PLAN OF DEVELOPMENT

Gemini Solar Project
N-84631

Prepared for

United States Department of the Interior

Bureau of Land Management

Southern Nevada District Office

Submitted by

Solar Partners XI, LLC

(a wholly owned subsidiary of Valley of Fire, LLC)

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ATTACHMENTS

ACRONYMS

AC	alternating current
a.e.	acid equivalent
AFB	Air Force Base
a.i.	active ingredient
APLIC	Avian Power Line Interaction Committee
ASTM	American Society for Testing and Materials
BESS	battery energy storage system
BLM	Bureau of Land Management
BMP	Best Management Practice
CFR	Code of Federal Regulations
DC	direct current
DoD	Department of Defense
DOE	Department of Energy
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
GW	gigawatts
HDPE	high-density polyethylene
I-15	Interstate 15
kV	kilovolt
kVA	kilovolt-ampere
LADWP	Los Angeles Department of Water and Power
lb	pound
LGIA	Large Generator Interconnection Agreement
MW	megawatt
MWac	megawatt alternating current
MWh	megawatt-hour
NEMA	National Electric Manufacturers Association
NEPA	National Environmental Policy Act
NRHP	National Register of Historic Places
O&M	operation and maintenance
oz	ounce
PCS	Power Conversion Station
POD	Plan of Development
PPA	Power Purchase Agreement
Project	Gemini Solar Project
pt	pint
PUP	Pesticide Use Plan
PV	photovoltaic
PVC	polyvinyl chloride
PVCS	Photovoltaic Combining Switchgear
ROD	Record of Decision
ROW	right-of-way

RPS	Renewable Portfolio Standard
SCADA	Supervisory control and data acquisition
SDS	Safety Data Sheet
SHPO	State Historic Preservation Office
Solar PEIS	Final Programmatic Environmental Impact Statement for Solar Energy Development in Six Southwestern States
SWPPP	Stormwater Pollution Prevention Plan
UPS	uninterruptible power supply
USC	United States Code
USFWS	United States Fish and Wildlife Service
WEAP	Worker Education and Awareness Plan

Section 1
Project Description

1.1 Introduction

1.1.1 Type of Facility, Planned Uses, Generation Output

Solar Partners XI, LLC (Applicant), a wholly owned subsidiary of Valley of Fire, LLC, proposes to construct, own, operate, and decommission the Gemini Solar Project (Project), consisting of up to a nominal[1] 690-megawatt (MW) alternating current (MWac) solar photovoltaic (PV) power generating facility on federal lands administered by the Bureau of Land Management (BLM) located in Clark County, Nevada. The Project would be constructed using PV solar modules mounted on single-axis, horizontal tracker structures.

The power produced by the Project would be conveyed to the NV Energy transmission system. The Project sponsor has an active application with NV Energy for a Large Generator Interconnection Agreement (LGIA) to interconnect 440-MWac at the Crystal Substation, with another 250-MWac planned for California delivery. The BLM grant for construction, operation, maintenance, and termination of the Project would be partially assigned to NV Energy for construction, operation, decommissioning, and ownership of related interconnection facilities and network upgrades.

Average annual energy production from a 690-MWac Project equates to the annual daytime electricity needs of approximately 260,000 households. Solar electric power is produced during daylight hours when electricity demand is highest. The Project would generate greenhouse gas-free electricity that would annually offset approximately 384,000 metric tons of carbon dioxide equivalent, which equates to emissions generated by approximately 81,482 passenger vehicles a year (USEPA 2018) and other emissions that would result from producing an equivalent amount of electricity from fossil fuel-fired electric generators.

1.1.2 Applicant's Schedule for the Project

The BLM would be the lead federal agency for approving the Project and would issue a ROW grant authorizing the use of federal lands administered by the BLM for Project construction, operation, and decommissioning. The Project site is within a "variance area" for solar power plant development, as defined in the Record of Decision (ROD) prepared for the Final Programmatic Environmental Impact Statement (EIS) for Solar Energy Development in Six Southwestern States

[1] Nominal power refers to the nameplate or peak capacity of photovoltaic system

(Solar PEIS). The ROD does not apply to this Project since the ROW application pre-dates the Solar PEIS. The Project is required to comply with the National Environmental Policy Act (NEPA) and other applicable laws. The Notice of Intent (NOI) for the Project was released July 13, 2018. Preparation of an EIS is required and the completion of the EIS process and issuance of a ROD is targeted for September 2019. Further detail on the Project schedule is provided in **Table 1-1.**

Prior to any activity on the Project site, required resource management plans would be developed and approved, and regulatory and permit conditions would be integrated into the final construction compliance documents. Project construction would begin once all applicable approvals and permits have been obtained and a Notice to Proceed is issued by the BLM. The Applicant is expected to commence pre-development activities (e.g., design and engineering elements) starting in 2019, and on-site construction of the Project is expected to start in late 2019. As phases of the overall Project are completed, they could potentially come on-line. An initial phase producing around 60- to 80-MW could come on-line in 2020. Additional phases could come on-line in 2021 with final completion as early as 2022, but no later than December 2023.

Construction would include the major activities of mobilization, construction grading and site preparation, installation of drainage and erosion controls, PV panel/tracker assembly, and solar field construction. Once construction is completed, the Project would be in operation for at least 30 years with the possibility of a subsequent repowering for additional years of operation.

TABLE 1-1 APPLICANT'S PROJECT SCHEDULE

Activity	Date
NEPA NOI	July 2018
BLM Permitting/NEPA (EIS) Process Complete	September 2019
Construction Commencement	October 2019
Startup, Testing, and Commercial Operation	Anticipated in phases from June 2020 through February 2022 (but no later than December 2023)

1.2 Proponent's Purpose and Need for the Project

1.2.1 Need for Renewable Energy

The United States has a greater solar energy resource potential than any other industrialized nation. The multiple benefits associated with developing this resource have been recognized repeatedly by both federal and state policy-makers. Development of solar resources reduces reliance on foreign sources of fuel, promotes national security, diversifies energy portfolios, and contributes to the reduction of greenhouse gas emissions. The demand for power continues to grow in the Western United States. As older technology fossil-fuel plants reach the end of their useful lives, there is a need to replace them with clean, reliable resources. Recognizing this need, many Western states, including Nevada, have enacted legislation to encourage or mandate the development of renewable generation.

Nevada's Renewable Portfolio Standard (RPS) requires that 15 percent of all electricity generated in Nevada be derived from renewable sources by 2011, 18 percent by 2013, 20 percent by 2015, 25 percent by 2025, and 50 percent by 2030 (Nevada Revised Statutes 704.7821). State government agencies were directed to take all appropriate actions to implement this target in all regulatory proceedings, including siting, permitting, and procurement for renewable energy power plants and transmission lines. The RPS in Nevada and other states has created a competitive market for contracts to sell renewable energy, with success determined on the basis of "least cost, best fit" criteria.

Nevada has passed legislation requiring utilities to phase out their use of coal-fired generation and partially replace that generation with renewable energy, as well as legislation that amended the existing RPS laws, resulting in requirements for utilities to increase their use of renewable energy (SB 123, SB 252). In order to achieve these goals, it is necessary to build new renewable energy facilities, including substantial solar energy facilities such as the Project. The Project would generate electricity that is cost competitive with electricity from other types of renewable projects.

The federal government has enacted legislation strongly encouraging the development of renewable energy. As part of an overall strategy to develop a diverse portfolio of domestic energy supplies for our future, the National Energy Policy of 2001 and the Energy Policy Act of 2005 (Public Law 109-58, August 8, 2005) encourage the development of renewable energy resources, which includes solar energy. Section 211 of the Energy Policy Act of 2005 encourages the approval of at least 10,000-MW of non-hydropower renewable energy production on the public lands; this goal was met in 2012. In early 2009, the Secretary of the Interior issued Orders 3283 and 3285, making the production, development, and delivery of renewable energy top priorities for the Department of the Interior. The President's Climate Action Plan, released on June 25, 2013, sets forth a new goal for the Department of the Interior to approve 20,000-MW of renewable energy projects on the public lands by 2020.

Part of the government's efforts to promote renewable energy depend on the ultimate development of increasingly economical facilities that drive down the price of renewable energy, and ultimately enable it to compete in the market place with fossil fuel facilities.

1.2.2 Project Purpose and Need

The fundamental purpose of the Project is to construct a clean, renewable source of solar electricity that helps meet the region's growing demand for power and helps fulfill national and state renewable energy and greenhouse gas emission goals. Solar energy provides a sustainable, renewable source of power that helps reduce fossil fuel dependence and greenhouse gas emissions. Considering the entire process, from raw material sourcing through end-of-life-cycle collection and recycling, 690-MWac of additional generating capacity would produce a small fraction of the greenhouse gas emissions of a similar capacity fossil fuel plant.

Specific Project objectives are summarized below.

- Establish a solar PV power-generating facility that is of sufficient size (approximately 7,100 acres [2,873.3 hectares]) and configuration to produce approximately 690-MWac of electricity in order to provide Nevada and neighboring states a significant new source of renewable energy
- Produce and transmit electricity at a competitive cost
- Initiate construction of the Project during calendar year 2019 in order to qualify for the federal solar Investment Tax Credit (ITC)
- Locate the facility in the rural part of Clark County in proximity to an available connection to the existing electrical distribution infrastructure
- Minimize environmental effects by:
    - using existing electrical distribution facilities, rights-of-way, roads and other existing infrastructure where practicable;
    - minimizing water use during operation;
    - reducing greenhouse gas emissions; and
    - using solar technology that is available, proven, efficient, and easily maintained, recyclable, and environmentally sound.

1.2.3 Power Market and Project Benefits

The Project would interconnect to NV Energy's existing Crystal Substation. The interconnection would allow NV Energy and other utilities to purchase renewable energy generated by the Project under one or more Power Purchase Agreements (PPAs) to deliver energy from a (nominal) 690-MWac generating facility.

The Project is well suited to arid environments because of the technology's low water consumption. This is a key consideration in Southern Nevada and the Western United States, as the population grows and water supplies become more constrained. PV solar technology, which converts sunlight directly into electrical energy, entails no thermal process, and therefore does not require process or cooling water to produce electricity. Water consumption during operations would consist of dust control and domestic use for on-site personnel and is between 95 and 99 percent less than concentrating solar projects that employ conventional steam turbines to generate electricity (DOE 2011).

The Project would also create employment for Southern Nevada residents. The Project is anticipated to directly create an average of 500 to 700, with a maximum of 900, on-site construction jobs and 19 full-time operational jobs. The Project would indirectly create other jobs in the Southern Nevada economy.

1.3 General Facility Description, Design, and Operation

1.3.1 Project Location, Land Ownership, and Jurisdiction

The Project site is located approximately 33 miles (53 kilometers) northeast of the Las Vegas metropolitan area, immediately south of the Moapa River Indian Reservation in an unincorporated area of Clark County, Nevada. Interstate 15 (I-15) is located less than 0.5 mile (0.8 kilometer) west of the Project site. The NV Energy Crystal Substation and high-voltage transmission lines are located less than 4 miles (6.4 kilometers) to the west, as shown in **Figure 1-1**.

All lands for the proposed solar facilities are federal lands administered by the BLM under the 1998 Las Vegas Resource Management Plan (BLM 1998). Existing uses of the site are managed by the BLM in accordance with the 1998 Las Vegas Resource Management Plan.

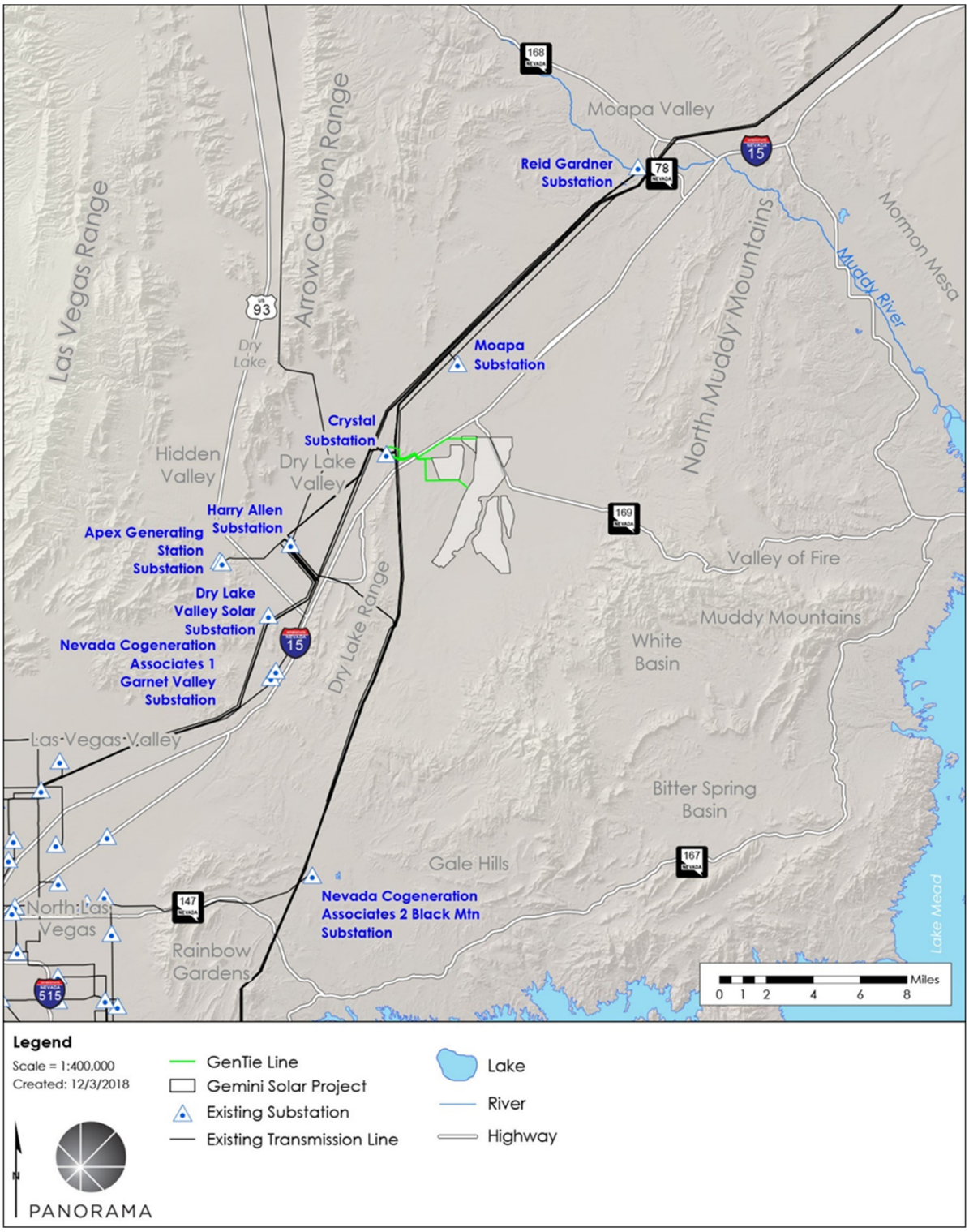
1.3.2 Legal Land Description

Refer to Attachment A for the Project's legal description of the solar field and ancillary facilities, power lines, and access roads within the overall application area.

1.3.3 Total Acreage and General Dimensions of All Facilities and Components

Table 1-2 lists Project facilities and the associated permanent and temporary disturbance acreages. The Project site plan is provided in Attachment B. Error! Reference source not found. shows the Project elements.

FIGURE 1-1 PROJECT LOCATION



Sources: (Louis Berger Group 2018, Esri 2006, USGS 2017, The National Map and USGS 2017, Ventyx 2010, Tele Atlas 2010a, Tele Atlas 2010b)

TABLE 1-2 SUMMARY OF PERMANENT AND TEMPORARY DISTURBANCE

Disturbance Type	Acres of Disturbance (hectare)	Notes
Permanent Disturbance		
Entire Solar Facility	7,071 (2,862)	690-MWac PV solar facility
Solar Arrays (Traditional Development)	6,810.9 (2,756.3)	Includes the solar PV panels, steel table frames, trackers, and posts
O&M Building	2.1 (0.85)	Includes the O&M building, parking, and water tank storage, all within solar facility footprint
Substations	7.1 (2.9)	Each of the three substations occupies approximately 2.4 acres (0.97 hectares) within the solar facility footprint
Firebreak	42.2 (17.1)	10-foot wide firebreak outside the perimeter fence
Perimeter Road	84.2 (34.1)	Up to 20 feet (6.1 meters) wide, graded and covered with gravel base or compacted soil. The access roads are included in the solar facility footprint
Internal Access Roads for Solar Field and Utility Corridor	62.9 (25.5)	Up to 20 feet (6.1 meters) wide with a 30-foot (9.1-meter) adjacent utility corridor (20 feet [6.1 meters] on one side and 10 feet [3.05 meters] on the other), graded and covered with gravel base or compacted soil. The access roads are included in the solar facility footprint. Includes temporary and permanent disturbance related to water infrastructure.
Water Ponds	4 (1.6)	Four temporary[1] water ponds would be constructed in development areas A, B, and D
Drainage Features	31.6 (12.7)	Includes channels (2.26 miles [3.6 kilometers]), a 15.4-acre (6.2 hectares) detention basin, and a spillway within the solar facility footprint
Berms	11.2 (4.5)	3.43 miles (1.6 kilometers) of berms within the solar facility footprint
Equipment Areas	14.7 (5.9)	425 equipment areas, which include batteries (53,550 individual batteries), inverters, and medium voltage transformers within the solar facility footprint
Gen-tie and Access Roads to Gen-tie	25.9 (10.5)	Gen-tie foundations assumed to fall within acreage for access roads
Total	**7,097 (2,872)** [3]	
Temporary Disturbance (granted through a short-term ROW, if outside the Project ROW area) [2]		
Gen-tie structure laydown, staging, and installation	37.7 (15.3)	Gen-tie structure laydown, staging, and installation, 200 feet (61 meters) by 200 feet (61 meters) at up to 48 poles, outside the solar facility fence
Gen-tie line conductor stringing	14.8 (6.0)	Multiple pulling sites for each gen-tie line where direction changes sharply; 100 feet (30.5 meters) by 500 feet (152.4 meters)
Total	**53 (21)**	

Disturbance Type	Acres of Disturbance (hectare)	Notes
GRAND TOTAL	**7,150 (2,893)**	

Gen-tie = generation tie line

All values presented are approximate and subject to change per final engineering.

1. Although the water ponds are temporary and would be removed following construction, the impact would be permanent.
2. Overlap with gen-tie access roads was netted out from these temporary impacts as access roads are considered under permanent impacts.
3. If selected as the water source, the water pipeline to Moapa Paiute Travel Plaza would be constructed in an already disturbed area along Valley of Fire Road and would not increase permanent disturbance.

1.3.4 Project Elements

The Project would include the following primary elements (see Attachment B):

- Solar array blocks consisting of solar PV modules mounted on single-axis, horizontal tracker mounting systems supported by driven steel posts or other embedded foundation design (**Figure 1-3**). The type of PV modules would be either traditional panels, which capture sunlight from one side of the panel, or bifacial panels, which can absorb light from both sides of the panels, including energy reflected back up from the ground surface. Solar panels would have a maximum height of 12 feet (3.7 meters) above the ground surface. When the panels are in their most vertical position, approximately 1 to 1.5 feet (0.3 to 0.5 meter) of space would remain between the bottom of the panel and the ground, depending upon site conditions such as flood flow depths (**Figure 1-3**).

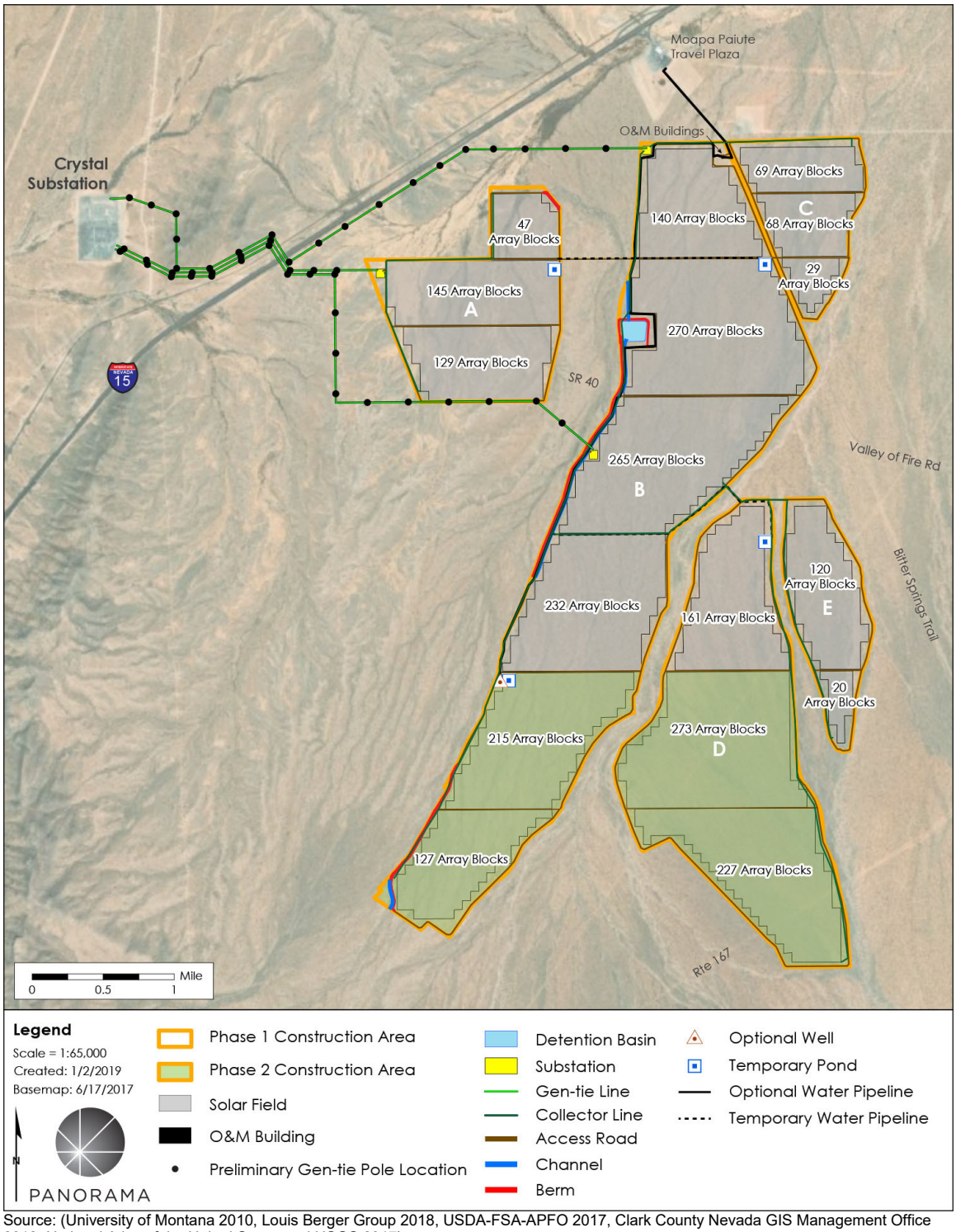
- Integrated battery energy storage system (BESS or battery system) consisting of approximately 425, 5-megawatt-hour (MWh) 4-hour battery systems with approximately 53,550 individual batteries enclosed in a container and installed adjacent to each inverter (**Figure 1-4**)

- Direct current (DC) collection system and Power Conversion Stations (PCSs) to collect power from the array blocks (**Figure 1-5**), with one PCS for approximately every four array blocks for a total of approximately 425 PCSs

- Overhead and underground 34.5 kilovolt (kV) alternating current (AC) collection system conveys electricity to the Photovoltaic Combining Switchgear (PVCSs) (**Figure 1-6**) to the substation

- A roadway system consisting of an internal grid and perimeter roadways comprising approximately 82 linear miles (132 kilometers), graded and covered in aggregate (4 inches [10 centimeters] in depth) or compacted soil (12 inches [30.5 centimeter] of recompacted native material) (**Figure 1-7**)

FIGURE 1-2 PROJECT ELEMENTS



Source: (University of Montana 2010, Louis Berger Group 2018, USDA-FSA-APFO 2017, Clark County Nevada GIS Management Office 2018, National Atlas of the United States and USGS 2017)

- Access roads along Project generation tie (gen-tie) lines (approximately 12 miles [19 kilometers]), constructed in accordance for use by NV Energy to be a minimum 20 feet (6.1 meters) wide with an all-weather (aggregate) surface

- Up to three additional on-site substations hosting on-site ringbus substation(s) (**Figure 1-8**)

- Up to three gen-tie lines extending from the Project substations to the NV Energy's Crystal Substation, consisting of two 230 kV circuits and one 500 kV circuit (ROW width of 100 feet [31 meters] for 230 kV lines and 200 feet [61 meters] for 500 kV lines, and where two lines converge into one corridor, the ROW is 300 feet [91.5 meters])

- A 2-acre (0.8-hectare) O&M area that would accommodate an O&M building, warehouse, parking area, and other associated facilities such as above ground water storage tanks a delivery pipelines, septic system, security fencing, signage, lighting, and potentially flagpoles (**Figure 1-9**)

- Redundant telecommunication systems and cables installed in tandem with the gen-tie lines as required by NV Energy LGIA. On-site microwave and wireless systems collect and send data to the supervisory control and data acquisition (SCADA) system

- One meteorological tower (steel lattice), approximately 30 feet (9.1 meters) high, mounted on concrete a foundation would be installed at the northern boundary of the solar development area near the O&M facilities

- Project security using a combination of perimeter security fencing, controlled access gates, on-site security patrols, lighting, electronic security systems and/or remote monitoring

