mortality to wildlife during grading and construction activities, and removal of 1,640 acres of habitat including 7 acres of unique dune habitat **Operation:** Potential for wildlife injury or mortality related to operation of evaporation ponds	**Construction:** Injury or mortality to wildlife during grading and construction activities, and removal of 1,628 acres of habitat **Operation:** Potential for wildlife injury or mortality related to operation of evaporation ponds	No wildlife would be affected.
Special status species (plants)	**Construction:** Removal of Nevada oryctes plants and 1,374 acres of suitable habitat **Operation:** No effects	**Construction:** Removal of Nevada oryctes plants and 803 acres of suitable habitat **Operation:** No effects	**Construction:** Removal of Nevada oryctes plants and 434 acres of suitable habitat **Operation:** No effects	No special status species would be affected.

Table 2-5. Comparative analysis of alternatives considered in detail

Resource/Issue	Proposed Action	Alternative 1	Alternative 2	No Action Alternative
Special status species (wildlife)	**Construction:** Injury or mortality to pale kangaroo mice during construction and grading activities, and removal of 1,466 acres of suitable habitat **Operation:** Pale kangaroo mice may suffer injury or mortality related to operation of the evaporation ponds	**Construction:** Injury or mortality to pale kangaroo mice and special status beetle species during construction and grading activities, removal of 1,191 acres of suitable habitat for pale kangaroo mouse, and removal of 7 acres of beetle habitat **Operation:** Pale kangaroo mice may suffer injury or mortality related to operation of the evaporation ponds	**Construction:** Injury or mortality to pale kangaroo mice during construction and grading activities, removal of 434 acres of suitable habitat **Operation:** Pale kangaroo mice may suffer injury or mortality related to operation of the evaporation ponds	No special status species would be affected.
Golden eagles and migratory birds	**Construction:** Removal of 1,673 acres of golden eagle foraging habitat and migratory bird nesting habitat **Operation:** Injury or mortality due to bird collisions with project structures and transmission line	**Construction:** Removal of 1,640 acres of golden eagle foraging habitat and migratory bird nesting habitat **Operation:** Injury or mortality due to bird collisions with project structures and transmission line	**Construction:** Removal of 1,628 acres of golden eagle foraging habitat and migratory bird nesting habitat **Operation:** Injury or mortality due to bird collisions with project structures and transmission line	Migratory birds or Golden eagles would no be affected.
Surface water quality and quantity	**Construction:** Increased potential for surface water contamination due to accidental hazardous material spills, and increased potential for sediment transport during storms **Operation:** Increased potential for sediment transport during storms	**Construction:** Increased potential for surface water contamination due to accidental hazardous material spills, and increased potential for sediment transport during storms **Operation:** Increased potential for sediment transport during storms	**Construction:** Increased potential for surface water contamination due to accidental hazardous material spills, and increased potential for sediment transport during storms **Operation:** Increased potential for sediment transport during storms	Surface water would not be affected.

Table 2-5. Comparative analysis of alternatives considered in detail

Resource/Issue	Proposed Action	Alternative 1	Alternative 2	No Action Alternative
Groundwater quality and quantity	**Construction:** Increased potential for groundwater quality effects due to naturally occurring total dissolved solids (TDS) in the area **Operation:** Increased potential for groundwater contamination due to accidental hazardous material spills	**Construction:** Increased potential for groundwater quality effects due to naturally occurring TDS in the area **Operation:** Increased potential for groundwater contamination due to accidental hazardous material spills	**Construction:** Increased potential for groundwater quality effects due to naturally occurring TDS in the area **Operation:** Increased potential for groundwater contamination due to accidental hazardous material spills	Groundwater would not be affected.
Waters of the United States	Not present	Not present	Not present	No waters of the United States would be affected.
Air quality	**Construction:** Temporary effects on air quality due to construction equipment exhaust, fugitive dust generated by vehicles and construction equipment, and wind driven fugitive dust; also, temporary effects on air quality due to initial heating of salt **Operation:** Emissions from operation of the plant not expected to exceed federal or state air quality standards	**Construction:** Temporary effects on air quality due to construction equipment exhaust, fugitive dust generated by vehicles and construction equipment, and wind driven fugitive dust; also, temporary effects on air quality due to initial heating of salt **Operation:** Emissions from operation of the plant not expected to exceed federal or state air quality standards	**Construction:** Temporary effects on air quality due to construction equipment exhaust, fugitive dust generated by vehicles and construction equipment, and wind driven fugitive dust; also, temporary effects on air quality due to initial heating of salt **Operation:** Emissions from operation of the plant not expected to exceed federal or state air quality standards	Air quality would not be affected.
Cultural resources	**Construction:** Effects include disturbance and removal of four existing properties eligible for listing on the National Register of Historic Places due to grading and construction activities **Operation:** No effects	**Construction:** Effects include disturbance and removal of one existing property eligible for listing on the National Register of Historic Places due to grading and construction activities **Operation:** No effects	**Construction:** Effects include disturbance and removal of eight existing properties eligible for listing on the National Register of Historic Places due to grading and construction activities **Operation:** No effects	Cultural resources would not be affected
Native American religious concerns	No Native American concerns were identified during consultations	No Native American concerns were identified during consultations	No Native American concerns were identified during consultations	No Native American concerns were identified during consultations