- A 10-foot-wide (3-meter-wide) firebreak outside the perimeter fence

- Desert tortoise exclusion fencing around the Project perimeter

- Drainage control structures including a detention basin, soil cement channels, and riprap or cement bank protection/berms (**Figure 1-10**)

- A temporary construction mobilization and laydown area, which would contain construction trailers, construction workforce parking, above ground water tanks, materials receiving, and materials storage (graded/compacted earth)

- An option for an on-site well or water pipeline extending from the Moapa Paiute Travel Plaza to the Project site (an alternate option for trucking water could also occur)

- Four, temporary on-site water storage ponds and pump systems of varying sizes during construction

The following improvements to NV Energy facilities are expected to be required to support interconnection for the Project:

- Interconnection with NV Energy for delivery of 440-MW to NV Energy Balancing Authority via 230 KV gen-tie line to the NV Energy Crystal Substation

  Interconnection Facilities

  - Two 230 kV circuit breakers, protection, and associated facilities at Crystal 230 kV substation
  - 230 kV dead-end structure, isolation switch, telecommunications (fiber optic systems data), and vertical transition structure into Crystal 230 kV Substation
  - Metering/communications equipment owned by NV Energy at the Project site

  Network Upgrades

  - New Crystal – Harry Allen 230 kV circuit line on existing transmission towers (previously permitted)

- Interconnection with NV Energy for delivery of 250-MW to Los Angeles Department of Water and Power (LADWP) Balancing Authority or another entity (e.g., NV Energy) via 500 kV gen-tie line or 230 kV gen-tie line to the NV Energy Crystal Substation

  Interconnection Facilities

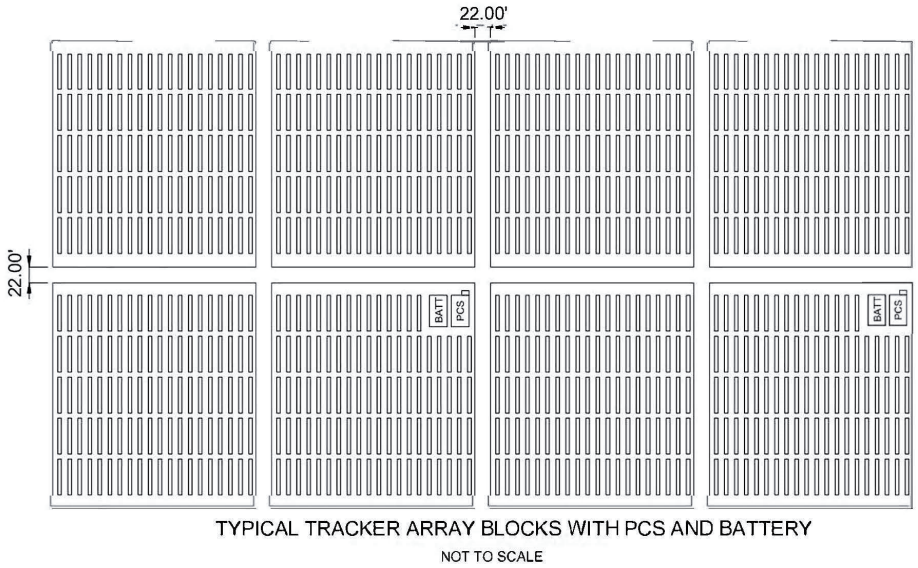
  - New 500 kV bay at Crystal North
  - Two 500 kV circuit breakers and associated disconnects
  - Substation switch
  - Bundled 1590 ACSR conductor (at least from H-frame to point of change of ownership)
  - 500 kV dead-end structure, isolation switch, telecommunications (fiber optic systems data), and vertical transition structure into Crystal 500 kV Substation
  - Metering/communications equipment owned by NV Energy at the Project site

  Network Upgrades

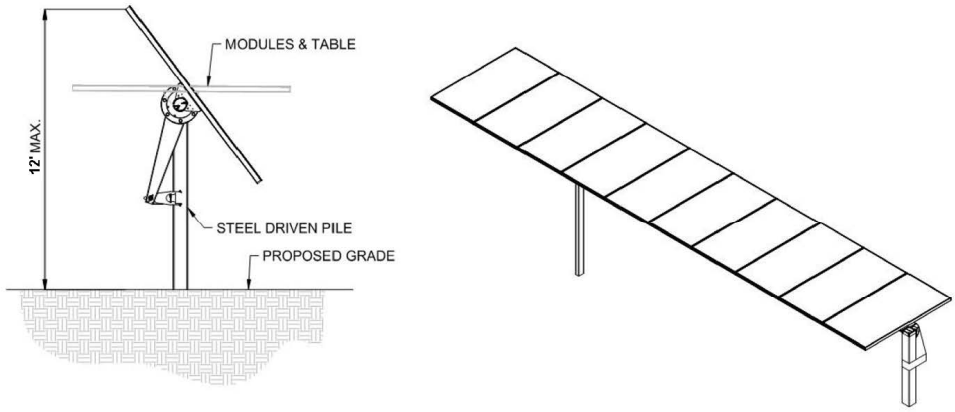
  - A new 230 kV circuit line on existing transmission towers connecting the Crystal Substation to Harry Allen Substation, approximately 5.5 miles (9 kilometers) to the southwest, with facility improvements at both stations (previously permitted)

- Additional requirements to be determined pending completion of System Impact Study

FIGURE 1-3 TYPICAL SECTION OF AN ARRAY BLOCK AND ELEVATION DRAWING OF A SINGLE-AXIS TRACKER



TYPICAL TRACKER ARRAY BLOCKS WITH PCS AND BATTERY
NOT TO SCALE



SINGLE AXIS TRACKER
NOT TO SCALE

FIGURE 1-4 PHOTOGRAPH OF A BATTERY ENERGY STORAGE SYSTEM AND DC/DC CONVERTER

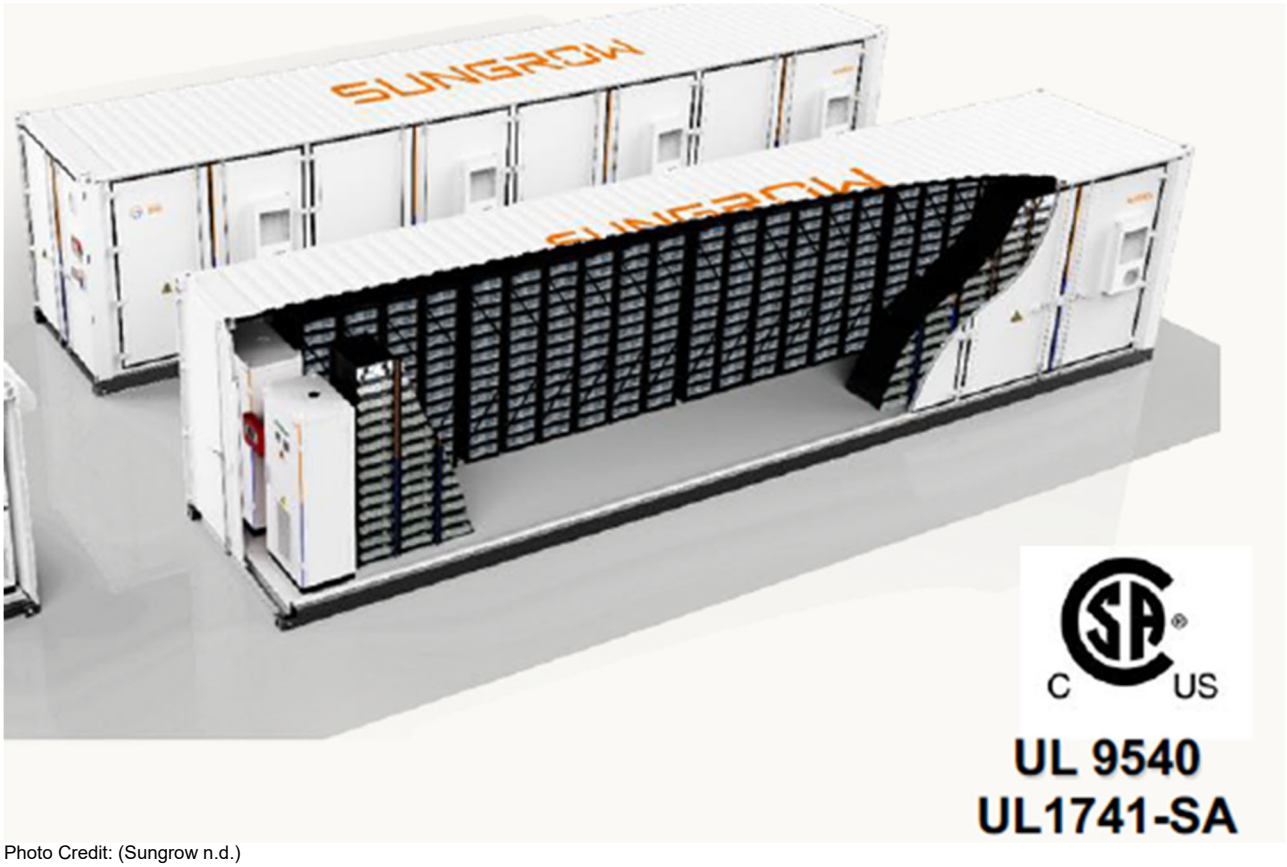


Photo Credit: (Sungrow n.d.)

FIGURE 1-5 PHOTOGRAPHS OF A TYPICAL POWER CONVERSION STATION/INVERTER

Source: (Luminous Energy n.d.)

Source: (Fotowatio Renewable Ventures 2017)

FIGURE 1-6 PHOTOGRAPH OF A TYPICAL PHOTOVOLTAIC COMBINING SWITCHGEAR

Source: (APT n.d.)

FIGURE 1-7 CROSS SECTION OF A TYPICAL ROAD

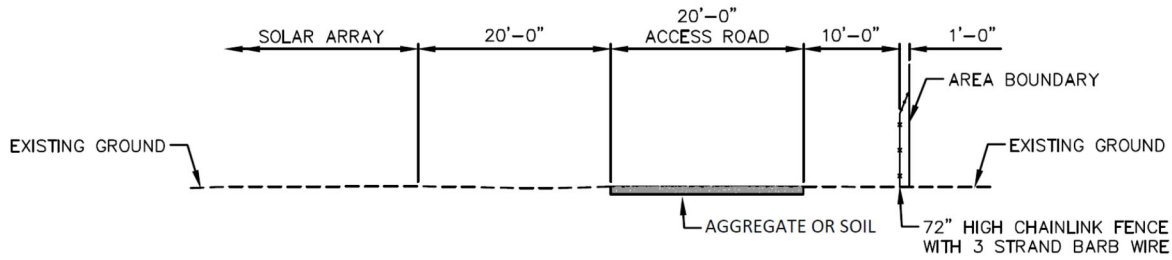


FIGURE 1-8 EXAMPLE OF A SIMILAR SUBSTATION LAYOUT

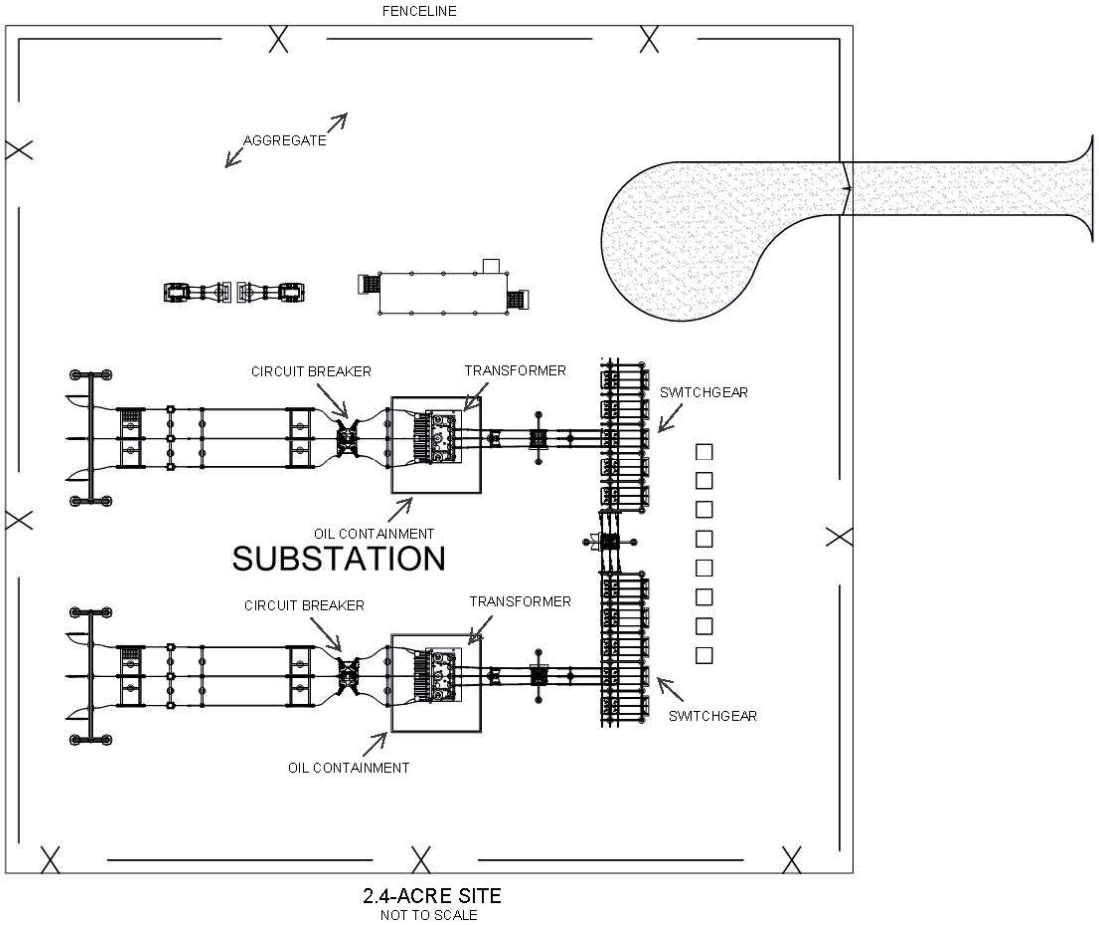


FIGURE 1-9 OPERATION AND MAINTENANCE BUILDING LAYOUT

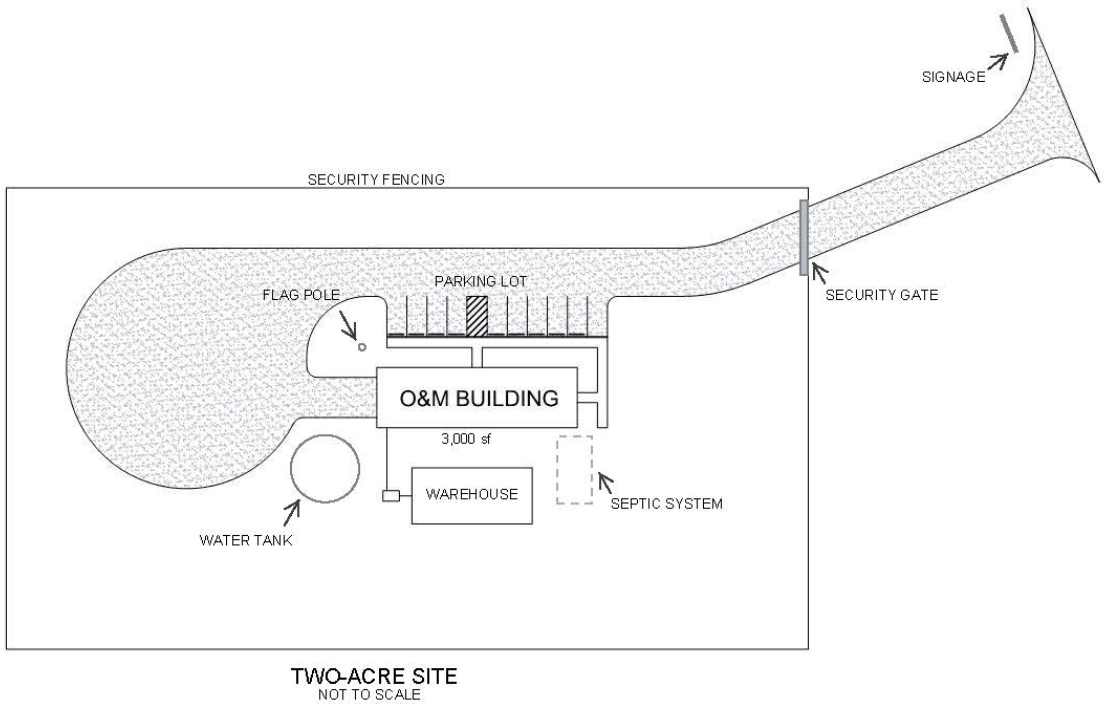
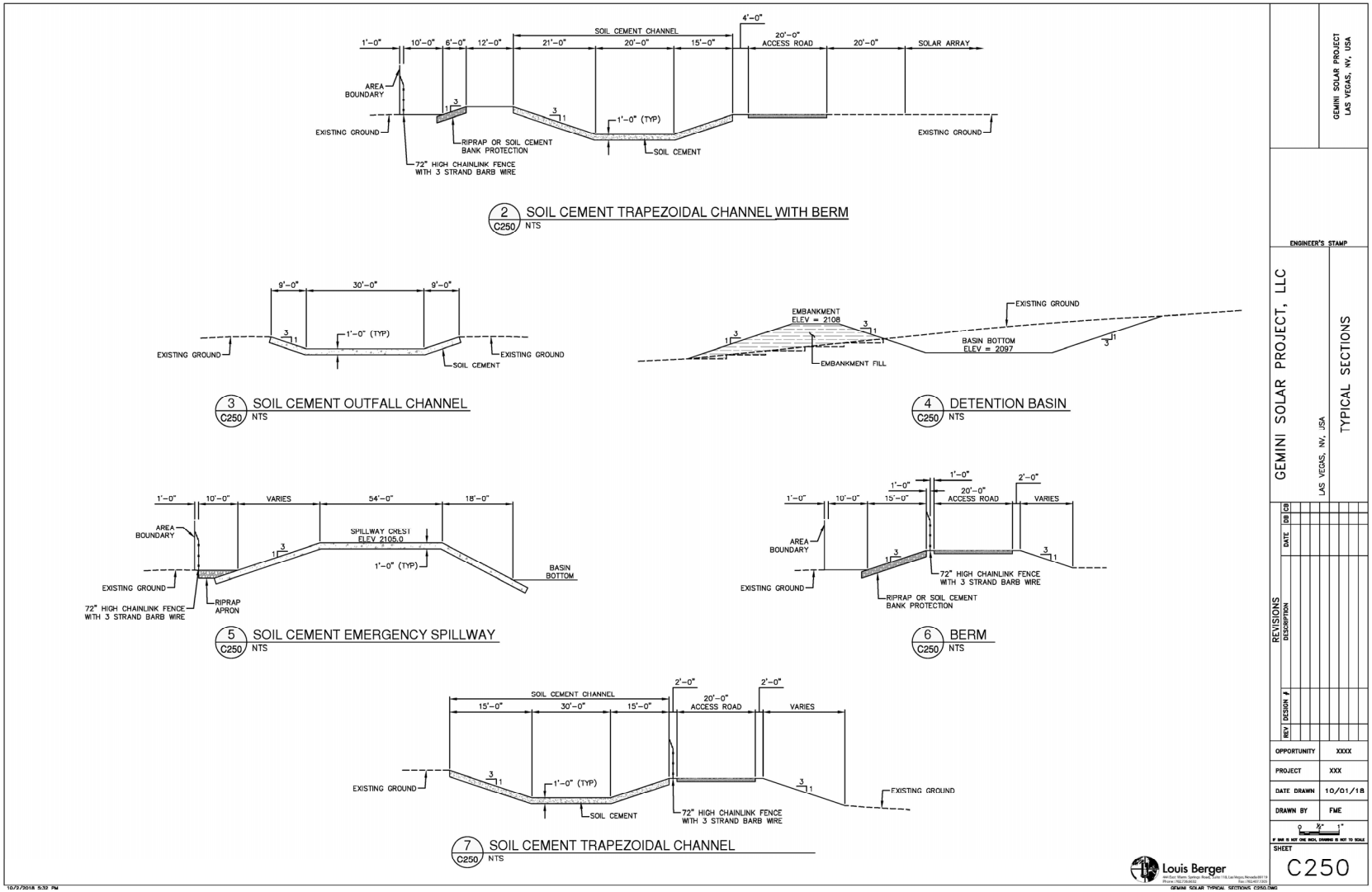


FIGURE 1-10 TYPICAL SECTIONS OF DRAINAGE FEATURES



1.3.5 Project Facilities

The Project would be designed in accordance with federal, state, and industrial standards, including American Society of Mechanical Engineers standards, National Electrical Safety Code, International Energy Conservation Code, International Building Code, Uniform Plumbing Code, Uniform Mechanical Code, National Fire Protection Association, and Occupational Safety and Health Administration regulations.

1.3.5.1 Solar Panel Arrays

The Project would utilize high-efficiency commercially available solar PV modules that are Underwriters Laboratory (UL)-listed or approved by another nationally recognized testing laboratory. Commercial solar panels are typically 77 inches (6.4 feet [2 meters]) long by 39 inches (3.25 feet [0.99 meter]) wide but could be as long as 8 feet (2.4 meters). Materials commonly used for solar PV modules include monocrystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium selenide/sulfide. The Project would use solar PV modules mounted on single-axis, horizontal tracker mounting systems. The type of PV modules would be either traditional panels, which capture sunlight from one side of the panel, or bifacial panels, which can absorb light from both sides of the panels, including energy reflected back up from the ground surface. Bifacial panels passively absorb light on both sides. Absorption of reflected light would not interfere with vegetation growth under panels (were it to occur). No heat or light is radiated back from the panels. Generally, traditional panels use polycrystalline materials, and bifacial panels use monocrystalline cells. Both types can have antireflective coating added to reduce glare. Mounted PV modules, inverters, and transformers would be combined to form array blocks.

With a horizontal tracker mounting system, the panel arrays are arranged in north-south oriented rows and drive motors would rotate the horizontally-mounted solar panels from east to west to follow the sun (on a single axis) throughout the day. A typical panel array layout using horizontal trackers is shown in **Figure 1-3**. The highest point for a horizontal tracker would be achieved during the morning and evening hours when the trackers are tilted at their maximum angle, and would be a maximum of 12 feet (3.7 meters) above the ground surface depending on the grade where the posts are installed (**Figure 1-3**). When solar modules are roughly parallel to the ground, the overall height of the tracker unit would be up to 6 feet (1.8 meters) above the ground surface depending on the grade where the posts are installed. At the most perpendicular to the ground surface, 1 to 1.5 feet (0.3 to 0.46 meter) of space would generally remain between the bottom of the panel and the ground, depending upon site conditions. Factors such as flow depth are accounted for when determining height of the posts.

The vertical support legs for the tracker mounting system consists of foundations that may include concrete piers approximately 18 to 24 inches (46 to 61 centimeters) in diameter and 6 to 8 feet (1.8 to 2.4 meters) deep, or driven posts (wide flange I-beam) approximately 6 to 8 inches (15 to 20 centimeters) across and 6 to 12 feet (1.8 to 3.7 meters) deep. The preferred mounting configuration would use directly embedded driven posts; concrete piers would be used only if subsurface conditions do not support driven posts. Posts in some areas of the solar array may

need to be up to 24 inches (61 centimeters) deeper based on hydrologic conditions, for depths of up to 14 feet (4.3 meters), depending on the type of foundation selected.

In this type of system, each tracker panel array is approximately 285 feet (86.9 meters) long and powered by a low-voltage solar-powered drive motor. The motors and actuator are mounted to one of the driven posts and do not require separate foundations for mounting. Hydraulic drive systems would not be used. The motors would only be operated for a few seconds every 5 to 10 minutes during daylight conditions to move the panels in approximately 1-degree increments. The sound from the tracker motors would be less than 70 decibels at a distance of 3 feet (0.9 meter). This would equate to less than 30 decibels at 50 feet (15.24 meters).

Meteorological Tower

A meteorological station would be installed at the northern boundary of the solar development area near the O&M facilities to monitor wind speed and communicate with the tracker units. This would allow for the trackers to rotate to a flat position to reduce the potential for damage during high wind activity [2]. The meteorological station tower would be monopole or lattice design and would not exceed 30 feet (9.1 meters) in height. The tower would require a small concrete foundation approximately 3 feet by 3 feet (0.9 meter by 0.9 meter) that would extend approximately 4 feet (1.2 meters) into the ground, depending on soil conditions.

Emergency Backup Power

The PCSs would be equipped with emergency backup power required to rotate the tracker units to a stow position in the unlikely event of high winds and a loss of the primary 230 kV electrical connection from the Project to NV Energy's transmission system. The emergency back-up power system would consist of a 15 kilovolt-ampere (kVA) battery-based uninterruptible power supply (UPS) at each PCS.

1.3.5.2 Electrical Collection System

Overview

The following diagram in **Figure 1-11** shows how power is transferred from the solar modules to the grid, followed by an explanation of the DC to AC power system.