Table 2-5. Comparative analysis of alternatives considered in detail

Resource/Issue	Proposed Action	Alternative 1	Alternative 2	No Action Alternative
Land use and access (including special designations)	**Construction:** Consistent with U.S. Bureau of Land Management (BLM) policies, goals, objectives, and land use descriptions; removal of 1,673 acres of BLM land from potential public use or disposal; potential impacts to military flights and airspace **Operation:** Same as construction	**Construction:** Not consistent with BLM policies, goals, objectives, and land use descriptions; removal of 1,640 acres of BLM land from potential public use or disposal; removal of 130 acres of a right-of-way avoidance area (Special Recreation Management Area); effects on a designated mineral leasing area; potential impacts to military flights and airspace **Operation:** Same as construction	**Construction:** Consistent with BLM policies, goals, objectives, and land use descriptions; removal of 1,628 acres of BLM land from potential public use; potential impacts to military flights and airspace **Operation:** Same as construction	Land use and access would not be affected.
Soils	**Construction:** Potential increase in soil erosion and compaction **Operation:** No effects	**Construction:** Potential increase in soil erosion and compaction **Operation:** No effects	**Construction:** Potential increase in soil erosion and compaction **Operation:** No effects	Soils would not be affected.
Social and economic values	**Construction:** Temporary increase in local population during peak construction, and temporary increase in local jobs **Operation:** Increase in local population, and approximately 200 direct and indirect jobs created, with $30 million in revenues added to the State of Nevada annually	**Construction:** Temporary increase in local population during peak construction, and temporary increase in local jobs **Operation:** Increase in local population, and approximately 200 direct and indirect jobs created, with $30 million in revenues added to the State of Nevada annually	**Construction:** Temporary increase in local population during peak construction, and temporary increase in local jobs **Operation:** Increase in local population, and approximately 200 direct and indirect jobs created, with $30 million in revenues added to the State of Nevada annually	No new jobs would be created and no revenue would be added to the State of Nevada annually as a result of the proposed project.
Visual resources	**Construction:** Major viewshed effects for recreationalists using dunes; Moderate viewshed effects for travelers along Pole Line Road **Operation:** Same as construction	**Construction:** Major viewshed effects for recreationalists using dunes; Moderate viewshed effects for travelers along Pole Line Road **Operation:** Same as construction	**Construction:** Major viewshed effects for recreationalists using dunes; Moderate viewshed effects for travelers along Pole Line Road **Operation:** Same as construction	Visual resources would not be affected.
Hazardous materials and solid waste	**Construction:** Potential for hazardous spills would increase and may affect groundwater **Operation:** Same as construction	**Construction:** Potential for hazardous spills would increase and may affect groundwater **Operation:** Same as construction	**Construction:** Potential for hazardous spills would increase and may affect groundwater **Operation:** Same as construction	No impacts from hazardous materials would occur.

Table 2-5. Comparative analysis of alternatives considered in detail

Resource/Issue	Proposed Action	Alternative 1	Alternative 2	No Action Alternative
Rangeland resources and livestock grazing	**Construction:** Removal of 1,673 acres of forage production and livestock grazing area, which amounts to 52 Animal Unit Months (AUM) **Operation:** Increased activity and human presence in the area may cause livestock to avoid the area adjacent to the facility	**Construction:** Removal of 1,640 acres of forage production and livestock grazing area, which amounts to 50 AUMs. **Operation:** Increased activity and human presence in the area may cause livestock to avoid the area adjacent to the facility	**Construction:** Removal of 1,628 acres of forage production and livestock grazing area, which amounts to 50 AUMs **Operation:** Increased activity and human presence in the area may cause livestock to avoid the area adjacent to the facility	Rangeland resources and livestock grazing would not be affected.
Recreation, wilderness	No effects to recreation and wilderness are likely to occur.	**Construction:** Conversion of approximately 130 acres of the rights-of-way avoidance area (e.g., Crescent Dunes SRMA) into project facilities **Operation:** Same as construction	No effects to recreation and wilderness are likely to occur.	Recreation and wilderness would not be affected.

2.8 BLM-Preferred Alternative

In accordance with NEPA, Federal agencies are required by the CEQ (40 CFR 1502.14) to identify their preferred alternative for a project in the Draft EIS, if a preference has been identified, and in the Final EIS prepared for the proposed project. The preferred alternative is not a final agency decision; rather, it is an indication of the agency's preference.

The BLM has selected a preferred alternative based on the analysis in this DEIS; this preferred alternative is the alternative that best fulfills the agency's statutory mission and responsibilities, considering economic, environmental, technical, and other factors.

The BLM has determined that the preferred alternative is Alternative 2 as described in Section 2.6, Alternatives to the Proposed Action. This alternative was chosen because this alternative:

- has the least impacts to special status plants and wildlife species;
- stays within the existing transmission corridor and reduces the length of the transmission line;
- does not impact the Crescent Dunes SRMA;
- has the least impact to recreationalists utilizing Crescent Dunes; and
- best complies with the TFO Resource Management Plan.