DC Collection System to AC Transformers

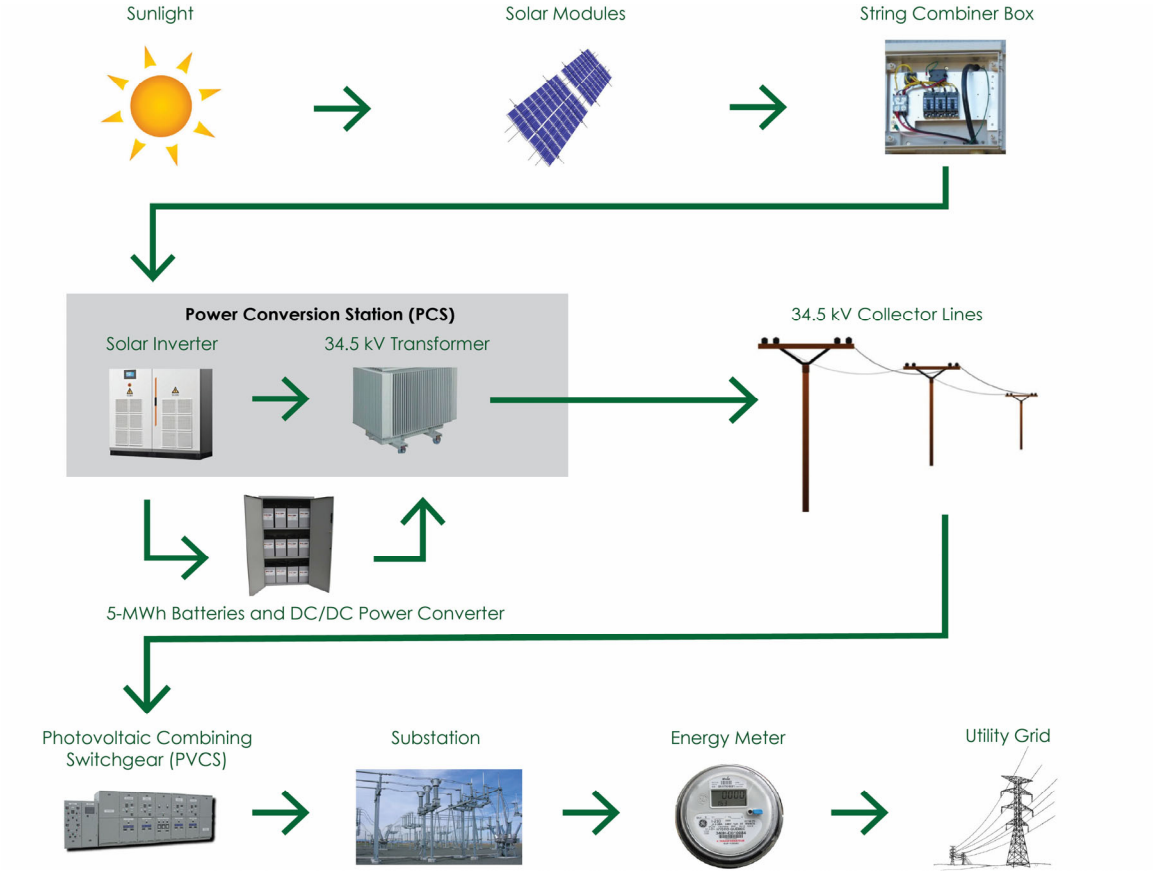
PV modules convert sunlight into DC electricity. One or more combiner boxes would be located in the array block to collect the DC electricity from PV modules.

A PCS containing inverters and medium voltage transformers (as shown in the diagram), as well as other electrical equipment would serve approximately four array blocks. The inverter converts DC generated by the solar arrays and collected at the combiner box into AC. Each inverter would also be coupled to a battery (described in more detail, below) with the capacity to store energy produced. From the inverter or battery, power is then passed through transformers to convert the low voltage output from the inverters to high voltage (34.5 kV AC) that is suitable for exporting onto the electricity distribution network. Each PCS also would contain communication equipment to wirelessly communicate with the tracker units to control operation and detect anomalous

[2] High wind activity is defined as sustained winds of 30 miles per hour (mph) (48 kilometers per hour [kph]) for one hour and/or frequent gusts of at least 45 mph (72 kph) that are occurring or expected within the next 36 hours (NOAA 2018).

conditions. All electrical equipment would be housed in protective containers typically 10 feet (3 meters) wide by 20 feet (6.1 meters) long, on concrete pads. A photograph of a typical PCS is shown in **Figure 1-5**. The PCSs for the Project would be painted colors determined by the BLM.

FIGURE 1-11 FLOW DIAGRAM OF POWER GENERATION



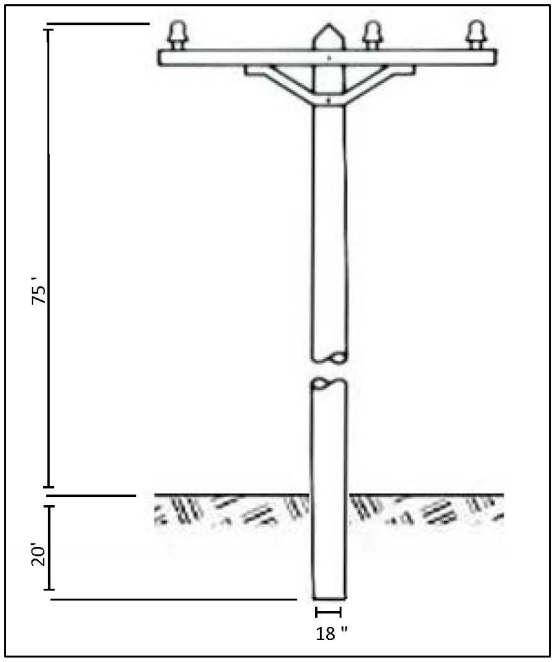
34.5 kV AC Collection System

A 34.5 kV AC collection system would convey electricity from the PCSs to on-site substations where electricity would be stepped up to 230 kV and 500 kV transmission levels.

The 34.5 kV AC collection system would include both underground and overhead cabling. The PVCSs aggregate AC power from multiple transformers/PCSs for transmission to the Project substations. The PVCS would be located along the 34.5 kV collector line. Each 34.5 kV circuit would feed electricity from approximately four array blocks to a PCS, which would then be aggregated at the PVCS and flow into the substations. The cables from the medium-voltage transformers to the PVCSs would be installed underground using 35 kV-rated medium voltage cables listed for direct buried applications. Overhead cabling would be installed where necessary to avoid existing underground facilities. Underground 34.5 kV cables would be installed to comply with the minimum burial depth in accordance with the National Electrical Code either directly in the ground or within a prefabricated duct bank system. Prefabricated duct banks are usually comprised of polyvinyl chloride (PVC) conduits and spacers, encased in concrete. The 34.5 kV cables would be threaded through the PVC conduits. From the PVCSs to the on-site substations, the 34.5 kV system would be installed overhead along the internal roads between

solar array blocks (Attachment B). The overhead lines would cross between development areas (including over the California Wash). Overhead 34.5 kV collector lines would be installed as double-circuit lines on wood or steel poles with cross-arms and post insulators (typical of medium voltage installations in electric distribution systems). Poles would have a diameter of approximately 18 inches (46 centimeters) and a height of up to 75 feet (23 meters) above grade (**Figure 1-12**). The poles would be installed either directly in the ground or on concrete pier foundations reaching a depth of up to approximately 20 feet (6 meters) below grade. The collector system cables would be installed in a linear arrangement generally following the array blocks and connecting to the closest on-site substation. Alternatively, the 34.5 kV circuit could be installed underground in a utility corridor conduit, adjacent to the established 20-foot-wide (6-meter-wide) roads. Corridors would include 20 feet (6.1 meters) on one side of the road and 10 feet (3 meters) on the other.

FIGURE 1-12 34.5 KV DISTRIBUTION POLE



Substations

Approximately three substations would be developed within the Project site: two 2.4-acre (0.97 hectare) 230 kV substations and one 500 kV substation within approximately 2.4 acres (0.97 hectares). A typical substation layout is shown in **Figure 1-8**. All substations would be constructed in accordance with applicable electrical safety codes. The substations would be separately fenced to provide increased security around the medium and high voltage electrical equipment. The substation area would include a transformer containment area, a microwave tower, a control house, and one or more transformers. Containment measures for all substation equipment shall be provided in accordance with Environmental Protection Agency 40 Code of Federal Regulations (CFR) Part 112 and all applicable codes required by the local, state, and federal governing authorities. The transformer containment area would be lined with an impermeable membrane covered with gravel and would include a drain with a normally closed drain valve. Transformers would be provided with secondary oil containment equal to 110 percent of the volume of oil present in the transformer in addition to the volume of rain water for

a 25-year, 24-hour rainfall event. All other equipment in the substation would be placed on concrete foundations. The remaining area within the substation fence would be covered in aggregate.

1.3.5.3 Energy Storage

A battery energy storage system would be located within the Project site. Battery storage would be used during periods of excess generation to store power until the customer or the system determines release of the power to be more valuable. Approximately 425 5-MWh 4-hour battery systems, comprised of a total of approximately 53,550 individual batteries (126 batteries per system), would be installed on the Project site, with each battery system installed at one inverter/PCS. The batteries may be lithium ion, but the technology for battery storage is changing rapidly and the appropriate technology at the time of construction would be utilized. The units would be installed adjacent to the DC/DC power converter and PCS, on a foundation or piles, as needed to protect the unit from stormwater. The brand and type of unit is not currently known. The battery systems would be enclosed in a container typically 40 feet (12.2 meters) long, by 9.5 feet (2.9 meters) wide, by 8 feet (2.4 meters) tall and are configured as a climate-controlled enclosure for batteries (**Figure 1-4**). A DC/DC power converter would be housed in a container, typically 10-foot (3-meter) long, 9.5-foot (2.9-meter) wide, and 8-foot (2.4-meter) long, adjacent to the battery container. The units would be painted colors determined by the BLM. Each unit would have a fire suppression system, which involves use of clean fire suppression gas. Alternatively, battery storage may also be located adjacent to the Project substations within the footprint of the substations.

1.3.5.4 Operation and Maintenance Facilities

An approximately 2-acre (0.8-hectare) O&M area would be located within the Project site, as shown in Error! Reference source not found.. The O&M area would accommodate a permanent O&M building, parking area, other associated facilities such as a warehouse, aboveground water storage tank, septic system, security gate, signage, and flagpoles. Structures in the O&M area would be a maximum height of approximately 34 feet (10.4 meters). The permanent O&M building would house administrative, operation, and maintenance equipment and personnel, and would be up to approximately 3,000 square feet (278.8 square meters) in size and would have an adjacent parking area. Typical O&M buildings are 16 to 18 feet (4.9 to 5.5 meters) tall. Warehouse structures are typically up to 20 feet (6 meters) tall. The O&M building may include communication equipment, a storage and equipment area, offices, restrooms, and other features necessary for daily use. The design and construction of this building would be consistent with applicable Clark County building standards. The O&M building would be painted colors determined by the BLM.

The on-site buildings are proposed to be pre-engineered metal buildings that would be fabricated off site. Sections would be transported to the Project site for erection and assembly. The buildings would be anchored to concrete foundations on-site. The interior details and other refinements would be completed on-site after anchoring. Water storage tanks for potable water and fire protection would either be delivered as modular components and assembled on-site or constructed on-site on a concrete pad.

Supervisory Control and Data Acquisition Equipment

The Project would be operated and monitored by means of a SCADA system located in the O&M building. Sensors located at each inverter/tracker combiner would report operational parameters. Data access and inverters are controlled, either on-site or remotely, through a high-security system. The non-conductive fiber optic communications cable would be co-located with the low-voltage DC and AC wiring.

1.3.5.5 Site Security and Fencing

Security at the Project site would be achieved by fencing, lighting, security patrols, and electronic security systems. The Project site would be monitored 24 hours per day, 7 days per week during all phases of construction and operation. Lighting would be provided at the O&M building and Project entrance gate. The solar field and support facilities perimeter would be secured with chain link metal-fabric security fencing. Controlled access gates would be located at the site entrance. The perimeter fence would be an approximately 6- to 7-foot-high (1.8- to 2.1-meter-high) chain link fence, installed on posts, with 1-foot-high (0.3-meter-high) three-strand barbed-wire at the top (the security fence in proximity to the gen-tie lines would be properly grounded). The fence would be treated with a chemical dulling agent that reduces the galvanized steel's potential for glare and reduces contrast. Approved desert tortoise exclusion fencing also would be utilized and would be installed within the perimeter security fence as shown in **Figure 1-13** (photograph taken by Ryan Young of the Barren Ridge Solar Facility in Kern County, California).

FIGURE 1-13 EXAMPLE TORTOISE AND SECURITY FENCING

Source: (Phoenix Biological Consulting, Inc. 2018b)

1.3.5.6 Site Access and Internal Project-Related Roads

The primary access road for the Project during both construction and operation would be Valley of Fire Road, a paved, public roadway that crosses through the site (**Figure 1-14**). Valley of Fire Road connects to I-15 less than 0.5 mile (0.8 kilometer) west of the Project site. Two alternate routes have been identified if access from through Valley of Fire Road on Tribal land is not

secured. Alternate Route 1 is I-15 to Northshore Road to Valley of Fire Road. Alternate Route 2 is I-15 to State Route 169 (SR 169) to Valley of Fire Road (**Figure 1-14**).

Project-related roads within the solar facility would include the perimeter road and solar field access roads as described below. Similar to the disturbance that would occur from other Project components (based on the assumption that all acreage within the fenced perimeter would be disturbed), the acreage identified for roads also is considered to be permanent disturbance.

A new perimeter road would be located just inside the Project site's perimeter fence and within the solar field around specific blocks of equipment. The perimeter road would be constructed to allow access by maintenance and security personnel. The perimeter road would be approximately 20 feet (6.1 meters) wide and would be composed of native graded and compacted dirt. Alternatively, the perimeter road may use a BLM-approved aggregate base in some or all areas to meet Project dust and flood control requirements.

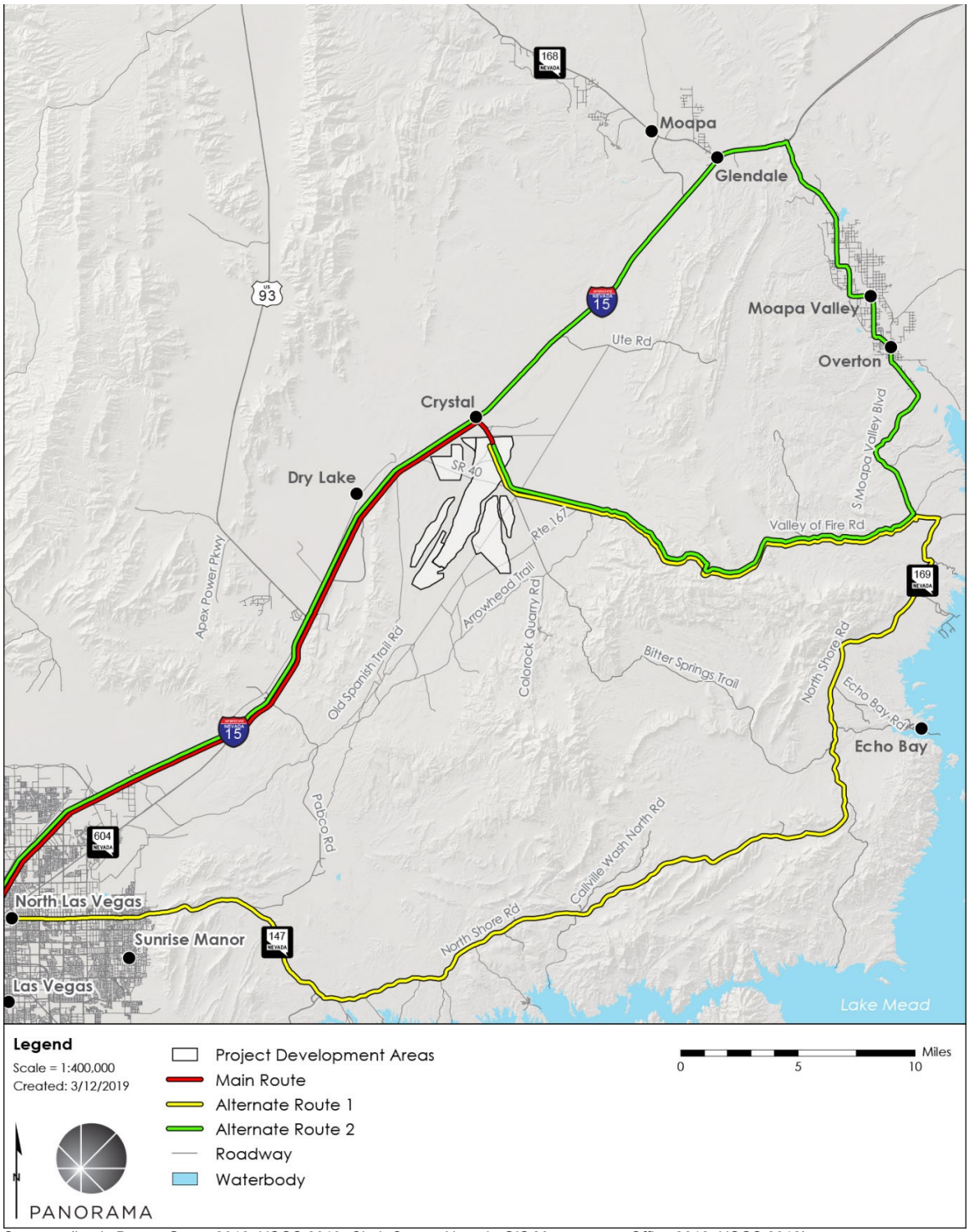
Within the solar field, new access roads would be built to provide vehicle access to the solar equipment (PV modules, inverters, transformers) for O&M activities. These access roads would be approximately 20 feet (6.1 meters) wide and approximately every 1.0 mile (1.6 kilometers) across the facility in development areas B, D, and E and every 0.5 mile (0.8 kilometer) in development areas A and C, as shown in the design drawings presented in Attachment B. The existing surface area would be graded and compacted using on-site materials and may be covered in aggregate. Some internal access roads may be constructed with aggregate; however, the majority of internal roads would be constructed using only recompacted native materials. Where aggregate is needed (either due to high usage or based on the need to facilitate drainage and minimize dust or erosion) approximately 4 inches (10 centimeter) of BLM-approved aggregate would be applied over compacted native soils. In general, the design standard for the access roads within the solar field would be consistent with the amount and type of use they would receive. A cross section of a typical internal access road is shown in **Figure 1-7**. Access roads would include a 10-foot (3-meter) buffer on one side of the road and a 20-foot (6-meter) buffer on the other side to allow for the installation of conduit for the 34.5 kV AC distribution system, as previously described.

1.3.6 Linear Facilities

1.3.6.1 230 kV and 500 kV Gen-Tie Transmission Lines

The Project would require the construction of two 230 kV circuit lines and one 500 kV circuit line, combined for interconnection to the utility transmission grid system. Conductor for the gen-tie lines would be installed on support structures similar to those found in the Project area (e.g., dull gray galvanized steel monopoles or lattice towers with cross-arm supports and insulators). Gen-tie support structures are not anticipated to be taller than 200 feet (61 meters) and would be spaced approximately 1,500 feet (457.2 meters) apart, depending on topography and clearance requirements. Towers and poles could be higher than 200 feet (61 meters) in areas where it must cross existing lines, such as existing NV Energy and LADWP lines near the Crystal Substation.

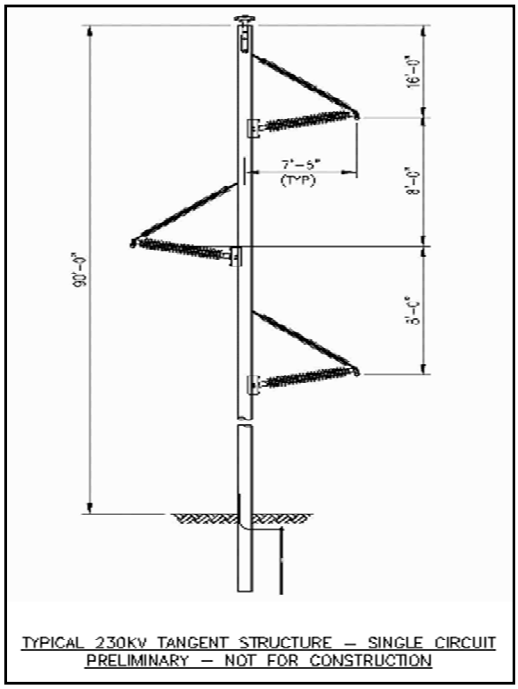
FIGURE 1-14 ACCESS ROUTES TO THE PROJECT SITE

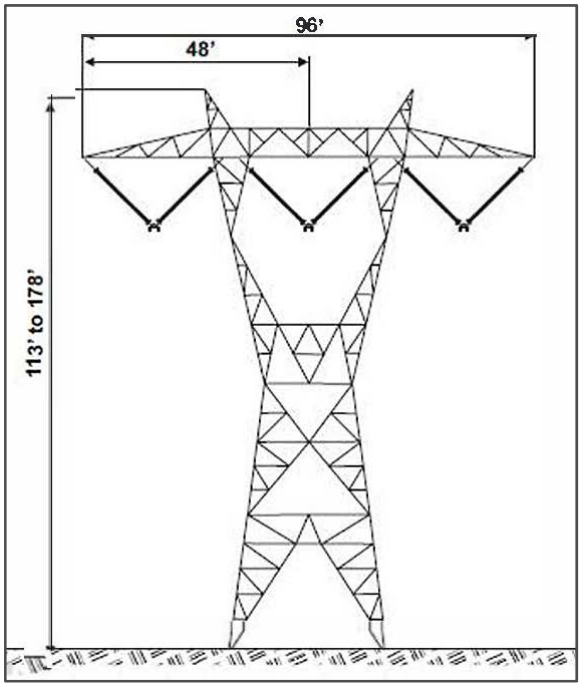


Sources: (Louis Berger Group 2018, USGS 2013, Clark County Nevada GIS Management Office 2018, USGS 2012)

If poles exceed 200 feet (61 meters) in height, a notice of Proposed Construction or Alteration would need to be filed with the Federal Aviation Administration (FAA). The FAA would conduct an obstruction evaluation and make recommendations. The structures would be installed on concrete pier foundations installed up to 20 feet (6.1 meters) belowground, but final depths would depend on tower heights and type of foundation (i.e., drilled piles, micro piles with pile caps, or piers). Typical gen-tie poles and towers are shown in Error! Reference source not found.. Given the Project site location and distance to the Crystal Substation, the gen-tie lines would be from approximately 2 to 4.75 miles (3 to 7.6 kilometers) long, each, with a combined length of approximately 11.5 miles (18.5 kilometers). An estimated 48 transmission structures would be required. Error! Reference source not found. shows an example of where transmission structures could be located along the gen-tie line. A permanent 20-foot-wide (6-meter-wide) gen-tie road would run the length of the gen-tie line. The ROW width needed for the gen-tie lines would be 100 feet (31 meters) for an individual 230 kV ROW, 200 feet (61 meters) for an individual 500 kV ROW, and 300 feet (91 meters) where the corridors are together. The overhead 230 kV and 500 kV lines would be installed per local and national electrical code requirements.

FIGURE 1-15 TYPICAL GEN-TIE SUPPORT STRUCTURES FOR 230 KV AND 500 KV LINES





All overhead electrical lines would be designed and installed in accordance with the Avian Power Line Interaction Committee's (APLIC) Suggested Practices for Avian Protection on Power Lines (APLIC 2006). The Applicant also would prepare a Bird and Bat Conservation Strategy to address potential impacts to birds and bats during the construction, operations, and maintenance phases of the Project.

The transmission lines would need to cross several facilities and existing ROWs, shown in **Table 1-3**. Detailed electrical engineering would be performed to micro-site and design the gen-tie lines to properly cross these facilities and would be updated in this Plan of Development (POD).

Arevia would also develop a Cooperative Engineering Agreement with TransWest and other ROW holders prior to construction to ensure that the compatibility of the crossings.

TABLE 1-3 LAND USE AUTHORIZATIONS IN THE PROJECT AREA

Name	Type of ROW Authorization	Owner/Applicant	BLM Serial Number
Crystal Substations (North and South) and Switchyard	Substation	NV Energy	N-61363; N-74575
Navajo-McCullough 500 kV transmission	500 kV transmission line	LADWP (formerly Department of Water and Power of the City of Los Angeles)	N-4790; N-943.2; N-2763
Intermountain Power Project Direct Current Line (IPP DC Line)	500 kV transmission line	LADWP	N-10683
Crystal-Moapa 500 kV line	500 kV transmission line	Moapa Southern Paiute Solar, LLC (f/k/a K Road Moapa Solar LLC); City of Los Angeles	N-89176A
One Nevada Transmission Line Project (ON Line Project)	500 kV transmission line	NV Energy; LS Power	N-82076
Harry Allen to Eldorado 500 kV Transmission Line Project (formerly known as the Southern Nevada Intertie Project [SNIP])	500 kV transmission line [1]	NV Energy; LS Power subsidiary of DesertLink	N-86359
Crystal Transmission Project	230 kV/500 kV transmission lines	NV Energy	NVN-92319
Harry Allen to Mead 500 kV Transmission Line	500 kV transmission line	NV Energy (formerly Nevada Power Company)	N-76327
TransWest Express Transmission Project	600 kV transmission line [1]	TransWest Express LLC	NVN-086732
--	Underground telephone line	CenturyLink, Inc.	NVN-057781
Interstate 15	Interstate highway	Nevada Department of Transportation	N/A
Union Pacific Railroad	Railroad	Union Pacific	N/A

Notes:
[1] Approved for construction and operation.

1.3.7 Interconnection Facilities

The following improvements to NV Energy facilities are expected to be required to support interconnection for the Project:

- Interconnection with NV Energy for delivery of 440-MW to NV Energy Balancing Authority via 230 KV gen-tie line to the NV Energy Crystal Substation

  Interconnection Facilities

  - Two 230 kV circuit breakers, protection and associated facilities at Crystal 230 kV substation

- 230 kV dead-end structure, isolation switch, telecommunications (fiber optic-system data), and vertical transition structure into Crystal 230 kV Substation
- Metering/communications equipment owned by NV Energy at the Project site

Network Upgrades

- New Crystal – Harry Allen 230 kV circuit line on existing transmission towers

- Interconnection with NV Energy for delivery of 250-MW to LADWP Balancing Authority via a 500 kV gen-tie line to the NV Energy Crystal Substation

Interconnection Facilities

- New 500 kV bay at Crystal North
- Two 500 kV circuit breakers and associated disconnects
- Substation switch
- Bundled 1590 ACSR conductor (at least from H-frame to point of change of ownership)
- 230 kV dead-end structure, isolation switch, telecommunications (fiber optic-system data), and vertical transition structure into Crystal 500 kV Substation

Network Upgrades

- A new 230 kV circuit line on existing transmission towers connecting the Crystal Substation to Harry Allen Substation, approximately 5.5 miles (9 kilometers) to the southwest, with facility improvements at both stations (previously permitted)

- Access roads to service the above-referenced interconnection routes and facilities

1.3.8 Water and Wastewater

1.3.8.1 Water

Approximately, 20 acre-feet (2.47 hectare-meters) of water per year is would be needed for Project operation and maintenance. The operational water use estimate is based on the median water use of other solar power plant installations in the desert areas of Nevada and neighboring states. Actual water use varies widely at different facilities depending on weather, soil, and vegetation conditions. A few options are being considered for obtaining water for the Project's operation (refer to Chapter 2: Construction of the Facilities for discussion of the sources of construction water). New appropriations are unlikely to be available in the groundwater basin. The options, therefore, are as follows:

- Purchasing water from a commercial source or a user with an existing appropriation and trucking the water to the Project site where it would be stored in an on-site water storage tank.

- Purchasing water from an existing appropriation held by the Moapa Band of Paiutes and piping the water from an existing well at the Moapa Paiute Travel Plaza to the Project O&M building via an underground 12-inch (30.5-centimeter) pipeline where it would be stored in an on-site water storage tank. It is assumed that the source of water has a minimum pressure of 40 pounds per square inch (276 kilopascals) and due to the lack of elevation change, no pump or associated backup generator is required to bring water to the O&M building.

- Purchasing water from an existing appropriation by accessing the water through a new on-site groundwater well (which would be drilled during construction, refer to Chapter 2: Construction of the Facilities for a discussion of this well, its size, and location). A new, approximately 5-mile (8 kilometers)-long 8-inch (20 centimeters) ductile iron underground pipeline from the well to the O&M building, would be installed under the perimeter access road. The pump for the well would be powered by solar energy, with a backup battery storage unit, and backup 250 to 300 kVA diesel generator. A 100 horsepower (75 kilowatt) pump at the O&M building would be powered by solar energy, with a backup battery storage unit, and backup 250 to 300 kVA diesel generator.

Water would not be used for panel washing but would be used in conjunction with dust palliatives during operation (see Chapter 4, *Operation and Maintenance*). The Project would not require process water.

The BLM has allowed the use of several dust palliatives on other projects within the Southern Nevada District. If dust palliatives are used in place of water for the Project, the total amount of water needed during construction would be reduced. The Applicant may opt to use such palliatives, as authorized by the BLM, for the Project. The soil binder/dust palliatives that are proposed for the Project, and which BLM previously has allowed, are:

- Road Bond 1000
- For roads and heavy traffic areas: Soil Cement
- For non-traffic areas on finer soils: Formulated Soil Binder FSB 1000
- For non-traffic areas on sandier/rockier soils: Plas-Tex
- Alternatives, as approved by BLM

1.3.8.2 Wastewater

Wastewater generated during construction would include sanitary waste from portable toilets and the O&M septic system (if feasible, or else portable toilets) once completed. The waste from portable toilets would be collected by a contracted sanitary disposal service and transported to a licensed disposal facility.

1.3.9 Lighting

Permanent lighting would be provided within the substation and at the Project entry gate. Small domestic fixtures would also be placed at other electrical equipment as required by applicable codes. Lighting for facilities and associated infrastructure would be down-shielded to keep light within the boundaries of the Project site and the minimum amount and intensity necessary for the intended use. Nighttime construction activities, if required, would be performed with temporary lighting. Night lighting, where used, would be controlled or reduced using directed lighting, shielding, and/or reduced lumen intensity. The Applicant would prepare a Lighting Plan for construction and operation of the Project.

1.3.10 Facility Power

The O&M facility, monitoring systems, and lighting would likely be powered by solar power, with a minimum 12-hour battery storage unit, and a 250 to 300 kVA diesel generator as backup if a permanent drop of power from existing distribution lines is not feasible.

1.3.11 Waste and Hazardous Materials Management

The primary wastes generated at the Project during construction, operation, and maintenance would be nonhazardous solid and liquid wastes. The types of wastes and their estimated quantities are discussed below and summarized in **Table 1-4.** The Applicant would prepare a Hazardous Materials and Waste Management Plan, as well as a Spill Prevention and Emergency Response Plan, which would address waste and hazardous materials management, including Best Management Practices (BMPs) related to storage, spill response, transportation, and handling of materials and wastes.

1.3.11.1 Nonhazardous Wastes

The Project would produce wastes typically associated with O&M activities. These would include defective or broken electrical materials, empty containers, typical refuse generated by workers and small office operations, and other miscellaneous solid wastes.

1.3.11.2 Battery Use and Recycling

Batteries would be used during construction in vehicles and equipment, and during operation and maintenance in the BESS and the battery-based UPS at each PCS. Spent lithium-ion batteries would be recycled. One of the battery recycling programs available involves feeding the batteries into a mechanical processing stream that reduces them into an inert, non-hazardous shred product. This process removes and recovers battery electrolyte and electrolyte salt. Between 80 and 100 percent of battery constituent materials, including the hydrometallurgical, are recovered during this process. If a battery cannot be recycled, due to damage or other issues, the battery would be disposed of at an appropriate facility.

TABLE 1-4 WASTES POTENTIALLY GENERATED BY THE PROJECT

Waste	Origin	Composition	Estimated Quantity		Classification	Disposal
			Construction[1]	O&M [2]		
Scrap wood, steel, glass, plastic, paper	Construction activities	Normal refuse	1,500 tons	N/A	Nonhazardous	Recycle and/or dispose of in industrial or municipal landfill
Scrap metals	Construction activities	Parts, containers	15 tons	N/A	Nonhazardous	Recycle and/or dispose of in industrial or municipal landfill; wood pallets may be returned for re-use
Empty hazardous material containers	Operation and maintenance of facility	Drums, containers, totes [3]	N/A	<7 tons	Hazardous and nonhazardous solids	Containers <5 gal would be disposed as normal refuse. Containers >5 gal would be returned to vendors for recycling or reconditioning.
Waste oil filters	Construction equipment and vehicles	Solids	3,500 lbs (1,587.6 kilogram)	N/A	Used Oil	Recycle at a permitted Treatment, Storage, and Disposal Facility (TSDF)
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	Unknown	700 cubic feet (19.8 cubic meters)	Used Oil	Recycle or dispose at a permitted TSDF
Spent lead acid batteries	Construction machinery	Heavy metals	70 units	N/A	Hazardous	Store no more than 10 batteries (up to 1 year)–recycle off-site.
Spent batteries	Solar facility equipment	Lithium-Ion	N/A	10,000 lbs (4,536.9 kilogram)	Universal waste solids	Recycle or dispose off-site in accordance with manufacturer's specifications at the time of disposal
Waste oil	Equipment, vehicles	Hydrocarbons	Unknown	3,500 gallons (13.2 cubic meters)	Used Oil	Dispose at a permitted TSDF
Sanitary waste	Portable toilet holding tanks	Solids and liquids	80,000 gallons (302.8 cubic meters)	N/A	Nonhazardous liquid	Remove by contracted sanitary service

[1] Over the entire construction period.
[2] Annually
[3] Containers include <5-gallon containers and 55-gallon drums or totes

1.3.11.3 Hazardous Materials Use

Limited quantities of hazardous materials would be used and stored on-site for construction and O&M activities. **Table 1-5** lists the anticipated hazardous materials that would be stored and used on-site. Safety Data Sheets (SDSs) for each of these materials would be provided in the Spill Prevention and Emergency Response Plan.

TABLE 1-5 HAZARDOUS MATERIAL USE

Hazardous Material	Storage Description; Capacity	Storage Practices and Special Handling Precautions
Gas and Diesel Fuel (for equipment)	Fuel is likely to be stored in and dispensed from aboveground tanks with capacities in the range of 500 to 2,000 gallons.	Would be managed in accordance with the Spill Response and Emergency Response Plan.

Lubricants	Only the amount sufficient to maintain fluid levels and perform preventive maintenance would be on-site.	Would be managed in accordance with the Spill Response and Emergency Response Plan.
Mineral Insulating Oil	Carbon steel transformers; total on-site inventory of approximately 80,000 gallons.	Used only in transformers; secondary containment for each transformer would be managed in accordance with the Spill Response and Emergency Response Plan.
Batteries, lead acid based and/or lithium ion	Battery-based emergency back-up power and BESS at each of the PCS.	Sufficient cooling capacity to maintain ambient temperatures appropriate for the selected battery would be provided.
Propane	Generator-based emergency back-up power at each of the nine PCS shelters (or one centralized generator); tanks at PCS would be sized between 20 and 100 gallons (or 1000 gallons if one centralized tank).	Would be managed in accordance with the Spill Response and Emergency Response Plan.
Herbicide; Pesticide	Brought on site by licensed contractor; used immediately.	No mixing would occur on site and no herbicides would be stored on-site.

1.3.12 Fire Protection

The Applicant would prepare and implement a Fire Management Plan. The Project's fire protection water system used during construction and operation would be supplied from a water storage tank. During construction, one electric and one diesel-fueled backup firewater pump would deliver water to the fire protection water-piping network. The electrical equipment enclosures that house the inverters and transformers would be either metal or concrete structures. Any fire that could occur would be contained within the structures, which would be designed to meet National Electric Manufacturers Association (NEMA) 1 or NEMA 3R IP44 standards for electrical enclosures (heavy duty sealed design to withstand harsh outdoor environmental conditions). A fire protection water system would be installed to support emergency fire response. The fire protection water system would be supplied by a water tank, holding a minimum of 2-hours of full flow run-time, that would be located in the O&M area. One electric and one diesel-fueled backup firewater pump would deliver water to the fire protection piping network. A smaller electric, motor-driven jockey pump would maintain pressure in the piping network. A jockey pump is a small pump designed to maintain a certain pressure in the sprinkler system. If the jockey pump were unable to maintain a set operating pressure in the piping network, the diesel fire pump would start automatically. All fire protection system pumps must be shut off manually.

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 Project site. Sprinkler systems would also be installed in the O&M building and fire pump enclosure as required by National Fire Protection Association (NFPA) and local code requirements.

1.3.13 Health and Safety Program

The Applicant would require that all employees and contractors adhere to appropriate health and safety plans and emergency response plans. All construction and operations contractors would be required to operate under a Health and Safety Program (HASP) that meets industry standards. All

site personnel would be required to go through a new hire orientation and follow a Worker Education and Awareness Plan (WEAP), which would address Project-specific safety, health, and environmental concerns.

1.3.14 Stormwater Management

Major existing Federal Emergency Management Agency (FEMA)-designated floodplains on the Project site would be avoided where feasible, with the exception of roadway crossings, and the Project would be designed and engineered to maintain the existing hydrology. Generally, off-site flows to the Project site come from the south. Runoff generated on-site would be conveyed as sheet flow across the site, maintaining as much of the natural grade of the terrain as possible. The soil is very permeable, so following the natural terrain would allow for maximum infiltration and would reduce runoff. Drainage channels, berms, and/or detention basins would be installed as shown in the site plans in Attachment B and the drainage plan in Attachment C. The detention basin would be approximately 15 acres (6.1 hectares) in size. A cross section of the detention basin is shown in **Figure 1-10**. Other drainage features would a concrete spillway and channel to the detention basin and berms. Cross sections of these structures are also shown in **Figure 1-10**. The structures sizes, locations, and materials may change in final engineering design. The drainage features are also shown in Plan sets in Attachment B.

1.3.15 Vegetation Management

Cacti and yucca between 1 and 6 feet (0.3 to 1.8 meters) in size would be salvaged in accordance with the Site Restoration Plan. Native vegetation (i.e., creosote and burrobush) is not anticipated to regrow in the solar field in bladed areas. The Applicant would address operational and post construction vegetation management including management of native species, and control of non-native and noxious weeds as part of a BLM approved Site Restoration Plan for the Project.

Weeds would be managed in accordance with the Site Restoration Plan, that follows the Las Vegas Resource Management Plan (BLM 1998), Noxious Weed Plan (BLM 2006), and the interagency guidance Partners Against Weeds (BLM 1996) for an active weed management program. Pest control may also be required, including control of rodents and insects inside of the buildings and electrical equipment enclosures. A Pesticide Use Plan (PUP) would be prepared and approved by the BLM prior to application of pesticides.

Herbicides would be one of the methods employed to control weeds throughout the Project site. The herbicide active ingredients approved for use on BLM land are detailed in Attachment F (BLM 2017). The PUP prepared for the Project would provide the exact specifications involved with herbicide application including the type of herbicide(s) proposed for use, method of application, and quantities of herbicide. Herbicide use would be conducted in accordance with BLM Manual 9011: Chemical Pest Control and BLM Handbook H-9011-1: Chemical Pest Control, and as covered under the RODs for the BLM's Programmatic EIS (PEIS) for Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on BLM Managed Lands in 17 Western States (BLM 2016), which is tiered from the PEIS for Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States (BLM 2007). The

Applicant would implement a Site Restoration Plan and an Integrated Weed Management Plan that specifies procedures for managing vegetation and minimizing the spread of non-native and noxious weeds, including integrated pest management and use of herbicides. Standard Operating Procedures (SOPs) from the Vegetation Treatments PEIS (BLM 2016) and provided in Attachment G, would be incorporated into the Integrated Weed Management Plan and implemented.

Four weed taxa were found to be widespread throughout the Project site; red brome (*Bromus madritensis ssp. rubens*), cheatgrass (*Bromus tectorum*), Mediterranean grass (*Schismus sp.*), and red stem stork's bill (*Erodium cicutarium*). Three species of weeds were recorded in large numbers during sampling conducted on the Project site; Saharan mustard (*Brassica tournefortii*), halogeton (*Halogeton glomeratus*), and African mustard (*Strigosella africana*) (Phoenix Biological Consulting 2018a). Herbicides approved for use in the ROD for the PEIS (BLM 2016) are included in Attachment F. The herbicides that have been determined to be effective at controlling weed species found on the Project site[3] are listed in **Table 1-6**. Surveys for and control of noxious and non-native weeds would be carried out during seasonally appropriate times and as needed to prevent the increase of non-native and noxious weeds within the Project area and to prevent spread of these weeds through Project-related activities.

1.4 Other Permits and Authorizations

Table 1-7 provides a list of federal, state, and local permits, authorizations, or inter-agency consultations that may be required for the Project.

1.5 Financial and Technical Capability of the Applicant

1.5.1 Solar Partners XI, LLC and Gemini Solar Ownership History

The APEX SEGS[4] was originally proposed by Solar Partners XI, LLC, a wholly-owned subsidiary of BrightSource Energy. In April 2017, BrightSource Energy Inc. sold 100 percent of the equity interests of Solar Partners XI, LLC (along with other BrightSource Energy US-based companies) to Valley of Fire, LLC.

BLM further acknowledged the transfer of ownership of Solar Partners XI, LLC to Valley of Fire, LLC in April 2017.

Notwithstanding BLM's previous determination of the financial and technical capability, Solar Partners XI LLC and Valley of Fire, LLC provide the following information describing the financial and technical capabilities of its owner.

[3] Studies regarding control of African mustard via herbicides have either not been conducted or are not readily available.

TABLE 1-6 RECOMMENDED USE AND APPLICATION OF APPROVED HERBICIDES

Active Ingredient	Trade Name	Saharan Mustard	Halogeton	Red Brome and Cheatgrass	Mediterranean Grass	Red Stem Stork's Bill
2,4-D	Several names	**Rate:** 1.5% v/v solution for spot application **Timing:** Postemergence when plants are small and are growing rapidly, but before flowering.	**Rate:** 2 to 6 pt product/acre for ester formulation (0.95 lb a.e./acre) **Timing:** Postemergence in early spring when plants are growing rapidly before bloom stage.	--	--	**Rate:** 0.5 to 2 pt product/acre (0.21 to 0.85 lb a.e./acre) **Timing:** Postemergence to rapidly growing plants up to flowering. Smaller plants are more effectively controlled.
Aminopyralid + metsulfuron	Opensight	--	--	--	--	**Rate:** 3 to 3.3 oz product/acre **Timing:** Postemergence, in spring from rosette to flowering stages, or in fall to seedlings and rosettes.
Chlorsulfuron	Telar	--	--	--	--	**Rate:** 1 to 2 oz product/acre (0.75 oz a.i./acre) **Timing:** Postemergence to young, rapidly growing plants in spring before flowering, or in fall to new rosettes.
Dicamba	Banvel, Clarity	--	--	--	--	**Rate:** 8 to 32 oz product/acre (0.25 to 1 lb a.e./acre); 8 to 16 oz for rosettes, up to 32 oz product/acre for bolting plants **Timing:** Postemergence to rapidly growing plants up to flowering. Smaller plants are more effectively controlled.
Glyphosate	Roundup, Accord XRT II, and others	**Rate:** 2% v/v solution for spot application **Timing:** Postemergence when plants are small and are growing rapidly, but before flowering.	**Rate:** Spot treatment, 2% v/v solution *Roundup ProMax* **Timing:** Postemergence in summer before plants bloom.	**Rate:** 0.33 to 1 qt product (Roundup ProMax)/acre (0.375 to 1.1 lb a.e./acre) **Timing:** Postemergence in early spring to rapidly growing, non-stressed plants after most seedlings have emerged. If possible, apply before	**Rate:** Broadcast foliar treatment: 1 to 2 pt product (Roundup ProMax)/acre (0.56 to 1.1 lb a.e./acre). Spot treatment: 1% v/v solution. **Timing:** Postemergence in the beginning of the	**Rate:** 2 to 3 pt product (Roundup ProMax)/acre (1.1 to 1.7 lb a.e./acre) **Timing:** Postemergence to rapidly growing plants.

Active Ingredient	Trade Name	Saharan Mustard	Halogeton	Red Brome and Cheatgrass	Mediterranean Grass	Red Stem Stork's Bill
				desirable perennials emerge.	season when plants are growing rapidly.	
Imazapic	Plateau	**Rate:** 4 to 10 oz product/acre (1 to 2.5 oz a.e./acre) **Timing:** Preemergence, or postemergence to rosettes.	**Rate:** 4 to 6 oz product/acre (1 to 1.5 oz a.e./acre) **Timing:** Preemergence or early postemergence to seedlings 1 to 3 inches tall.	**Rate:** 4 to 12 oz product/acre (1 to 3 oz a.e./acre) **Timing:** Preemergence to very early postemergence (3 leaves maximum) from fall to early spring.	**Rate:** 4 to 12 oz product/acre (1 to 3 oz a.e./acre) **Timing:** Preemergence in fall or postemergence in early spring. In colder climates, spring applications after snow melt are better than fall treatments.	**Rate:** 8 to 12 oz product/acre (2 to 3 oz a.e./acre) **Timing:** Most effective postemergence.
Imazapyr	Habitat, Stalker, Arsenal, Chopper, Polaris	--	--	**Rate:** 2 to 3 pt product/acre (8 to 12 oz a.e./acre) **Timing:** Preemergence or postemergence	--	**Rate:** 2 pt product (Habitat)/acre (0.5 lb a.e./acre) **Timing:** Preemergence or postemergence.
Metsulfuron	Escort	--	--	--	--	**Rate:** 0.33 to 0.5 oz product/acre (0.2 to 0.3 oz a.i./acre) **Timing:** Postemergence to young, rapidly growing plants in spring before flowering, or in fall to new rosettes
Metsulfuron + chlorsulfuron	Cimarron X-tra	--	--	--	--	**Rate:** 0.5 oz product/acre **Timing:** Postemergence to rapidly growing plants before flowering.
Rimsulfuron	Matrix	--	--	**Rate:** 2 to 4 oz product/acre (0.5 to 1 oz a.i./acre) **Timing:** Preemergence in fall to early postemergence in early spring.	--	**Rate:** 4 oz product/acre (1 oz a.i./acre) **Timing:** Preemergence
Sulfometuron	Oust and others	--	--	**Rate:** 0.75 to 5 oz product/acre (0.56 to 3.75 oz a.i./acre) **Timing:** Preemergence or early postemergence from fall to early spring. Most effective control is with early postemergence	**Rate:** 2 to 6.67 oz product/acre (1.5 to 5 ozz a.i./acre) **Timing:** Preemergence or postemergence. Fall and spring applications can both be effective, but	**Rate:** 6 to 8 oz product/acre (4.5 to 6 oz a.i./acre) **Timing:** Preemergence or early postemergence, during the rainy season when weeds are

Active Ingredient	Trade Name	Saharan Mustard	Halogeton	Red Brome and Cheatgrass	Mediterranean Grass	Red Stem Stork's Bill
				treatment after brome seedlings have emerged. However, Oust will control large downy brome (e.g., 8 to 12 inches tall).	fall applications may give full season control.	germinating or rapidly growing.
Sulfometuron + chlorsulfuron	Landmark XP	--	--	**Rate:** 0.75 oz product/acre **Timing:** Preemergence in fall or after soil thaws in spring.	--	**Rate:** 4.5 oz product/acre **Timing:** Preemergence to early postemergence.
Tebuthiuron	Spike 20P	--	Tebuthiuron is a pelleted formulation that provides total vegetation control for several years and may be desirable for use on railroad ballast and oil field locations, where halogeton is often found. It has a very long soil residual activity and will provide total vegetation control for 3 to 5 years.	--	--	--
Triclopyr	Garlon 3A, Garlon 4 Ultra	**Rate:** 2% v/v solution for spot application **Timing:** Postemergence when plants are small (rosette stage) and are growing rapidly, but before flowering.	--	--	--	--
Hexazinone	Velpar L	**Rate:** 1 to 2 pt product/acre (0.25 to 0.5 lb a.i./acre) **Timing:** Typically applied preemergence.	--	**Rate:** 2 to 6 pt product/acre (0.5 to 1.5 lb a.i./acre) **Timing:** Preemergence to early postemergence.	--	**Rate:** 2.67 to 6.67 lb product/acre (2 to 5 lb a.i./acre) **Timing:** Preemergence to early postemergence to seedlings.

Notes:
Directions may vary between brands.
%v/v percent volume to volume or percent solution
a.e. acid equivalent
a.i. active ingredient
lb pound
oz ounce
pt pint
qt quart

Source: (DiTomaso, J.M., G.B. Kyser et.al. 2013)

TABLE 1-7 FEDERAL, STATE, AND LOCAL PERMITS AND AUTHORIZATIONS

I. Federal Permits, Authorizations or Inter-Agency Consultations

United States Department of the Interior, BLM

- ROW grant under Title V of FLPMA
- EIS and ROD to support issuance of ROW grant

United States Department of the Interior, BLM and State Historic Preservation Office/Advisory Council on Historic Preservation

- BLM/SHPO, NHPA Section 106 Consultation
- 18 United States Code (USC) Section 841-848; 27 CFR 181

United States Department of the Interior, Fish and Wildlife Service

- Endangered Species Act Section 7 Consultation and Biological Opinion/Incidental Take Statement
- 16 USC 1531 et seq. Biological Opinion and Take Authorization

United States Department of the Interior, National Parks Service

- Participant in the review of impacts to the Congressionally-Designated Old Spanish Trail

United States Army Corps of Engineers

- Permit for the discharge of dredged and/or fill material into waters of the United States under Section 404 of the Clean Water Act

United States Department of Defense, Nellis Air Force Base

- Review of Project for conflicts with military uses

United States Federal Aviation Administration

- Notice of Proposed Construction or Alteration and Obstruction Evaluation

II. State of Nevada Permits or Authorizations

Nevada State Historic Preservation Office

- Section 106 of the NHPA review and concurrence

Nevada Department of Wildlife

- Implementation of terms and conditions of the Biological Opinion
- Fund for the Recovery of Costs
- Scientific Collection Permit (for subcontractor)

Nevada Division of Environmental Protection

- Prevention of Significant Deterioration Program, Major Source Permit
- Operating Permit to Construct
- General Stormwater Permit for Construction Activities (Notice of Intent and General Permit)
- Surface Area Disturbance/Dust Mitigation Control Plan
- Section 401 of the Clean Water Act Water Quality Certification
- General Stormwater Discharge Permit
- Groundwater Well Approval

Nevada Division of Forestry

- Native Cacti and Yucca Commercial Salvaging and Transportation Permit
- State List Endangered Species Take Permit

Nevada Public Utilities Commission

- Nevada Utility Environmental Protection Act Permit

Nevada Department of Motor Vehicles and Public Safety

- Nevada State Hazardous Materials Permit or Roving Permit

Nevada Department of Transportation

- Right-of Way Occupancy Permit for facilities, such as transmission lines crossing state highways

III. Clark County Permits
Clark County Department of Air Quality
• Dust Control Permit
Clark County Regional Flood Control District
• Drainage Study Review
Clark County Department of Comprehensive Planning
• Special Use Permit
Clark County Building Department
• Grading Permit
• Building Permit
Other
• Union Pacific Railroad Crossing Right-of-Way grant

NOTES: FLPMA = Federal Land Policy and Management Act
NHPA = National Historic Preservation Act
SHPO = State Historic Preservation Office

1.5.2 Arevia Power, LLC

Arevia Power, LLC, the development manager for Valley of Fire, LLC, develops, designs, and builds utility-scale solar PV power generation facilities that deliver low-cost solar energy to utility and industrial utility customers worldwide. Arevia Power, LLC is a privately-held company with operations in the United States. The company manages approximately 1gigawat (GW) of solar development projects in the United States Southwest. Members of Arevia Power, LLC's management team have successfully developed 200-MW of utility-scale PV solar energy plants to commercial operations and has underwritten over 2 GWs of projects in various stages of development. Arevia Power, LLC also has extensive project finance, capital raising experience collectively raising over $100 million for solar PV projects.

Section 2
Construction of the Facilities

2.1 Overview

Construction is expected to occur over approximately 28 months, during which an initial phase producing around 60- to 80-MW could come on-line in early 2020. Additional phases could come on-line in 2021 with final completion as early as 2022, but no later than December 2023. Construction phases would overlap. Construction would include the major activities of mobilization, construction grading and site preparation, installation of drainage and erosion controls, PV panel/tracker assembly, and solar field construction. The Applicant is planning to commence construction in the third or fourth quarter of 2019. Some aspects of construction would need to be coordinated with NV Energy, including but not limited to interconnection to the Crystal Substation and construction power.

2.2 Best Management Practices Used During Construction

Several BMPs would be employed during construction of the Project to minimize environmental degradation. These BMPs include, but are not limited to:

- Minimizing vegetation removal by limiting it only to areas of active construction
- Recontouring and revegetating Project roads that are no longer needed in order to increase infiltration and reduce soil compaction
- Utilizing originally excavated materials for backfill
- Controlling Project vehicle and equipment speeds to reduce dust erosion
- Controlling water runoff and directing it to settling or rapid infiltration basins
- Retaining sediment-laden waters from disturbed, active areas within the Project site through the use of barriers and sedimentation devices (e.g., berms, straw bales, sandbags, jute netting, or silt fences). Conducting periodic surveys of these areas and remove sediment from barriers and sedimentation devices to restore sediment-control capacity.
- Placing barriers and sedimentation devices around drainages and wetlands

- Replanting Project areas with native vegetation at spaced intervals to break up areas of exposed soil and reduce soil loss through wind erosion, where possible
- Minimizing land disturbance (including crossings) in natural drainage systems and groundwater recharge zones (i.e., ephemeral washes)
- Locating and constructing drainage crossing structures so as not to decrease channel stability or increase water volume or velocity
- Avoiding clearing and disturbing areas outside the construction zone
- Conducting construction grading in compliance with industry practice (e.g., the American Society for Testing and Materials [ASTM] international standard methods) and other requirements (e.g., BLM and/or local grading and construction permits)
- Using temporary stabilization devices (i.e., erosion matting blankets, or soil stabilizing agents) for areas that are not actively under construction
- Minimize topsoil removal and disturbance to minimize weed invasions and to keep the soil seed bank in place. Where soils would otherwise be disturbed, salvage topsoil and store for restoration
- Restoring native plant communities as quickly as possible in areas temporarily disturbed during construction, through natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), based on BLM recommendations
- Conducting inventory for non-native and noxious weeds throughout construction, treating weeds when they are found, and following weed plant to minimize the spread of weeds during construction
- Minimizing soil-disturbing activities on wet soils

2.3 Temporary Construction Workspace, Laydown and Mobilization Areas

The Project construction contractor would develop a temporary construction mobilization and laydown area at the location of the O&M building, or adjacent to it, that would include temporary construction trailers with administrative offices, construction worker parking, temporary water service and fire water supply holding tanks, temporary construction power services, tool sheds and containers, as well as a laydown area for construction equipment and material delivery and storage. Permanent access roads would be used for temporary laydown as the solar field is developed, allowing for the O&M building and facilities to be constructed.

In addition, temporary construction areas would be located at the transmission structure locations and at locations required for conductor stringing and pulling operations to accommodate construction of the gen-tie lines, covering an area not-to-exceed 200 feet by 200 feet (61 by 61

meters). These areas would be required for staging equipment and materials for foundation construction and tower installation. Grading or blading would be avoided wherever possible.

2.4 Site Preparation

Geotechnical investigation and environmental clearance surveys would be performed at the Project site prior to commencement of construction activities. The preliminary geotechnical investigation was conducted, which involved digging test pits and collecting core samples from various locations within the Project site. Test pit and core sample locations were accessed via 4-wheel drive pickup trucks or all-terrain vehicles (ATVs). The program included 15 exploratory test borings to depths of 16 to 21 feet (4.9 to 6.4 meters). A design-level geotechnical investigation would be performed including additional subsurface evaluation and laboratory testing prior to construction. During the environmental clearance phase, the boundaries of the construction area would be delineated and marked. The site then would be prepared for use; existing vegetation removal and grading would be minimized to the extent reasonably practicable. Site preparation techniques are described below.

2.4.1 Land Surveying and Staking

Prior to construction, the limits of construction disturbance areas would be determined by surveying, and where necessary, flagging and staking. Where necessary, the limits of the gen-tie ROW also would be flagged. All construction activities would be confined to these areas to prevent unnecessary impacts affecting sensitive areas. These areas, which would include buffers established to protect biological resources, also would be staked and flagged, where necessary. The locations of underground utilities would be located and staked and flagged in order to guide construction activities.

2.4.2 Clearance Surveys and Fencing

Prior to major vegetation mowing, removal, and grading, approved desert tortoise fencing or permanent Project fencing would be installed around the perimeter of the construction area to prevent tortoise from moving onto the site from adjacent areas. Agency-approved biologists would be retained to survey and relocate desert tortoise and perform other sensitive species removal and mitigation in accordance with an approved Desert Tortoise Translocation Plan.

2.4.3 Vegetation Removal and Treatment

Vegetation would be permanently cleared from roadways, access roads, and where concrete foundations are used for the inverter equipment, substations, and O&M facilities. A 10-foot-wide (3-meter-wide) firebreak would be established around the outside of the perimeter fence and a 20-foot (6-meter) perimeter road would be constructed on the inside of the perimeter fence, both of which would be maintained clear of vegetation. Vegetation management is discussed in Section 1.3.15, *Vegetation Management.*

2.4.4 Site Clearing, Grading, and Excavation

All earthwork required to install drainage control features, access roads, and foundations for Project-related buildings would be balanced on site. Trenching would be required for placement of the underground 34.5 kV AC collector system. The solar field would require a positive natural terrain slope of less than 5 percent.

Construction would occur using methods typical for a utility solar development in the Project region, also referred to as "traditional construction methods" or "traditional methods." These methods include "disk and roll," where the vegetation is crushed and mixed into the soil using deep disking, then the soil is compacted so that construction equipment can safety traverse the site to construct the solar arrays and infrastructure. The disk and roll technique would be used generally to prepare the surface of the solar field for post and PV panel installation. The disk and roll technique uses conventional farming equipment to prepare the site for construction. Typical farming equipment includes rubber-tired tractors with disking equipment and drum rollers with limited use of scrapers to perform micrograding. The disk and roll method would result in deep tilling of the soil, which would bury all cut surface vegetation. Root crowns of the typical dominant desert vegetation (creosote and white burrobush) are typically destroyed using this method. The areas are compacted after disking, which allows for safe access of construction vehicles across the development area. Desert tortoise would be removed and excluded from areas constructed using traditional methods through installation of a fence.

In areas where the terrain is not suitable for disk and roll, conventional cut and fill grading would be used.

Within the solar field, some grading would be required for roads and access ways between the solar arrays, and for electrical equipment pads. The substations would require a graded site to create a relatively flat surface for proper operation, with approximately 1 percent maximum slope in either direction. The substation interior would be covered with a BLM-approved aggregate surfacing for safe operation.

2.4.5 Gravel, Aggregate, and Concrete Needs and Sources

Concrete would be poured in place for equipment and building foundations, fence footing, and miscellaneous small pads. BLM-approved aggregate material would be used for the trench backfill, surface of the O&M parking lot, and substation area (and if determined necessary, for the perimeter road and internal access roads). Riprap material may be required for erosion control such as along berms and the detention basin. The Applicant would determine a source for these materials that would be presented for BLM review and approval.

2.5 PV Solar Array Assembly and Construction

Prior to any construction in PV equipment areas, the clearance and site preparation steps for those areas would be completed. Within each area designated for PV equipment, the construction sequence would follow a generally consecutive order.

1. Construct the solar field by array. Each array would contain solar panels, a PCS, and a step-up transformer. Within each array, materials for each row of PV modules would be staged next to that row.
2. Prepare trenches for underground cable
3. Install underground cable
4. Backfill trenches
5. Install steel posts and table frames
6. Install PV modules
7. Install concrete footings for inverters, transformers, and substation equipment
8. Install inverter and transformer equipment
9. Perform electrical terminations
10. Inspect, test, and commission equipment

Cable trenches would be used to provide underground connection of Project equipment. Trenches would contain electrical conductors for power generation and fiber optic cables for equipment communication. Trenches would vary between 2 to 3 feet (0.6 to 0.9 meter) wide and 2 to 3 feet (0.6 to 0.9 meter) deep depending on the number of conductors and voltage of equipment to comply with applicable electrical codes.

The assembled solar equipment would be installed on steel posts to which steel table frames would be attached. Trucks would be used to transport the PV modules to the solar field. A small mobile crane may be used to assist construction workers in setting the solar modules on the driven steel posts. Final solar field assembly would require small cranes, tractors, and forklifts.

2.6 Electrical Collection and Transmission System Construction

Electrical collection and transmission system construction would consist primarily of the following elements:

1. **Equipment**—Installation of all electrical equipment including BESS containers, DC/DC converter containers, PCS containers (including inverters and transformers), PVCS containers, circuit breakers, disconnect switches, switchgear and distribution panels, lighting, communication, control, and SCADA equipment.

2. **Cables**—Installation of all cables necessary to energize the Project equipment including instrument control wiring. High, medium, and low voltage cables would be routed via cable trays, above-grade conduits, below-grade conduit in duct bank, and overhead structures.
3. **Grounding**—All equipment and structures would be grounded as necessary. Within the solar field, an appropriate grounding system would be engineered and constructed in order to maintain personnel safety and equipment protection.
4. **Telecommunications**—Multiple communication systems would be required for the Project to properly operate, including T1 internet cables, fiber optic, microwave, and telephone. All communications would be installed during electrical construction.

2.6.1 Standard Electrical Collection and Transmission Line Construction Techniques

The Project would include overhead 230 kV and 500 kV gen-tie lines and some of the 34.5 kV collection system may also be installed on overhead lines. Standard transmission line construction techniques would be used to construct the collector and gen-tie lines. Primary stages in transmission line construction are foundation installation (e.g., concrete footings, pier foundations, or micropiles), tower installation with attached cross-arms and insulators, and conductor stringing onto the structures. Up to a 200-foot by 200-foot (61-meter by 61-meter) temporary laydown or staging area would be required at each 230 kV and 500 kV tower location for equipment, towers, and hardware. Grading of laydown areas would be avoided to the extent possible. Temporary staging for gen-tie lines would comprise up to 38 acres (15 hectares) of land. In general, little to no grading is expected to be required for these areas. Typical equipment expected to be used for transmission line construction includes: backhoe, truck-mounted tower hole auger, forklift, crane, line truck with air compressor, various pickup and flatbed trucks, conductor reel and tower trailers, bucket trucks, and truck-mounted tensioner and puller, as detailed in

Table 2-4.

Foundation Installation. The steel towers used for the gen-tie lines would be supported by steel-reinforced poured pier concrete foundations suitable for the sandy soils' conditions at the site. These foundations are constructed by auguring a cylindrical hole using a truck-mounted drilling rig. Reinforcing steel and anchor bolt cages would be installed in the hole and then the hole would be backfilled with concrete. Steel tower foundations would range in size from approximately 4 to 7 feet (1.2 to 2.1 meters) in diameter, and in depth from 12 to 30 feet (3.7 to 9.1 meters).

Smaller wood or steel poles used for the overhead 34.5 kV collector line would be embedded into the ground to a depth of at least 10 percent of the pole height plus 2 feet (0.6 meter). Installation of wood poles is anticipated to require auguring holes approximately 2 feet (0.6 meter) in diameter and 8 feet (2.4 meters) deep. Aggregate or high-strength backfill would be used to

stabilize the installed poles. Angle points on the 34.5 kV collection line would require steel poles supported by steel-reinforced poured pier concrete foundations.

Tower/Pole Installation. Poles would be placed onto their foundations (wood poles would be placed into their holes) using backhoes or heavy lifter vehicles for the smaller, lighter poles, or a crane for longer poles. The poles would be supported, as necessary, during backfilling or bolted to the foundation to ensure correct pole seating.

Conductor Stringing. Conductor stringing would likely be conducted one phase at a time, with all equipment staged at the same place until all phases of that operation are strung.

Grounding. Ground rods would be hammered into the earth with a jackhammer device attached to a small excavator (such as a Bobcat). Typically, the rods are 8 to 12 feet (2.4 to 3.7 meters) long and can be longer, if needed, by joining multiple rods. For the 34.5 kV wood poles, a 3-foot (0.9-meter) square by 2-foot (0.6-meter) deep area would be excavated to expose the ground rod for connection to the plant's grounding grid.

2.7 Road System Construction

Preconstruction activities for the Project-related roads would include installation of tortoise fencing, relocation of desert tortoise if necessary, and meeting any necessary cacti and yucca salvage requirements. The construction entrance and exit gates would be established. The Project's main access point from Valley of Fire Road would be graded and constructed in order to facilitate entry to the Project site. Within the solar field, some grading would be required for roads and access roads between the solar arrays. As part of the gen-tie lines, a permanent 20-foot-wide (6-meter-wide) gen-tie road would be constructed that would run the length of the gen-tie lines. All Project-related roads are proposed to be native graded/compacted dirt; however, roads may alternatively use an aggregate base in some or all areas to meet Project dust and flood control requirements.

Any temporary or permanent crossings under the existing transmission line would be coordinated and approved with NV Energy and other ROW holders, as previously described, which would also address construction timing and coordination. In addition, the use of all existing permitted roads would be coordinated with NV Energy.

Roadways within designated FEMA floodplains would be constructed per the guidelines outlined in Chapter 9 of Low Volume Roads Engineering, Best Management Practices Field Guide (2003), as approved by the BLM. No new culverts are proposed. Roads would be constructed through drainages with an Arizona crossing.

2.8 Substation Construction

The Project's three substations would be constructed in compliance with applicable electrical safety codes. Substation construction would consist of site grading, concrete equipment foundation forming and pouring, crane-placed electrical and structural equipment, underground

and overhead cabling and cable termination, ground grid trenching and termination, control building erection, and installation of all associated systems, including, but not limited to heating, ventilating, and air conditioning system components; distribution panels; lighting; communication and control equipment; and lightning protection.

The substation area would be excavated to a depth of 10 feet (3 meters). A copper grounding grid designed to meet the requirements of Institute of Electrical and Electronics Engineers (IEEE) 80, "IEEE Guide for Safety in AC Substation Grounding," would be installed and the foundations for transformers and metal structures would be prepared.

After installation of the grounding grid, the area would be backfilled, compacted and leveled followed by the application of 6 inches (15 centimeters) of aggregate rock base. Equipment installation of the transformers, breakers, buswork, and metal dead-end structures would follow. A pre-fabricated control house would be installed to house the electronic components required of the substation equipment. Containment measures for all substation equipment shall be provided in accordance with Environmental Protection Agency 40 CFR Part 112 and all applicable codes required by the local, state, and federal governing authorities. The transformer containment area would be lined with an impermeable membrane covered with gravel and would include a drain with a normally closed drain valve. Transformers shall be provided with secondary oil containment equal to 110 percent of the volume of oil present in the transformer in addition to the volume of rain water for a 25-year, 24-hour rainfall event.

2.9 Drainage Feature Construction

The detention basin, berms, and channels would be constructed using conventional earth-moving equipment (e.g., scrapers, excavators). The berms would be constructed using excavated material from the adjacent channel and/or the detention basin. Area under the berms would be stripped of native vegetation and scarified recompacted. Fill for the berm would then be placed in lifts until the design height is achieved. The berm's slope would be armored with either riprap or soil cement. The soil cement channels would be constructed by amending the native soil in-place with cement. The amended soil would be moisture conditioned and compacted to the design lines and grades.

2.10 Site Stabilization, Protection, and Reclamation

Appropriate water erosion and dust-control measures would be implemented to prevent an increased dust and sediment load to ephemeral washes around the construction site and to comply with Clark County dust control requirements. Dust during construction would be controlled and minimized by applying water and/or BLM-approved palliatives discussed in Section 1.3.8, *Water*.

The Applicant would employ BMPs (as described in Section 2.2, *Best Management Practices Used During Construction*) to protect the soil surface by covering or binding soil particles. The Project would incorporate erosion-control measures required by regulatory agency permits and contract documents as well as other measures selected by the contractor. Project-specific BMPs would be designed by the contractor and included in the Project Stormwater Pollution Prevention

Plan (also referred to as a SWPPP). Weed management guidance would be followed to prevent the additional establishment, increase, or spread of non-native or noxious weeds within and outside of the Project area as a result of Project activities.

The Site Restoration Plan, which also addresses site rehabilitation and restoration, would be implemented immediately after construction for the areas that are temporarily disturbed (**Table 1-2**), such as portions of the transmission line route that involve disturbance for staging.

2.11 Water Sources and Storage for Construction

Approximately 2,000 acre-feet (246.7 hectare-meters) of water is estimated as needed for Project construction, including for dust control. The construction water use estimate is based on the median water use of other solar power plant installations in the desert areas of Nevada and neighboring states. Actual water use varies widely at different facilities depending on weather, soil, and vegetation conditions encountered during construction. New appropriations are not likely available in the groundwater basin. The options for sourcing construction water are as follows:

- Purchasing water from a commercial source or a user with an existing appropriation and trucking the water to the Project site where it would then be pumped the four 1-acre (0.4 hectare) storage ponds across the construction site (Error! Reference source not found.). The storage ponds would be encircled by an earthen berm comprised of on-site material fill with a liner and would be approximately 3 feet (0.9 meter) deep. Each pond would hold approximately 1 million gallons of water. The water would be pumped from the O&M building via a diesel generator pump or an existing distribution drop, through temporary 8-inch (20-centimeter) diameter High-density polyethylene (HDPE) pipe laid on the ground surface to each pond.

- Purchasing water from an existing appropriation held by the Moapa Band of Paiutes and piping the water from an existing well at the Moapa Paiute Travel Plaza to the Project O&M building via an underground pipeline where it would then be pumped to the 1-acre (0.4 hectare) storage ponds across the construction site. Under this scenario, the water would also be pumped via a 40 horsepower (30 kilowatt) pump powered by a 150 to 200 kVA diesel generator or an existing distribution drop, through temporary HDPE 12-inch (30.5-centimeter) pipe laid on the ground surface to each pond. It is assumed that the source of water has a minimum pressure of 40 pounds per square inch (276 kilopascals)and due to the lack of elevation change, no pump or associated generator is required to bring water to the O&M building.

- Purchasing water from an existing appropriation but accessing the water through a new on-site groundwater well. The well would be located approximately 3.5 miles (5.6 kilometers) south of the O&M building in development area B (**Figure 1-9**). The well would be located near the perimeter road for the facility and could be as much as 1,200 feet (365.8 meters) deep to access groundwater. Three vertical turbine pumps for the well would be powered by a 750-1,000 kVA diesel generator during the 28 months of

construction. Water would flow via gravity to each of the four temporary storage ponds, but diesel-powered 10 horsepower (7.5 kilowatt) pumps would also be available to pump the water to augment flows, if needed.

Following construction, the ponds would be removed, and solar panels installed in the graded area.

2.12 Workforce, Schedule, Equipment, and Materials

The on-site construction workforce would consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel. The on-site construction workforce is anticipated to be an average of 500 to 700 construction workers with a peak of up to 900 workers at any given time. Most construction staff and workers would commute daily to the jobsite from within Clark County, primarily from the Las Vegas area.

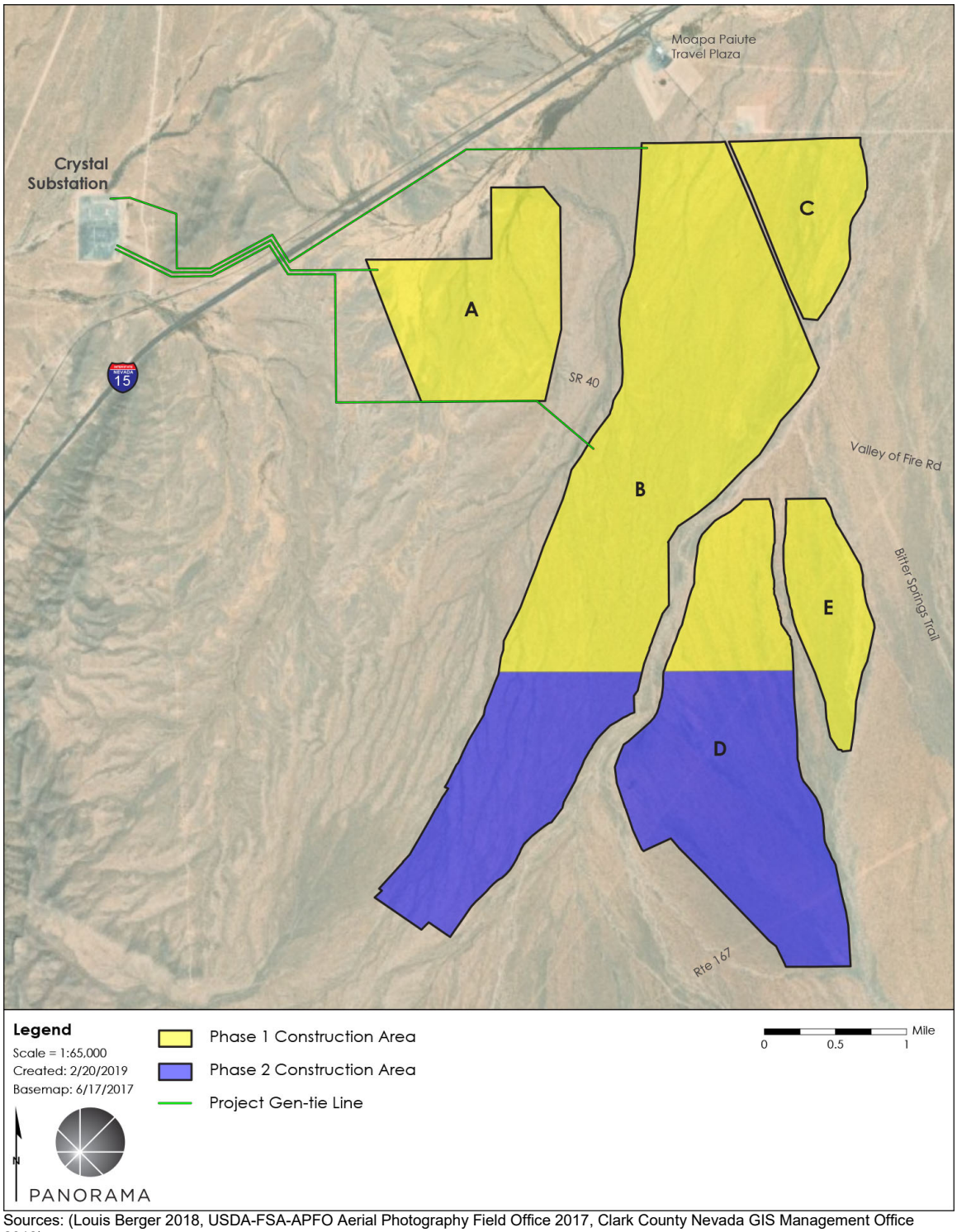
Construction generally would occur between 5:00 a.m. and 5:00 p.m. and may occur 7 days a week. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities. For instance, during hot weather, it may be necessary to start work earlier (e.g., at 3:00 am) to avoid work during high ambient temperatures. Further, construction requirements would require some night-time activity for installation, service or electrical connection, inspection, and testing activities.

A preliminary construction schedule for the Project is shown in **Table 2-1.** The table and **Figure 2-1** show how construction would be phased by development area. Construction could begin on a portion of the site in October 2019. The on-line dates for Phase I and Phase II would not change.

Construction activities would follow a generally consecutive order, however, most construction activities associated with each construction component would overlap to some degree and would include the following:

1. Installation of tortoise fencing and security fencing
2. Installation of BMPs and erosion control measures
3. Site preparation activities and construction of the access road, laydown areas, substation concrete pad, and distribution line
4. Construction of drainage control features
5. Clearing of solar fields and posts and table frames
6. Installation of electrical collection system and substation
7. PV module assembly, testing, and commissioning

FIGURE 2-1 CONSTRUCTION PHASING



Sources: (Louis Berger 2018, USDA-FSA-APFO Aerial Photography Field Office 2017, Clark County Nevada GIS Management Office 2018)

TABLE 2-1 CONSTRUCTION SCHEDULE

Activity	Development Area	Duration	Timeframe
Install Fencing	A	2 weeks	September 1 – September 15, 2019
	B, Phase I and Tortoise Holding Pen	12 weeks	January 1 – March 31, 2020
	C	11 weeks	January 15 – March 31, 2020
	D, Phase I	11 weeks	January 15 – March 31, 2020
	E	11 weeks	January 15 – March 31, 2020
	B, Phase II	8 weeks	July 1 – August 31, 2020
	D, Phase II	8 weeks	July 1 – August 31, 2020
Desert Tortoise Clearance Surveys, Additional Health Assessments, and Disposition Plan	A	3 weeks	September 15 – October 7, 2019
	B, Phase I	8 weeks	April 1 – May 31, 2020
	C	8 weeks	April 1 – May 31, 2020
	D	8 weeks	April 1 – May 31, 2020
	E	8 weeks	April 1 – May 31, 2020
	B, Phase II	6 weeks	September 15 – October 31, 2020
	D, Phase II	6 weeks	September 15 – October 31, 2020
Translocate Tortoises	A	1 week	October 1 – October 10, 2019
	B, Phase I	3 weeks	September 15 – October 5, 2020
	C	3 weeks	September 15 – October 5, 2020
	D, Phase I	3 weeks	September 15 – October 5, 2020
	E	3 weeks	September 15 – October 5, 2020
	B, Phase II	2 weeks	April 1 – April 10, 2021
	D, Phase II	2 weeks	April 1 – April 10, 2021
Install BMP Erosion Control Measures	A	2 weeks	November 1 – November 15, 2019
	B, Phase I	3 weeks	November 1 – November 21, 2020
	C	2 weeks	November 1 – November 15, 2020
	D, Phase I	2 weeks	November 7 – November 21, 2020
	E	2 weeks	November 1 – November 15, 2020
	Gen-Tie, Phase I	2 weeks	November 7 – November 21, 2020
	B, Phase II	2 weeks	June 1 – June 15, 2021
	D, Phase II	2 weeks	June 1 – June 15, 2021
	Gen-Tie, Phase II	2 weeks	June 1 – June 15, 2021
Site preparation including constructing roads (including gen-tie) and laydown areas, berms, pads for O&M building, and water tanks. Substation grading, and detention basin development	A	2 weeks	November 15 – November 30, 2019
	Substations, B, Phase I	4 weeks	November 21 – December 21, 2020
	C	2 weeks	November 15 – November 30, 2020
	D, Phase I	2 weeks	November 21 – December 7, 2020
	E	2 weeks	November 15 – December 1 - 2020
	Gen-Tie, Phase I	4 weeks	November 15 – December 15, 2020
	B, Phase II	4 weeks	June 15 – July 15, 2021
	D, Phase II	4 weeks	June 15 – July 15, 2021
	Gen-tie, Phase II	4 weeks	June 15 – July 15, 2021
Blading/grading/mowing for solar block arrays; dig trenches and install underground cable in array. For substation, install	A	4 weeks	December 1 – December 31, 2019

Activity	Development Area	Duration	Timeframe
underground cabling, aggregate base, and concrete foundations for equipment. Dig and install water pipeline. Install foundations for towers for gen-tie lines			
	Substations, B, Phase I	7 weeks	December 21, 2020 – February 1, 2021
	C	2 weeks	December 7 – December 21, 2020
	D, Phase I	2 weeks	December 7 – December 21, 2020
	E	2 weeks	December 1 – December 15, 2020
	Gen-Tie Phase I	4 weeks	December 1 – December 31, 2020
	B, Phase II	4 weeks	July 15 – August 15, 2021
	D, Phase II	4 weeks	July 15 – August 15, 2021
	Gen-Tie Phase II	4 weeks	July 15 – August 15, 2021
Install tracking system posts and table frames	A	4 weeks	January 1 – January 31, 2020
	B, Phase I	6 weeks	February 1 – March 15, 2021
	C	4 weeks	February 1 – February 28, 2021
	D, Phase I	4 weeks	February 1 – February 28, 2021
	E	4 weeks	February 1 – February 28, 2021
	B, Phase II	4 weeks	August 15 – September 15, 2021
	D, Phase II	4 weeks	August 7 – September 7, 2021
Install above-grade DC and AC cable and poles, PCS equipment, SCADA equipment, and communications system. Install towers and cable for gen-tie, install O&M building, install substation equipment, install water tanks	A	6 weeks	February 1 to April 15, 2020
	Substations	34 weeks	March 1 – Nov 15, 2021
	B, Phase I	8 weeks	March 15 – May 15, 2021
	C	4 weeks	March 15 – April 15, 2021
	D, Phase I	4 weeks	March 1 – April 1, 2021
	E	4 weeks	March 1 – April 1, 2021
	Gen-Tie Phase I	17 weeks	March 1 – July 7, 2021
	B, Phase II	8 weeks	September 15 – November 15, 2021
	D, Phase II	8 weeks	September 15 – November 15, 2021
	Gen-Tie, Phase II	17 weeks	July 8 – November 15, 2021
Install Modules	A	4 weeks	April 15 – May 15, 2020
	B, Phase I	10 weeks	May 1 – July 15, 2021
	C	8 weeks	May 1 – July 1, 2021
	D, Phase I	8 weeks	May 1 – July 1, 2021
	E	2 weeks	May 15 – Jun 1, 2021
	B, Phase II	4 weeks	September 15 - October 15, 2021
	D, Phase II	4 weeks	September 15 – October 15, 2021
Testing and Commissioning	A*, B (Phase I), C, D (Phase I), E	2 weeks	July 1 – July 31, 2021
	B (Phase II) and D/E (Phase II)	2 weeks	January 15 – February 15, 2022

* Development area A could be connected on-line in Q2 of 2020, if an off-taker is available at that time. Development area A would comprise approximately 60- to 80-MW of power. The substation in that area would be constructed with the solar array, if the power is to be sold in Q2 2020.

Table 2-2, Table 2-3, and **Table 2-4,** below, provide a description of the on-site equipment expected to be used for solar panel array and collection system construction (**Table 2-2**), substation construction (**Table 2-3**), and gen-tie line construction (**Table 2-4**). Actual construction equipment details and durations may vary.

TABLE 2-2 ESTIMATED ON-SITE EQUIPMENT FOR 1,700 ACRES OF SOLAR PANEL ARRAY AND COLLECTION SYSTEM CONSTRUCTION

Equipment Description	Daily Quantity	Horse-power	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Miles (VMT) per Day on Unpaved Surface
Install BMP Measures (Part of Site Preparation)					
Rough Terrain Forklift	4	75	Diesel	1.7	10
Delivery/Work Trucks	6	200	Diesel	2	5
Site Prep – Solar Arrays					
Truck, Pick-Up (Survey Crew)	4	180	Gas	1.7	5
Grader	12	200	Diesel	6.8	20
Backhoe/Front Loader	4	120	Diesel	3.4	20
Tractor/Disc	6	210	Diesel	6.8	40
Scraper	8	265	Diesel	3.4	30
Rock crusher	4	210	Diesel	4.5	1
Compactor	4	120	Diesel	1.7	10
Water Truck	4	175	Diesel	6.8	2
Site Prep – Roads					
Grader	6	200	Diesel	6.8	20
Backhoe/Front Loader	2	120	Diesel	6.8	10
Compactor	4	120	Diesel	6.8	20
Water Truck	4	175	Diesel	6.8	2
Dump Truck	10	235	Diesel	2.7	10
Install Fencing					
Rough Terrain Forklift	4	75	Diesel	1.7	10
Delivery/Work Trucks	6	200	Diesel	1	5
Post Installation					
Delivery/Work Trucks	4	200	Diesel	1	5
Post Machine	14	45	Diesel	8.1	1
Rough Terrain Forklift	4	75	Diesel	6.8	10
Install Support Structure					
Rough Terrain Forklift	12	75	Diesel	6.8	10
Delivery/Work Trucks	4	200	Diesel	1	5
Install Inverters and Switchgear & Substation Structure					
Crane	4	125	Diesel	4.5	1
Backhoe/Front End Loader	4	120	Diesel	6.8	10
Delivery/Work Trucks	4	200	Diesel	1	5
DC and AC Wire Installation (UG)					
Backhoe/Front Loader	8	120	Diesel	6.8	10
Crawling Trencher	4	100	Diesel	4.1	1
Mini-Excavator	8	42	Diesel	6.8	10
Delivery/Work Trucks	4	200	Diesel	1	5

Equipment Description	Daily Quantity	Horse-power	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Miles (VMT) per Day on Unpaved Surface
DC and AC Wire Installation (AG)					
Rough Terrain Forklift	6	75	Diesel	1.7	10
Delivery/Work Trucks	4	200	Diesel	1	5
Module Installation					
Rough Terrain Forklift	30	75	Diesel	1.7	10
Delivery/Work Trucks	10	200	Diesel	1	5
O&M Building					
Rough Terrain Forklift	2	75	Diesel	1	1
Manlift	4	110	Diesel	3	1
Misc. (Across Project Site)					
Crane, Hydraulic, Rough Terrain	2	125	Diesel	1.5	N/A
Delivery: Truck, Semi, Tractor	2	310	Diesel	0.5	5
Delivery: Truck, Flatbed, 1 Ton	2	180	Diesel	0.5	5
Forklift, less than 5 Ton	6	75	Diesel	3.8	5
Forklift, greater than 5 Ton	4	85	Diesel	3.8	5
Motor, Auxiliary Generator Power for trailers	8	24	Diesel	8	N/A
Trailer, Office, 40’	28	N/A	N/A	N/A	N/A
Trailer, Office, 20’	8	N/A	N/A	N/A	N/A
Skid Steers	10	75	Diesel	1.7	5
AWD Gator/Cart	40	15	Diesel	8.1	10
Water Truck	8	175	Diesel	6.8	2
Delivery/Work Trucks	20	200	Diesel	1	5
Electrical Generators/Pumps	8	50	Diesel	8.1	N/A

TABLE 2-3 ESTIMATED ON-SITE EQUIPMENT FOR ONE SUBSTATION CONSTRUCTION

Equipment Description	Daily Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Miles (VMT) per Day on Unpaved Surface
Steel Structures					
Boom Truck - 33 Ton	2	290	Diesel	1.5	1
Manlift	2	110	Diesel	1.2	1
Material Delivery - Hwy Tractor w 40’ Flat	6	220	Diesel	0.2	4
Insulators, Bus, & Electrical Equipment					
Boom Truck	2	220	Diesel	1.5	1
Manlift	4	110	Diesel	1.2	1
Welder Truck	4	210	Diesel	1.2	4
Material Delivery - Hwy Tractor w 40’ Flat	8	310	Diesel	0.2	4
Material Delivery - Heavy Haul	2	300	Diesel	1.5	4
Crane	2	500	Diesel	1	N/A
Control Wiring					
Boom Truck	2	220	Diesel	0.6	1
Manlift	4	110	Diesel	0.8	1
1-ton crew vehicle	2	260	Diesel	0.2	4
Fiber Splicer Van	2	180	Gas	0.6	4
Test Equipment Van	2	180	Gas	1.7	4

Equipment Description	Daily Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Miles (VMT) per Day on Unpaved Surface
Rough Terrain Forklift	2	75	Diesel	1.7	6

TABLE 2-4 ESTIMATED ON-SITE EQUIPMENT FOR 0.7 MILE OF GEN-TIE LINE CONSTRUCTION

Equipment Description	Daily Quantity	Horsepower	Fuel Type	Equivalent Full-Load Operating Time (hr/day)	Vehicle Miles (VMT) per Day on Unpaved Surface
Steel (Hauling, Shake-Out, Assembly and Erection)					
Crane, Hydraulic, 150/300 Ton	2	250	Diesel	1.8	5
Crane, Hydraulic, Rough Terrain, 25 Ton	2	125	Diesel	1.8	5
Truck, Flatbed w/Boom, 12 Ton	2	235	Diesel	1	10
Truck, Crew Cab, Flatbed, 1 Ton	12	180	Gas	1.1	10
Truck, Semi-Tractor	2	310	Diesel	6	10
Trailer, Flatbed, 40’	2	N/A	N/A	N/A	N/A
Water Truck	2	175	Diesel	4.5	N/A
Motor, Auxiliary Power	2	5	Gas	1	0
Compressor, Air	2	75	Gas	2	15
Conductor / Shield Wire / OPGW (Stringing, Sagging, Dead-ending and Clipping)					
Truck, Flatbed, w/ Bucket	3	235	Diesel	3	15
Tension Machine, Conductor	2	135	Diesel	1.5	1
Tension Machine, Static	2	135	Diesel	0.2	1
Truck, Sock Line, Puller, 3 Drum	2	310	Diesel	2.3	1
Truck, Wire Puller, 1 Drum	2	310	Diesel	2.3	1
Truck, Semi, Tractor	4	310	Diesel	6	10
Water Truck	2	175	Diesel	4.5	2/
Truck, Crew Cab, Flatbed, 1 Ton	6	180	Gas	1.4	10
Back Hoe, w/ Bucket	2	85	Diesel	3	1
Truck, Mechanics	2	260	Diesel	3	15
Crane, Hydraulic, Rough Terrain	2	125	Diesel	1	10
Motor, Auxiliary Power	4	5	Gas	2.3	N/A
Cleanup					
Truck, Flatbed, w/ Bucket, 5 Ton	2	235	Diesel	2	5
Excavator, Bucket Type	2	165	Diesel	4.5	5
Truck, Semi, Tractor	2	310	Diesel	4.5	10
Truck, Dump, 10 Ton	2	235	Diesel	3	10
Motor Grader	2	110	Diesel	8	20
Truck, Flatbed	2	210	Diesel	2.1	10
Truck, Pick-Up	2	210	Diesel	2.1	10
Motor, Auxiliary Power	2	5	Gas	0.5	N/A

2.12 Construction Traffic

Typical construction traffic would consist of trucks transporting construction equipment and materials to and from the site and vehicles of management and construction employees during the construction period. Most construction staff and workers would commute daily to the jobsite from within Clark County, primarily from the Las Vegas area. All traffic would use I-15 and/or Valley

of Fire Road to access the site. Prior to the start of construction, the Applicant would prepare a Traffic and Transportation Plan to address Project-related traffic. Vehicle traffic during operation and maintenance would be minimal at less than 30 round-trips per day under normal operational conditions.

2.13 Construction Power

A temporary overhead line would be installed during construction to provide power to the laydown areas, if feasible. The nearest existing distribution lines are located west of I-15. Alternatively, diesel generators may be used to provide construction power, as identified in **Table 2-2**.

2.14 Construction Plans

The following plans are included as part of the POD and would be implemented during construction.

- Health and Safety Plan (Attachment H)
    - Emergency Action Plan
    - Waste and Hazardous Materials Management Plan
    - Fire Protection and Prevention Plan
    - Structure and Hazardous Materials Fire
    - Wildland Fire
    - Fuels Management
    - Wildfires caused by of human or project activities that could threaten adjacent lands and wildfires burning on adjacent lands that could threaten project safety and infrastructure.
    - Wildfire history in the vicinity of the project
- Lighting Plan (prepared prior to construction)
- Cultural Resources Mitigation and Monitoring Plan and Human Remains Discovery Plan (Attachment I)
- Paleontological Discovery and Mitigation and Monitoring Plan (Attachment J)
- Traffic and Transportation Plan (Attachment K)
- Dust Control and Air Quality Plan (Attachment L)

- Stormwater Pollution Prevention Plan (prepared prior to construction)
- Spill Prevention Control and Countermeasure Plan (prepared prior to construction)
- Flagging, Fencing and Signage Plan (prepared prior to construction)
- Site Restoration Plan (Attachment M)
    - Cacti and Yucca Salvage Plan
    - Desert Pavement and Biocrust Protection Plan
    - Restoration and Revegetation Plan
    - Integrated Restoration Plan
        - Restoration standards
        - Habitat restoration standards
- Integrated Weed Management Plan
- Integrated Pest Management Plan
    - Note: All pesticide use must be authorized through a Pesticide Use Proposal (PUP). PUPs are subject to NEPA analysis and environmental compliance requirements for pesticide use on BLM-managed public lands. This includes herbicides, insecticides, rodenticides, fungicides, etc.
- Bird and Bat Conservation Strategy, including Eagle Management Plan (Attachment N)
- Environmental Construction Compliance Monitoring Program (Attachment O)
    - Compliance monitoring and mitigation personnel
    - Communication workflows
    - Reporting and documentation
    - Variance process
    - WEAP
- Decommissioning Plan Site Plans (Attachment P)
- Waters of the United States Compensatory Mitigation Plan (Attachment Q)

Section 3
Related Facilities and Systems

3.1 Transmission System Interconnect

3.1.1 Proposed Transmission System

The overhead 230 kV and 500 kV gen-tie lines would be installed as described in Section 2.6.1, *Standard Electrical Collection and Transmission Line Construction Techniques*, and would transmit power generated by the Project from the Project substation to the existing NV Energy Crystal Substation (N-61363).

3.1.2 Ancillary Facilities

A new 230kV transmission line would be installed on existing transmission towers from the Crystal Substation, connecting Harry Allen Substation, approximately 5.5 miles (9 kilometers) to the southwest. The transmission line would be installed as a required network upgrade (N-92319). Addition of this circuit on existing lines was previously authorized and approved.

3.1.3 Status of Power Purchase Agreements

The Applicant intends to sell power from the Project in accordance with a PPA to be negotiated with one or more utilities.

3.1.4 Status of Interconnection Agreement

The power produced by the Project would be conveyed to the NV Energy transmission system. The Project sponsor has an active application with NV Energy for an LGIA to interconnect 440-MWac at the Crystal Substation, with another 250-MWac planned for California delivery.

3.1.5 General Design and Construction Standards

The Project would be designed in accordance with federal and industrial standards including American Society of Mechanical Engineers Standards, National Electrical Safety Code, International Energy Conservation Code, International Building Code, Uniform Plumbing Code, Uniform Mechanical Code, and National Fire Protection Association and Occupational Safety and Health Administration standards.

Construction would be in accordance with the federal codes listed above and all applicable state and local codes. Local Clark County codes would include Title 13 – Fire and Fire Prevention, Title 22 – Buildings and Construction, Title 24 – Water, Sewage and Other Utilities, and Title 25 – Plumbing and Electrical Regulations.

3.2 Gas Supply Systems

The Project would not require a natural gas supply system.

3.3 Other Related Systems - Communication System Requirements

Multiple communication systems would be used for construction and operation. Redundant telecommunication systems and cables would be installed on the same structures as the gen-tie lines, as required by NV Energy LGIA, including telephone, fiber optics, and T1 internet. The Applicant expects to utilize existing wired or wireless telecommunications facilities. In the event that these facilities are not available in the Project vicinity, the Applicant would install hard-wired (land-line) systems as part of the electrical construction activities or would supplement with small aperture (less than 1 meter) satellite communications gear.

Section 4
Operation and Maintenance

4.1 Operation and Maintenance Processes

The facility would operate 7 days a week using automated facility controls and monitoring systems with SCADA control systems. Operation of the Project would create 38 permanent positions. Nineteen people would be directly employed on the Project site, five jobs would be indirectly created, and employee spending would induce 14 jobs. It is expected operations staff would be located off-site, with site visits occurring daily for security, maintenance, and repairs. To maintain solar generation performance, PV array cleaning may occur approximately two times per year and could take approximately 24 hours to complete (including nighttime panel cleaning). The Project would use no process water, gas, or fuels for the power generation process. Cleaning would occur by manually methods using brushes and air or using robotic systems.

A plant operation and maintenance program, typical of a project this size, would be implemented to control the quality of operation and maintenance. The frequency and type of maintenance is described in **Table 4-1.** During the first year of operation, the frequency of inspections would be increased to address settling and electrical termination torque (e.g., for year 1, inspections shown as semi-annually are performed quarterly, inspections shown as annual are performed semi-annually). At designated intervals, approximately every 10 to 15 years, major equipment maintenance would be performed. Operation and maintenance procedures would be consistent with industry standards practices maintaining useful life of plant components.

Operation and maintenance would require the use of vehicles and equipment, including crane trucks for minor equipment maintenance. Additional maintenance equipment would include forklifts, manlifts, and chemical application equipment for weed abatement and soil stabilizer treatment in the bioremediation area. Pick-up trucks would be used periodically on the site. No heavy equipment would be used during normal plant operation.

The Project is expected to have an annual equivalent plant availability of 92 to 98 percent. It would be possible for plant availability to exceed 98 percent for a given 12-month period.

The facility would be operated in one of the following modes:

1. The facility would be operated at its maximum continuous output for as many hours per year as sunlight is available. During times of excess generation, the battery storage system receives solar power and stores the power until the customer or the system determines release of the power to be more valuable.

2. Small portions of the facility may be temporarily shut down for maintenance and repairs, when necessary.

3. Only in the case of a transmission system disconnect would the facility encounter a full shutdown.

Dust during operation and maintenance would be controlled and minimized by applying water and/or BLM-approved palliatives (See Section 2.8, *Site Stabilization, Protection, and Reclamation*). Vegetation, including weeds, would be managed in accordance with the Site Restoration Plan, which includes integrated pest management and weed control, as described in Section 1.3.15, *Vegetation Management*.

Hazardous wastes and other wastes would be disposed of in accordance with a Waste and Hazardous Materials Management Plan.

TABLE 4-1 ROUTINE MAINTENANCE PROTOCOL

Equipment	Maintenance Interval	Task
PV Modules	Quarterly	• Visually inspect panels for breakage and secure mounting • Visually inspect modules for discoloration • Visually inspect wiring for connections and secure mounting • Visually inspect mounting structure for rust and erosion around foundations • Manually clean localized debris from bird droppings, etc.
	Semi-Annually	• Clean modules if determined necessary
Inverters	Semi-annually	• Perform temperature checks on breakers and electrical terminations • Visual inspection of all major components and wiring harnesses for discoloration or damage • Measure all low voltage power supply levels • Inspect/remove any dust/debris inside cabinet • Inspect door seals • Check proper fan operation • Inspect and clean (replace if necessary) filters • Check electrical termination torque • Check the operation of all safety devices (e-stop, door switches, ground fault detection)
	Annually	• Check all nuts, bolts, and connections for torque and heat discoloration • Calibrate control board and sensors • Inspect air conditioning units for proper operation

Equipment	Maintenance Interval	Task
Medium voltage transformers	Semi-annually	• Perform temperature check • Inspect door seals • Record all gauge readings • Clean any dirt/debris from low voltage compartment • Visual inspection of batteries for corrosion or discoloration (replace if necessary)
Substation transformers	Semi-annually	• Inspect access doors/seals • Inspect electronics enclosure and sensor wiring • Record all gauge readings
	Annually	• Inspect fans for proper operation • Calibrate temperature and pressure sensors • Pull oil sample for oil screening and dissolved gas analysis
Breakers and switchgear	Semi-annually	• Inspect for discoloration of equipment and terminations • Inspect door seals
	Annually	• Check open/close operation
Overhead transmission lines	Annually (and after heavy rains)	• Inspect guy wires and tower angle • Visual inspection of supports/insulators • Visual inspection for discoloration at terminations
Roadways	Annually (and after heavy rain)	• Inspect access roads that cross drainage paths for erosion
Vegetation	Semi-annually in all areas but will likely be on-going activity	• Non-native and noxious weed inspections would be conducted in accordance with the BLM-approved Integrated Weed Management Plan • Inspect for localized vegetation control to restrict height to less than 12 inches (30.5 centimeters) to address faster growth vegetation • Apply herbicides as necessary to control non-native and noxious weeds
	Every 3 years	• Mowing as required to reduce vegetation height to 9 inches (23 centimeters)
Water Wells	Annually	• Visual inspection • Pressure test
O&M Building	Semi-annually	• Check smoke detectors • Apply pesticides as necessary to control rodents and insects
	Annually	• Check weather stripping and door/window operation • Check emergency lighting • Inspect electrical service panel
Backup Power	Annually	• Visually inspect backup power system • Perform functional test of backup power system

Equipment	Maintenance Interval	Task
Fencing	Quarterly (and after heavy rain)	• Inspect fence for vandalism and erosion at base • Desert tortoise fence inspections would be conducted in accordance with the terms and conditions of the Project-specific United States Fish and Wildlife Service (USFWS) Biological Opinion

4.2 Operation and Maintenance Plans

The plans identified in Section 2.14: *Construction Plans* are included as part of the POD and would be implemented during operation and maintenance.

Section 5
Decommissioning and Site Reclamation

The objective of decommissioning and reclamation is to remove the installed power generation equipment and return the site to a condition as close to its preconstruction state as practical.

The Decommissioning Plan (Attachment P) and Site Restoration Plan (Attachment M) describes Applicant's decommissioning and site reclamation strategy for the Project area after the solar generating facility permanently ceases operation. Permanent closure would occur as a result of facility age, damage beyond repair to the facility, economic conditions, or other reasons. The Decommissioning Plan would be reviewed at least 5 years prior to planned permanent closure and a Final Closure Plan would be prepared. The ROW requested from BLM is anticipated to be at least 30 years in duration. The ROW may, if granted, be extended, subject to the discretion of BLM. The extension of the ROW may be subject to additional review under NEPA.

The Decommissioning Plan addresses dismantling and removal of Project components and reclamation of areas disturbed over the life of the Project. Reclamation would primarily be accomplished through revegetation. Reclamation of areas that would be temporarily disturbed during Project construction are addressed in a separate Site Restoration Plan, in Attachment M. Invasive weeds in the Project area would also be controlled throughout the life of the Project in accordance with the Site Restoration Plan. This Decommissioning Plan supplements the Site Restoration Plan. Together, the plans describe the overall approach to vegetation management, weed management, and site closure and reclamation to be implemented for the Project.

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Section 6
Alternatives

6.1 Overview

Alternative technologies and project layouts were defined in accordance with the NEPA process. Each of the alternatives carried forward for NEPA analysis meet the basic purpose and need of the Project and are economically feasible; however, each alternative addresses a different set of environmental constraints or conflicts. The alternatives that were carried forward are based on different solar development area configurations, as well as different construction methods within the solar development areas, as described here. A detailed Alternatives Report that describes the process used to develop alternatives, the screening criteria for alternatives, the alternatives considered and carried forward for analysis in the EIS, and the alternatives rejected from further analysis, is included as Attachment E.

6.2 Alternative Solar Development Areas B1, B2, F, and G

Additional areas have been surveyed within the 44,000-acre (17,806-hectare) ROW application areas, as shown in **Figure 6-1**, to facilitate the alternatives analysis. To develop alternatives, several additional areas within the 44,000-acre (17,806-hectare) application area were studied. These additional areas total approximately 3,600 acres (1,456.8 hectares) (**Table 6-1**), and are identified as development areas B1, B2, F, and G. A total of approximately 10,670 acres (4,318 hectares) have been studied in order to develop alternatives that provide a minimum development acreage of 7,100 acres (2,873 hectares) and avoid resource constraints. The minimum acreage is needed to meet the purpose and need of the Project to develop a 690-MW solar facility.

6.3 Alternative Construction Methods – Mowing

An alternative method of site development is proposed that can be applied to each solar development area configuration alternative. The method is known as mowing. Areas that would be constructed through mowing of vegetation to 24 inches (61 centimeters), versus “disk and roll” or “traditional methods of construction” would minimize the areas of direct vegetation removal, thereby maintaining the vegetation community and topsoil seed bank for future regrowth and minimize weed proliferation on- and off-site. If vegetation cannot be mowed to 24 inches, justification would need to be provided to BLM in order to mow to the absolute minimum height allowable of 18 inches (46 centimeters). Areas of the solar array subject to mowing would be designed and constructed differently from the areas cleared using traditional methods. The differences are summarized below. Attachment A of this report includes the modified site design drawings for the mowing alternatives.

- **Design**
  - **Panel heights:** The solar arrays in mowing areas would need to have higher vegetation clearance than is typical, which would increase the total height of the arrays from 12 feet (3.7 meters) to 14 feet (4.3 meters) tall (24 inches [61 centimeters] taller at the top edge of the panel when the panel is positioned vertically). Vegetation may be trimmed to no less than 18 inches (46 centimeters) tall under justifiable circumstances. The greater height would require approximately 1 to 2 feet (0.3 to 0.6 meter) deeper steel posts to support the solar arrays.
  - **Array Block Configurations and Access Roads:** Array blocks in mowing areas would be consolidated as compared to array blocks for traditional methods, such that less space would be provided between array blocks. Panel spacing would be the same as for traditional methods, which allows light between panels to reach the ground to support plant growth. Internal access roads would be constructed in an east-west alignment approximately every 0.25 mile (0.4 kilometer) to allow for panel maintenance. Access roads would be 15 feet (4.6 meters) wide with every fourth access road 30 feet (9.1 meters) wide to allow for a utility corridor. Internal access roads would primarily be constructed through soil compaction. Aggregate could be used as needed to facilitate drainage, reduce erosion, and/or reduce dust. Typically, roads with aggregate receive approximately 4 inches (10 centimeters) of material on top of compacted soils.
  - **Fencing and Barriers:** The security fencing around the mowed areas would be modified allowing approximately 8 inches (20 centimeters) of space at the bottom of the fence. Once the solar array is constructed, desert tortoises would be allowed to move freely back into the mowed areas of the solar facility. Permanent desert tortoise exclusion fencing would remain around the perimeter of areas where traditional methods would be used, and between areas constructed via mowing and traditional methods. Permanent desert tortoise fencing would consist of hardware cloth and T-posts adhered to a fence. A tortoise barrier guard would be required across every access road traveling between areas constructed via mowing and traditional methods.
  - **Drainage Features:** Existing drainage is maintained under the mowing method, as is vegetative cover, which reduces runoff and sedimentation by trapping sediment and debris and slowing the rate of runoff and the effects of scouring. It also provides microhabitat, forage, and greater survivability of cryptobiotic crusts along the drainages. A large drainage basin, channel, and berms are needed for construction using traditional methods, in order to capture large potential flooding events that have increased velocity and scouring potential. These flood prevention features may not be required, or the

features needed may be smaller, for alternatives that include mowing. The sizing would be determined during final design.

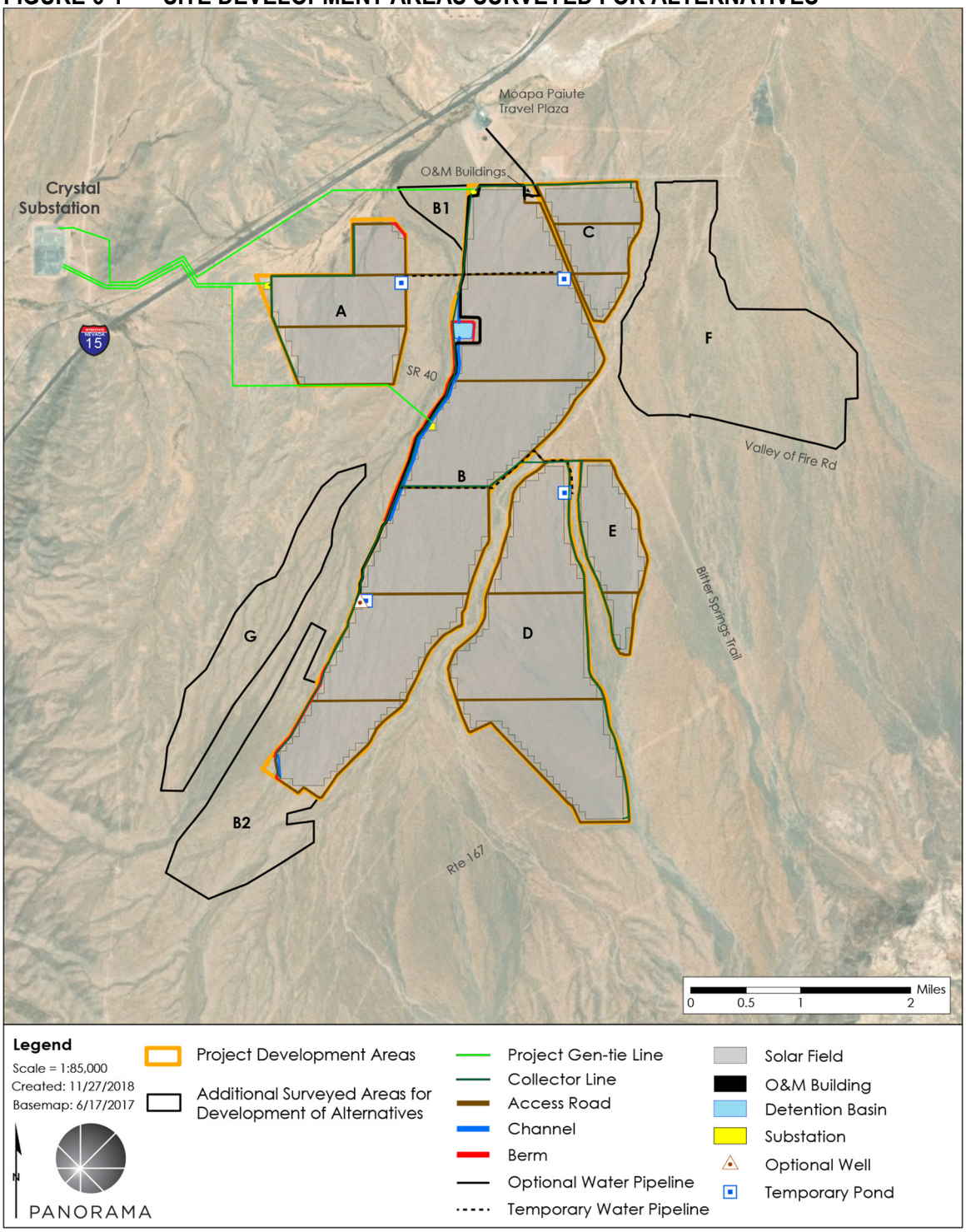
- **Construction**
  - **Surface Preparation:** Surface preparation would be minimal. The mowing method of construction would also minimize the areas of grading and leveling. Grading would be conducted in areas where existing topography must be modified for installation and operations. Surface drainage channels would remain largely unchanged.
  - **Vegetation Removal:** Vegetation would only be actively and completely removed in the areas of the power blocks, along a series of access roads, and in areas where topography modification is required for access or construction. These areas would be graded and vegetation tilled into the ground.
  - **Vegetation Mowing, Clipping, or Crushing**: In all other areas within the mowed configuration, vegetation would only be mowed or clipped to a height of 24 inches (61 centimeters), to allow for panel construction. Vegetation may be trimmed to no less than 18 inches (46 centimeters) tall under justifiable circumstances. In rare circumstances, vegetation in limited areas may need to be crushed to allow for construction of a panel or equipment. Crushing would be avoided to the greatest extent possible. At a minimum, root-balls would remain in place on crushed vegetation so that it would regrow. Construction would occur to minimize crushed vegetation. Mowing would occur at a height that would not kill the dominant shrub and bunch grass species and would still result in functional habitat when tortoises are permitted to re-occupy the mowed site. Vegetation crushing also would occur during solar panel construction, but BMPs, which may include utilizing skid steer vehicles or other tracked vehicles and minimizing the construction passes during installation, would encourage continued viability of the native plant community. Construction would be accomplished through use of equipment selected to maximize slope-climbing capability, minimize width of footprint, minimize weight of equipment and ground pressure, and allow extended reach across multiple solar array rows. A rubber tracked skid steer, or a steel tracked excavator could also be used.
  - **Conduits Installation:** Panels would be electrically connected to each other under the panel face to the inverter for each 4 by 4 array block. Underground conduit is needed to connect the electrical system from the inverter to the nearest substation. Conduits would be installed in or along access roads to the nearest substation and would require a trench up to 10 feet (3 meters) wide and 3 to 5 feet (0.9 to 1.5 meters) deep.
  - **Workforce and Schedule**: Similar workforces in both worker type and number would be required for construction of the mowing areas as for the traditional methods. The construction schedule; however,

would require up to 40 percent more labor or up to 40 percent more equipment for construction in areas where the mowing method is used as compared with areas constructed using traditional methods. Little data is available on the increased labor required to construct mowed areas, since few projects have been constructed using these methods. The increase of up to 40 percent was provided by Bombard Construction based on their construction of the Valley Electric Association 15-MW Community Solar Project, located in Pahrump, Nye County, Nevada. Factors that contribute to the increased labor to construct mowed areas include the following:

    - The need for vehicles to travel greater distances to access parts of the site, given access must remain on access roads located 0.25-mile apart
    - Use of special equipment that must reach over longer distances to construct facilities, requiring more time to set up and operate
    - Construction of deeper posts that take longer to install
    - The need to potentially perform more work by hand due to reduced accessibility of large equipment that can perform work more quickly
  - An increase of 40 percent in labor is assumed for the mowed areas as a "worst-case" scenario. Only the mowed areas result in increased labor and time. That is, if only 15 percent of a site is mowed, only that 15 percent would require the increased labor to construct.

- **Maintenance**
  - **Conditions:** Maintenance of the facility in the mowed areas would occur under the conditions of a Biological Opinion.
  - **Vegetation Trimming**: Vegetation under the solar arrays would be cut or trimmed with motorized equipment during the winter months or by hand during panel cleaning to a height of 24 inches (61 centimeters) but no less than 18 inches (46 centimeters) under justifiable conditions. This allows the vegetation to maintain its habitat function for desert tortoise and to maintain hydrology patterns on the site while not impacting the functionality of the solar panels. It is anticipated that trimming would occur every few years, but not annually.
  - **Signage and Training**: Signage on roads and WEAP training would be required to minimize risks of take to desert tortoise during project maintenance.

FIGURE 6-1 SITE DEVELOPMENT AREAS SURVEYED FOR ALTERNATIVES



Sources: (University of Montana 2010, Louis Berger Group 2018, USDA-FSA-APFO 2017, Clark County Nevada GIS Management Office 2018)

TABLE 6-1 SUMMARY OF ALTERNATIVE DEVELOPMENT AREAS SURVEYED

Site	Acreage (Hectare)
B1	132 (53.4)
B2	867 (350.9)
F	1,833 (741.8)
G	767 (310.4)
Total Alternative Analysis Study Area	**3,599**

Section 7
Environmental Considerations

7.1 Site Characteristics and Potential Environmental Issues

The Project site is located within a variance area as analyzed in the Solar PEIS. This indicates that, based on the program-level review in the Solar PEIS, the Project site does not contain any major constraints to for utility-scale solar energy development; such development is permitted subject to site-specific conditions of approval.

A detailed analysis of site characteristics and environmental considerations would be provided in the EIS for the Project. Topics to be covered in the Project's environmental analysis include, but are not limited to:

- Air Resources
- Areas of Critical Environmental Concern
- Cultural Resources; Native American Religious Concerns
- Wildlife; Migratory Birds; Threatened, Endangered, and Candidate Animal Species
- Vegetation; Forestry; Invasive and Noxious Weeds
- Geology and Mineral Resources
- Soil Resources
- Hazards and Hazardous Materials
- Lands/Access
- Military and Civilian Aviation
- Recreation
- Socioeconomics and Environmental Justice
- Transportation
- Visual Resources
- Water Resources

7.2 Other Uses on the Project Site

Portions of the Applicant's ROW application area are crossed by trails, including the Old Spanish Trail and the Bitter Spring Back Country Byway. An evaluation of these and other uses on the site would be included in the EIS.

Although the Project site is not located under any military airspace or in a Department of Defense (DoD) Consultation Area, it is approximately 15 miles (24 kilometers) northeast of Nellis Air Force Base (AFB). Given that distance, Project elements would not be expected to affect the approach or departure corridors for runways at the base, but any potential affects would be analyzed in the EIS. The Project is unlikely to construct facilities taller than 200 feet (61 meters), but would coordinate with FAA if structures taller than 200 feet (61 meters) are constructed to evaluate possible safety hazards. Outreach to Nellis AFB has been initiated. At this time, no concerns have been expressed by Nellis AFB. Consultation with DoD would be ongoing during the EIS process.

7.3 Design Features

The BLM's decision in the Solar PEIS ROD includes amending land use plans in the six-state study area with: (1) programmatic design features that would be required for all utility-scale solar energy projects on BLM-administered lands; and (2) Solar Energy Zone (SEZ)-specific design features that would be required for projects in individual SEZs. Based on the design features in the Dry Lake SEZ, which is located 5 miles (8 kilometers) west of the Project site, the Applicant has included numerous plans as part of this POD.

7.4 Mitigation Measures.

The following are preliminary Applicant-proposed mitigation measures. These measures are subject to change based on the findings of site-specific technical analyses, the analysis in the EIS, and BLM's decision in the Project's ROD.

7.4.1 Desert Tortoise Habitat

A habitat assessment for the Project has been completed. The habitat assessment identifies areas that may support sensitive species based on available habitat. Typically, a habitat assessment is used as a method for limiting the overall survey area by focusing survey efforts to those portions of the Project area that are most likely to support target species. For this Project, data was acquired regarding protected species according to USFWS, BLM, and State-listed species for the Project area and surrounding buffer. Additional data obtained included soils, vegetation, and landownership data for the Project area. With this report, monitors in the field during construction can pre-survey if the data suggests the potential presence of a species.

- A WEAP would be implemented for construction crews prior to commencement of construction activities. Training materials and briefings would include but would not be limited to discussion of the Endangered Species Act (ESA), the consequences of noncompliance with the ESA, identification and values of wildlife and natural plant

communities, hazardous substance spill prevention and containment measures, and review of all design features of the proposed action. Additionally, a qualified tortoise biologist would present a tortoise-education program to all personnel who would be working on-site. The program would include information on the life history of the desert tortoise, legal protection for desert tortoises, penalties for violations of federal and state laws, general tortoise activity patterns, reporting requirements, measures to protect tortoises, terms and conditions of the biological opinion, and personal measures employees can take to promote the conservation of desert tortoises. All workers would be instructed to check underneath all vehicles at work sites before moving vehicles, as tortoises are attracted to shade and often take cover under vehicles. The definition of "take" would also be explained.

- All Project construction within desert tortoise habitat, including access routes and fence lines, would be cleared by an authorized biologist before the start of construction or ground disturbance. The site would be surveyed for desert tortoises using survey techniques that provide 100 percent coverage. During the tortoise active season (typically April 1 to May 31 and September 1 to October 31), the preconstruction clearance survey would take place no more than 10 days before initiation of construction.

- Desert tortoise burrows would be avoided whenever possible. Tortoise burrows found in the construction areas that cannot be avoided would be searched for resident tortoises. Burrows that contain tortoises or nests would be excavated with hand tools, to allow removal of the tortoise or eggs following USFWS handling methods. If no tortoises are found, burrows would be collapsed to prevent re-entry.

- Tortoises found during the clearance surveys within the Project site would be relocated to temporary holding pens within the Project area. The tortoises would be affixed with radio transmitters and two health assessments would be conducted within 14-30 days apart prior to relocation. The tortoises would be monitored daily while retained in the pens.

- If trenches are needed, trenches would have tortoise escape ramps built to USFWS standards placed at least every 2,000 feet (609.6 meters).

- A maximum speed limit of 25 miles (40 kilometers) per hour would be maintained while traveling on unpaved access roads. During active season (April–May and September–October), a maximum speed limit of 15 miles (24 kilometers) per hour would be maintained. This effort would reduce the potential for vehicle–wildlife related accidents. All project-related individuals shall check underneath and around stationary vehicles before moving them.

7.4.2 Migratory Birds

- To prevent undue harm, habitat-altering Project activities or portions of activities should be scheduled outside bird breeding seasons. In upland desert habitats and ephemeral washes containing upland species, this season generally occurs from March 1 through August 31. During breeding season, a qualified biologist would survey the area for nests

prior to commencement of construction activities. This shall include burrowing and ground-nesting species, in addition to those nesting in vegetation. If any active nests (containing eggs or young) are found, an appropriate buffer around the nest must be avoided until the young birds fledge.

- During construction in migratory bird season, the authorized biologist would clear ahead of the construction crews and flag and monitor any active nests found. If active nests are found within the construction zone, construction would only occur outside the buffer zone, until the nest is inactive.

7.4.3 Cultural Resources

- Cultural resources are defined as buildings, sites, structures, or objects, each of which has historical, architectural, archaeological, cultural, and/or scientific importance. Numerous laws, regulations, and statues, on both the federal and state levels, seek to protect and target the management of cultural resources.

- In consultation with BLM and with SHPO concurrence, any areas which contain cultural resources of significance or whose eligibility for inclusion on the National Register of Historic Places (NRHP) is unevaluated, would be avoided, mitigated, or treated and recorded as appropriate. Applicant employees, contractors, and suppliers would be reminded that all cultural resources are protected and if uncovered, the resource shall be left in place, work would cease, and notification would be made to the Applicant representative and the appropriate BLM authorized office, with written confirmation to follow immediately upon such discovery.

- If construction occurs in proximity to an NRHP-eligible cultural resource site, the Applicant would have an authorized cultural monitor on-site during the activity.

7.4.4 Reclamation

- Also refer to Section 1.3.15, *Vegetation Management*. For areas that have required clearing and/or grading work, restoration and reclamation procedures would be based on site-specific requirements and techniques commonly employed at the time the area is to be reclaimed and would include regrading, top soiling, and revegetating all disturbed areas. Topsoil from all decommissioning activities shall be salvaged and reapplied during final reclamation. All areas of disturbed soil shall be reclaimed using weed-free native shrubs, grasses, and/or forbs. Vegetation cover, composition, and diversity shall be restored to values commensurate with the ecological setting.

- Reclamation would be conducted on all disturbed areas to comply with BLM requirements. The short-term goal of reclamation would be to stabilize newly disturbed areas as rapidly as possible, thereby protecting sites and adjacent undisturbed areas from degradation. The long-term goal would be to return the land to approximate pre-disturbance conditions.

- After construction is complete, disturbed work areas would be graded to the approximate original contour, and the area would be revegetated with BLM-approved seed mixtures. Most postconstruction work would entail scarifying soils to reduce compaction and reseeding. Since only certain areas along the Project site would be disturbed, a specific Site Restoration Plan, and Decommissioning Plan would be prepared that describes the recommendations for each area.

7.5.5 Weed Management

Non-native and noxious weeds within the construction area are to be addressed by the implementation of mitigation measures in consultation with the BLM noxious weed management specialists. The BLM would require ROW monitoring and abatement for non-native and noxious weeds prior to and following construction. The Applicant has developed a project-specific Site Restoration Plan. The Site Restoration Plan and Integrated Weed Management Plan includes preventive measures, treatment methods, and monitoring activities. The Site Restoration Plan and Integrated Weed Management Plan includes the following preventive measures:

(from the Site Restoration Plan):

- Minimizing vegetation removal by implementing the mowing method of construction on 65 percent of the Project
- Recontouring and revegetating Project roads that are no longer needed in order to increase infiltration and reduce soil compaction
- Utilizing originally excavated materials for backfill
- Controlling Project vehicle and equipment speeds to reduce dust erosion
- Controlling water runoff and directing it to settling or rapid infiltration basins
- Retaining sediment-laden waters from disturbed, active areas within the Project site through the use of barriers and sedimentation devices (e.g., berms, straw bales, sandbags, jute netting, or silt fences). Conducting periodic surveys of these areas and removing sediment from barriers and sedimentation devices to restore sediment-control capacity.
- Placing barriers and sedimentation devices around drainages and wetlands in areas with ground disturbance upstream
- Replanting Project areas with native vegetation at spaced intervals to break up areas of exposed soil and reduce soil loss through wind erosion
- Minimizing land disturbance (including crossings) in natural drainage systems and groundwater recharge zones (i.e., ephemeral washes)
- Locating and constructing drainage crossing structures so as not to decrease channel stability or increase water volume or velocity

- Avoiding clearing and disturbing areas outside the construction zone
- Conducting construction grading in compliance with industry practice (e.g., the ASTM international standard methods) and other requirements (e.g., BLM and/or local grading and construction permits)
- Using temporary stabilization devices (i.e., erosion matting blankets, or soil stabilizing agents) for areas that are not actively under construction
- Upon completion of construction, reapplying any topsoil that is salvaged during excavation and construction
- Restoring disturbed lands following construction as outlined in the Site Restoration Plan
- Restoring native plant communities as quickly as possible in areas temporarily disturbed during construction, through natural revegetation or by seeding and transplanting (using weed-free native grasses, forbs, and shrubs), on the basis of BLM recommendations
- Minimizing soil-disturbing activities on wet soils

(from the Integrated Weed Management Plan):

- All Project personnel will receive environmental awareness training regarding the prevention of introducing and spreading non-native and noxious weeds.
- Prior to construction, the permanent and temporary disturbance areas will be inventoried for non-native and noxious weeds. All non-native and noxious weed populations will be mapped with a Global Positioning System (GPS) and the species, phenology, and populations size will be recorded. Surveyors will cover the entire area by walking transects spaced five meters apart. Clearance surveys will take place when non-native and noxious weed species are detectable.
- Prior to construction, the identified and delineated non-native and noxious weed problem areas will be treated to reduce the spread and infestation of non-native and noxious weeds. Manual removal methods will be the preferred method. All manually removed weeds will be bagged and disposed of in sealed refuse receptacles in a landfill. Following treatment, seeding and/or replanting will occur unless the area will be disturbed during construction. If hand-pulling is too time consuming, chemical treatments with BLM-approved herbicides may be used as described in the Integrated Weed Management Plan. Herbicide use in areas with special status plant species will be carefully considered to ensure that the herbicide can be applied without affecting the species, otherwise manual and mechanical methods may only be employed.
- Herbicides applications will be controlled to minimize the impacts on the surrounding vegetation. In areas of dense infestation, a broader application may be used, and follow-

up seeding/replanting implemented, as appropriate. The timing of subsequent seeding/revegetation efforts will be based on the life of the selected herbicide.

- All contractor vehicles and equipment will arrive at the work site clean and weed free.
- Prior to allowing access to vehicles and equipment in the ROW or ancillary facilities, an inspector will ensure that vehicles and equipment are free of soil and debris capable of transporting non-native and noxious weed seeds, roots, or rhizomes.
- Project construction and operation and maintenance will begin in weed-free areas whenever feasible before operating in weed-infested areas.
- Access to and from the site will be limited to defined routes of travel and established gates.
- Designated staging areas will be established in locations that are relatively free of non-native and noxious weed infestations; staging areas will be used for equipment storage, machine and vehicle parking, or the temporary placement of people, machinery, and supplies.
- All travel through weed-infested areas will be avoided or minimized and major activities will be restricted to periods of time when the spread of weed seeds or plant parts are least likely.
- All site personnel will self-inspect their boots, clothes, personal gear, and equipment for mud, dirt, and/or seeds before coming to work, regularly during the day, before leaving one area and entering another area, and before leaving the site. Any mud, excessive dirt, and/or seeds will be removed into a plastic bag which will be deposited in a sealed trash receptacle.
- All vegetation and ground disturbance will be limited to the absolute minimum necessary to perform the work safely and as designed. Project construction activities will avoid creating soil conditions that promote weed germination and establishment.
- In areas where infestations have been identified or non-native and noxious weeds were noted in the field, the contractor will stockpile cleared vegetation and salvaged topsoil adjacent to the area from which they are stripped to eliminate the transport of soil-borne non-native and noxious weed seeds, roots, or rhizomes. During reclamation, the contractor will return topsoil and vegetative material from infestation sites to the areas from which they were stripped.
- Temporarily disturbed areas will be rehabilitated immediately following completion of construction in the area, including reseeding and/or replanting with desirable species in order to reduce weed infestations.

- The contractor will implement the reclamation of disturbed lands following construction as outlined in the Site Restoration Plan.

- The contractor will continue revegetation efforts to ensure adequate vegetative cover to reduce or prevent the invasion of non-native and noxious weeds.

- The contractor will ensure that straw bales used on the Project for sediment barrier installations or mulch distribution are certified weed-free. In addition, all other materials that may harbor weed seeds, including gravel and soil, must also be certified weed-seed free. Mulch will be made from the native vegetation cleared from the Project area. Any soils brought onto the site will need to have been processed to eliminate any weed seeds at a professional facility; preferably, native soils from the site will be used.

- Equipment will not be sprayed with pre-emergent chemicals as a preventive measure, as these chemicals target a wide range of vegetation. As a result, the use of such chemicals could affect the success of revegetation efforts.

- Dust suppressants (water or palliative) may be used as needed to limit the spread of airborne weed seeds. Soil bonding and weighting agents used on unpaved surfaces will be non-toxic to plants and wildlife and only BLM-approved dust palliatives will be used.

- Cleaning/inspection stations will be located at all entrance/exit points. Compressed air will be used to remove seeds, roots, and rhizomes from vehicles and equipment before leaving the site.

- Non-native and noxious monitoring will be conducted on the Project for at least three consecutive years following Project construction.

Additional measures specific to herbicide use include:

- All personnel responsible for weed control will be certified pesticide applicators trained in the proper and safe use of all equipment and chemicals used. Applicators will have copies of the appropriate SDS for the herbicides used readily available at all times.

- Treatment methods will be based on species-specific, area-specific, seasonal, and climatic conditions and will be coordinated with the BLM.

- Both newly identified populations of non-native and noxious weeds and previously treated infestations will be treated and monitored.

- Calibration checks of equipment will be conducted at the beginning of spraying and periodically to ensure proper application rates.

- Herbicides will be transported to the Project site daily with the following provisions: only the quantity needed for that day's work will be transported; concentrate will be transported in approved containers only and in a manner that will prevent tipping or spilling, and in a location that is isolated from the vehicle's driving compartment, food,

clothing, and safety equipment; and, mixing will be done off-site, over a drip-catching device and at a distance greater than 200 feet (61 meters) from open or flowing water, wetlands, or other sensitive resources.

- No herbicides will be applied within 200 feet (61 meters) of open or flowing water, wetlands, or other sensitive resources.

- All herbicide equipment and containers will be inspected for leaks daily. Disposal of spent containers will be in accordance with the herbicide label.

- All reasonable precautions will be taken to avoid herbicide spills. All herbicide spills will be reported in accordance with applicable laws and requirements. In the event of a spill, clean-up will be immediate. Applicators will keep spill kits in their vehicles and in herbicide storage areas to allow for quick and effective response to spills.

- Applicators will treat weed populations with the following provisions: treatment will only occur in areas previously delineated by the designated botanist; all herbicide drift will be minimized or avoided during applications; weed seed dispersal will be limited or avoided during treatments; and, applications will be made directly over target plants.

- No herbicides will be applied under the following conditions: when wind velocity is greater than 6 mph (10 kph) for liquid herbicides or 15 mph (24 kph) for granular herbicides; when precipitation is occurring or forecasted; when snow or ice covers the foliage of the weeds; or, when temperatures exceed 90 degrees Fahrenheit (32 degrees Celsius).

- All herbicides used will comply with federal and state laws and will be used in accordance with their registered uses, as directed by the herbicide-specific label, or within the limitations imposed by the Secretary of the Interior (whichever is more restrictive).

7.5.6 Air Quality

- Water and/or BLM-approved dust palliatives will be applied to the ground during the construction and use of the Project area, access roads, and other disturbed areas as necessary to control dust.

- If required by Clark County, a fugitive dust permit from the Clark County will be obtained prior to construction, and requisite dust control measures and BMPs will be implemented during the Project.

7.5.7 Fire Protection

- All federal, state, and county laws, ordinances, rules, and regulations that pertain to prevention, pre-suppression, and suppression of fire will be strictly adhered to. All personnel will be advised of their responsibilities under the applicable fire laws and

regulations. It will be the responsibility of the construction crews to notify the agencies when a project-related fire occurs within or adjacent to the construction area.

- The construction crews will be responsible for any fire started by their employees or operations during construction, in or out of the Project area. The contractor will be responsible for fire suppression and rehabilitation. The crews will take aggressive action to prevent and suppress fires on and adjacent to the Project area and will use their workers and equipment on the Project for fighting fires within the Project area.

Section 8
References

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ATTACHMENT A
Legal Description

The Project is located on the property identified below. This legal description includes the solar field, gen-tie lines, ancillary facilities, and BLM segment of Valley of Fire Road that would be used by the Project as primary access.

Mount Diablo Meridian, Nevada
T. 17 S., R. 64 E.,
sec. 10, S1/2;
sec. 11, S1/2;
sec. 12;
sec. 13;
sec. 14, N1/2 and SE1/4;
sec. 15, N1/2;
sec. 25, E1/2;
sec. 36, E1/2 and SW1/4;
T. 17 S., R. 65 E.,
sec. 7;
sec. 8;
sec. 9, W1/2;
sec. 16, W1/2;
secs. 17 thru 20;
sec. 21, SW1/4;
sec. 28, W1/2;
secs. 29 thru 32;
sec. 33, W1/2;
T. 18 S., R. 64 E.,
sec. 1;
sec. 2, E1/2;
T. 18 S., R. 65 E.,
sec. 4, W1/4;
sec. 5;
sec. 6, NE1/4.
The areas described aggregate 7,094.8 acres (2,871.2 hectares).

The legal description would further encompass a water pipeline constructed from the Moapa River Indian Reservation to the Project site, if this water source is selected.

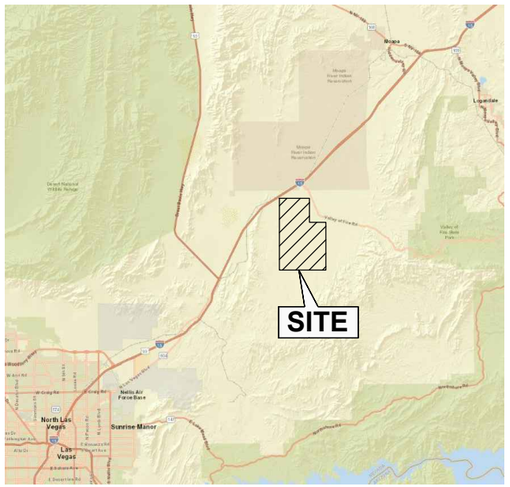
Mount Diablo Meridian, Nevada
T. 16S., R. 65 E.,
sec. 31, W1/2 and SE ¼.

ATTACHMENT B
Preliminary Site Plan

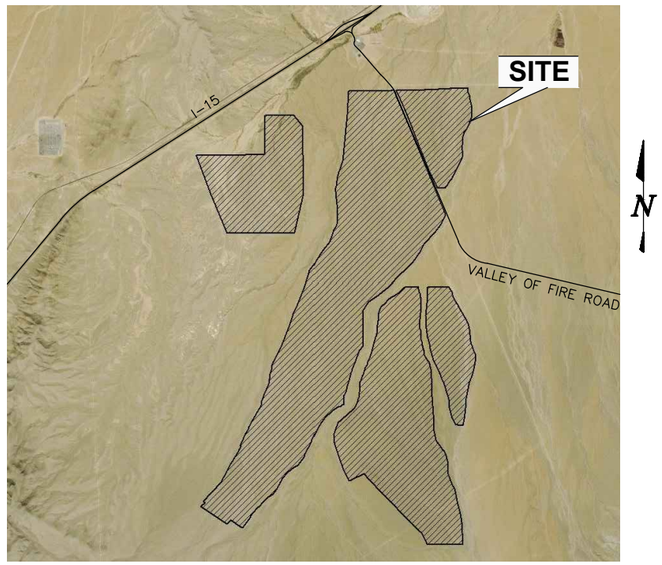
GEMINI SOLAR PROJECT - PROPOSED ACTION

LAS VEGAS, NV

VICINITY MAP



SITE MAP



Sheet List Table	
Sheet Number	**Sheet Title**
GENERAL	
G001	TITLE SHEET
CIVIL	
C200	INDEX PLAN
C201	CONSTRUCTION LAYOUT PLAN
C202	CONSTRUCTION LAYOUT PLAN
C203	CONSTRUCTION LAYOUT PLAN
C204	CONSTRUCTION LAYOUT PLAN
C205	CONSTRUCTION LAYOUT PLAN
C206	CONSTRUCTION LAYOUT PLAN
C207	CONSTRUCTION LAYOUT PLAN
C208	CONSTRUCTION LAYOUT PLAN
C209	CONSTRUCTION LAYOUT PLAN
C220	DETENTION BASIN DETAIL
C250	TYPICAL SECTIONS

GEMINI SOLAR PROJECT
LAS VEGAS, NV, USA

ENGINEER'S STAMP

GEMINI SOLAR PROJECT, LLC
LAS VEGAS, NV, USA

PROPOSED ACTION TITLE SHEET

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
G100

Louis Berger
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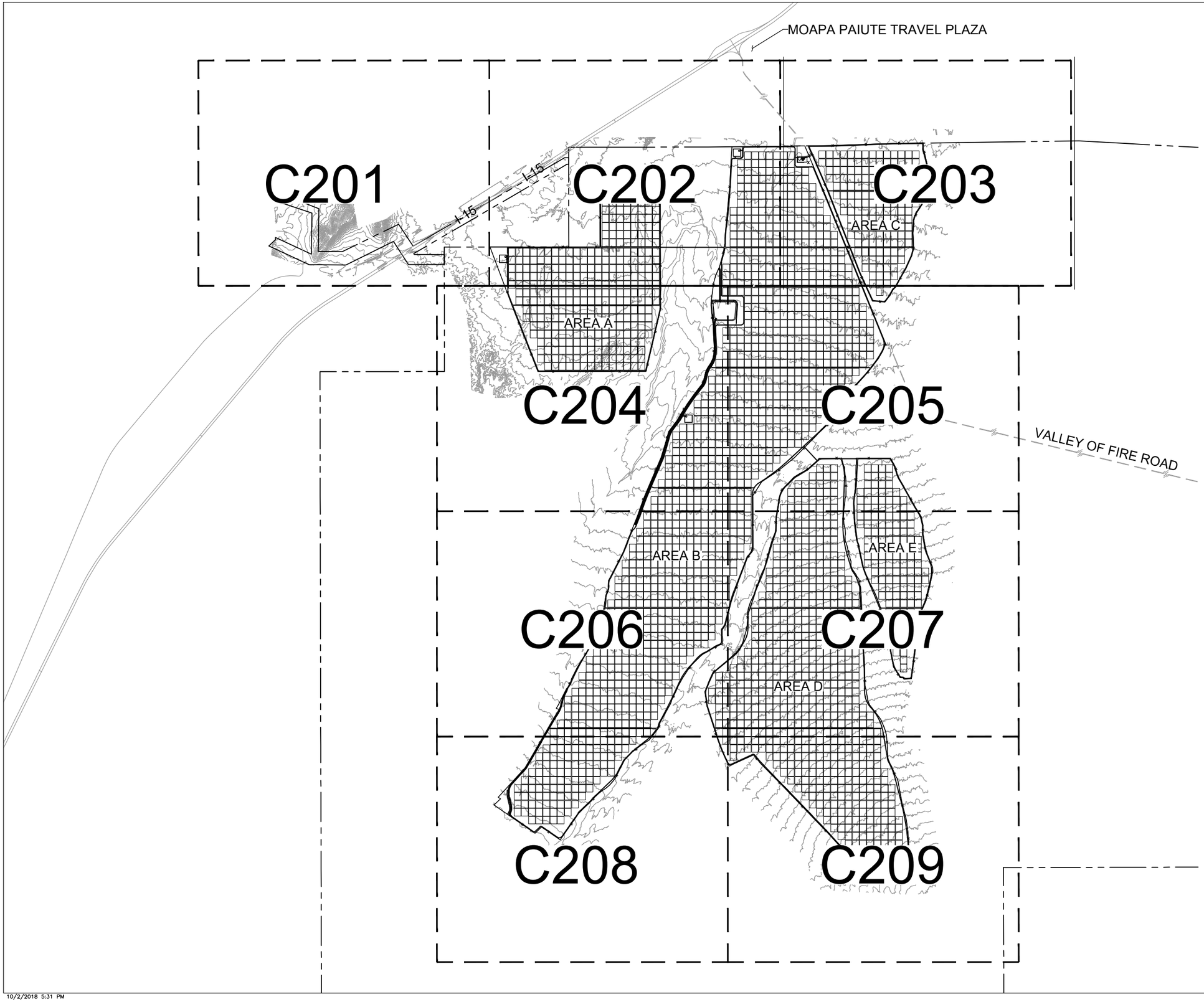

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LAS VEGAS, NV, USA

PROPOSED ACTION INDEX

REVISIONS				
REV	DESIGN #	DESCRIPTION	DATE	DB | CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 1000' 2000' 4000'
GRAPHIC SCALE

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
C200

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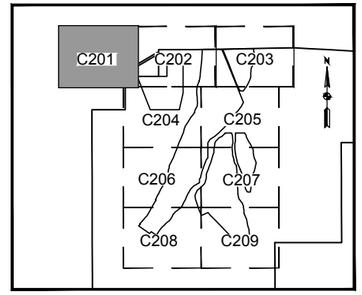

KEY MAP

33

34

10

11

MATCHLINE - FOR CONTINUATION SEE DWG C202

MATCHLINE - FOR CONTINUATION SEE DWG C204

OHE

PROPOSED TRANSMISSION LINE

PROPOSED TRANSMISSION LINE

1/4 9 16

1/4 10 15

10 12 15 14

1/4 13 14

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARB WIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

0 250' 500' 1000'

GRAPHIC SCALE

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PROPOSED ACTION LAYOUT PLAN

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

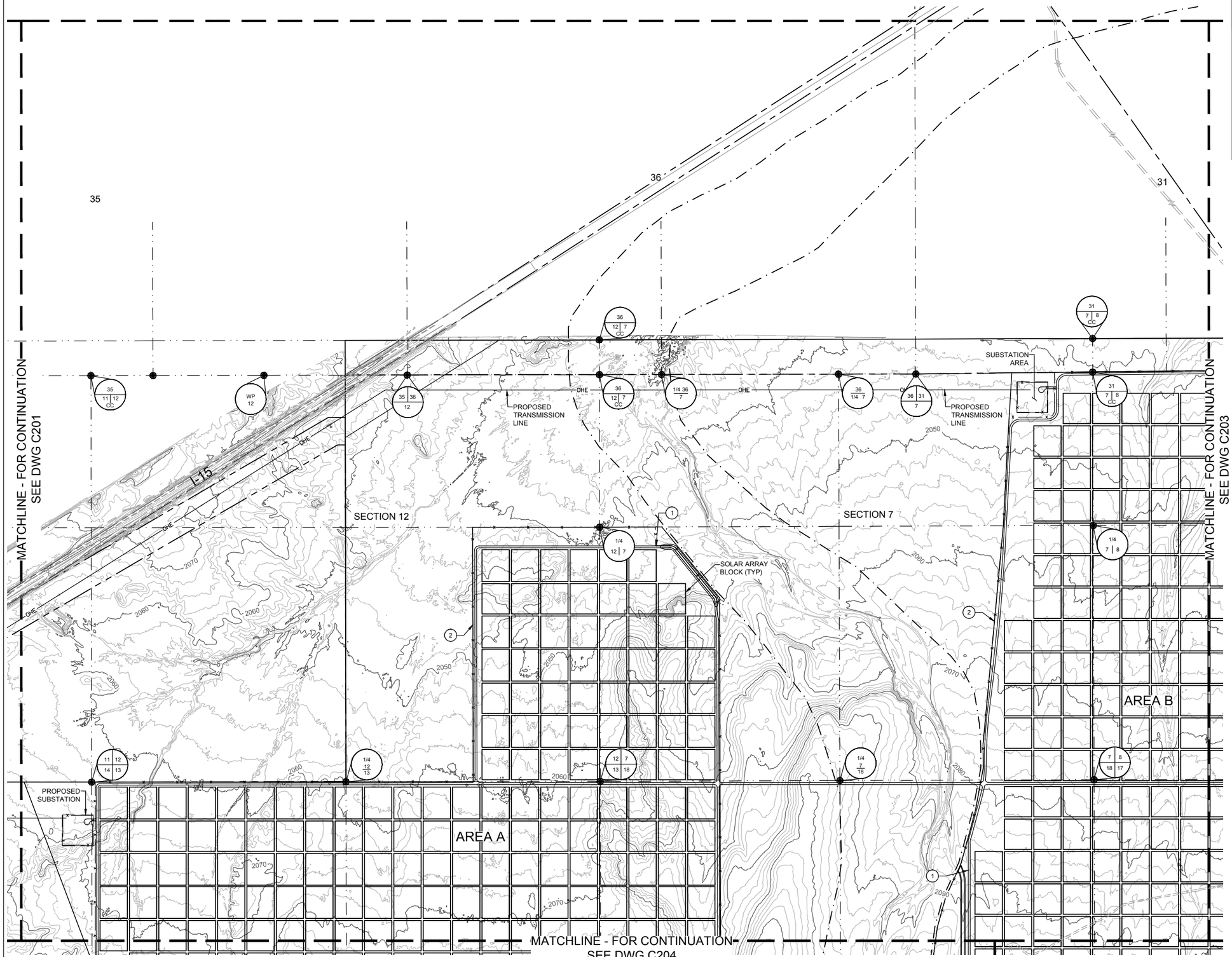
OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

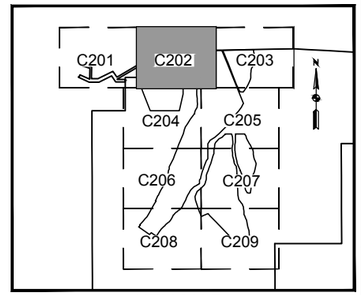
0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET

C201





KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

0 250' 500' 1000'

GRAPHIC SCALE

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REVISIONS

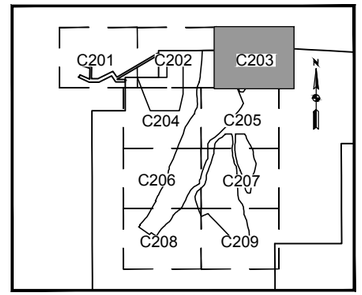
REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET C202



KEY MAP

32

33

MATCHLINE - FOR CONTINUATION SEE DWG C202

MATCHLINE - FOR CONTINUATION SEE DWG C205

SECTION 8

SECTION 9

OPERATIONS AND MAINTENANCE FACILITY AREA

AREA B

AREA C

VALLEY OF FIRE ROAD

SOLAR ARRAY BLOCK (TYP)

2030

2040

2050

2060

2070

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE TRANSMISSION LINE
- x SECURITY FENCE
- FEMA ZONE A SFHA

N

0 250' 500' 1000'

GRAPHIC SCALE

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PROPOSED ACTION LAYOUT PLAN

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET

C203

MATCHLINE - FOR CONTINUATION
SEE DWG C202

SECTION 14

SECTION 13

SECTION 18

SECTION 19

PROPOSED TRANSMISSION LINE

AREA A

AREA B

SOLAR ARRAY BLOCK (TYP)

DETENTION BASIN (SEE SHEET C220)

PROPOSED TRANSMISSION LINE

SUBSTATION AREA

PROPOSED X' BERM

MATCHLINE - FOR CONTINUATION
SEE DWG C201

MATCHLINE - FOR CONTINUATION
SEE DWG C205

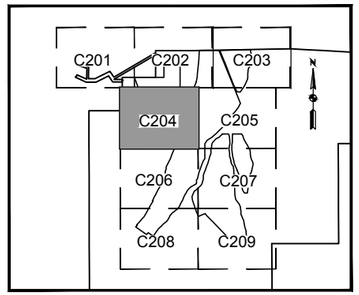
MATCHLINE - FOR CONTINUATION
SEE DWG C206

OHE

2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180

1/4 14 | 13 — 1/4 13 | 18 — 14 | 13 / 23 | 24 — 1/4 13 / 24 — 13 | 18 / 24 | 19 — 1/4 18 / 19 — 1/4 14 / 23 — 1/4 23 | 24 — 1/4 24 | 19 — 23 | 24 / 26 | 25 — 1/4 24 / 25 — 24 | 19 / 25 | 30 — 1/4 19 / 30

KEY MAP



CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

0 250' 500' 1000'
GRAPHIC SCALE

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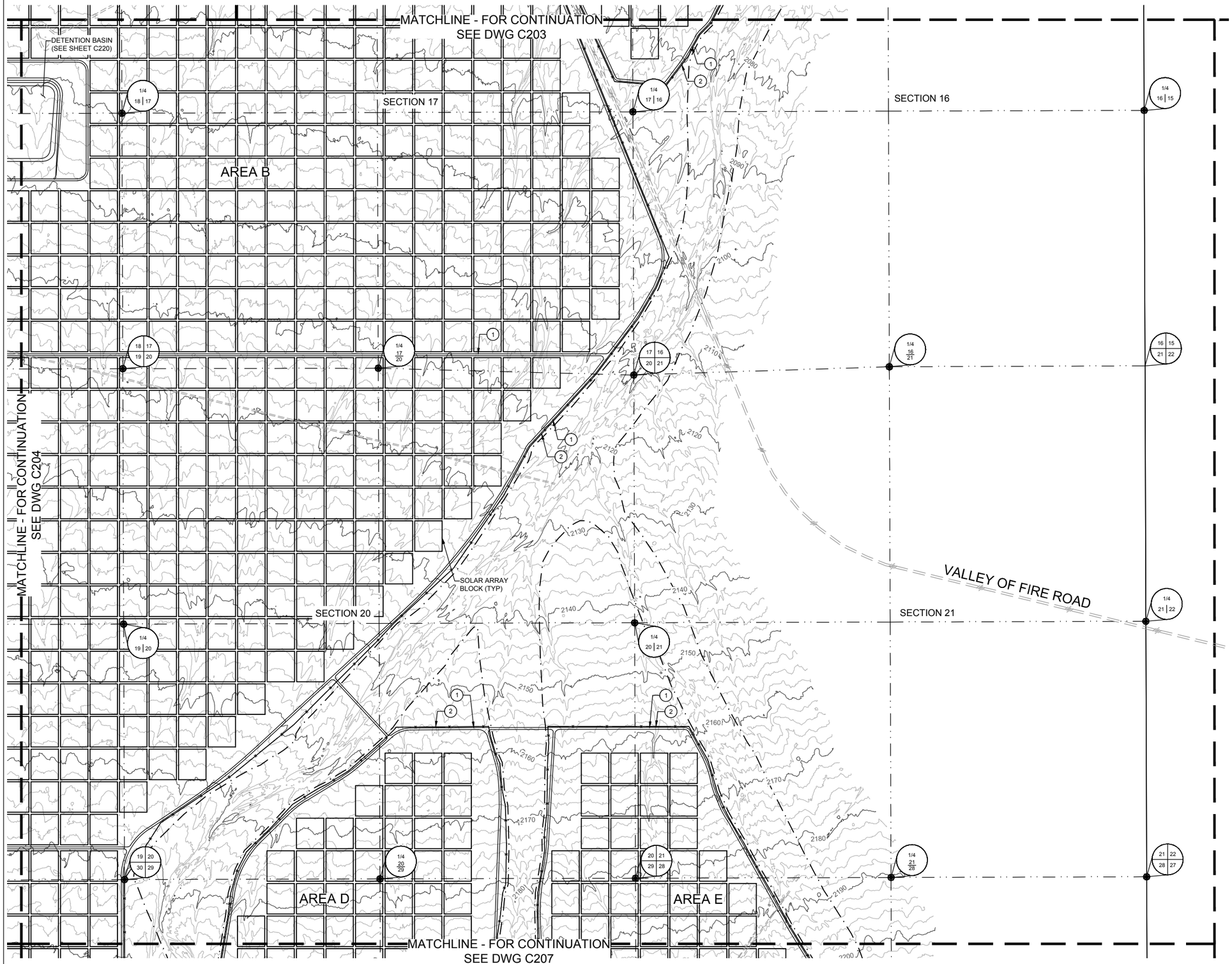
REVISIONS

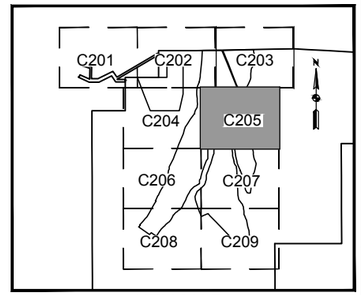
REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
C204





KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE TRANSMISSION LINE
- x SECURITY FENCE
- FEMA ZONE A SFHA

GRAPHIC SCALE
0 250' 500' 1000'

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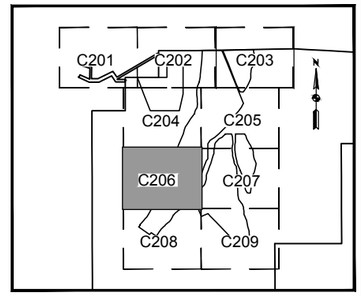
REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
C205



KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

N

0 250' 500' 1000'

GRAPHIC SCALE

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PROPOSED ACTION LAYOUT PLAN

REVISIONS				
REV	DESIGN #	DESCRIPTION	DATE	DB CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
C206

MATCHLINE - FOR CONTINUATION SEE DWG C205

MATCHLINE - FOR CONTINUATION SEE DWG C206

MATCHLINE - FOR CONTINUATION SEE DWG C209

SECTION 29

SECTION 28

SECTION 32

SECTION 33

AREA E

AREA D

1/4 30 | 29

1/4 29 | 28

1/4 28 | 27

30 29 / 31 32

1/4 29/32

29 28 / 32 33

1/4 28/33

28 27 / 33 34

1/4 31 | 32

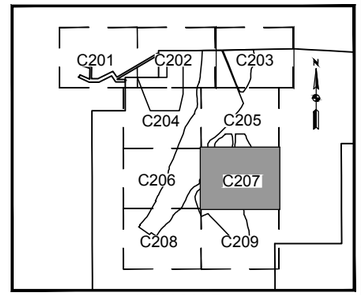
1/4 32 | 33

1/4 33 | 34

31 32

33 34

2190 2200 2210 2220 2230 2240 2250 2260 2270 2280 2290 2300 2310 2320 2330 2340 2350 2360 2370



KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE TRANSMISSION LINE
- x SECURITY FENCE
- FEMA ZONE A SFHA

N

0 250' 500' 1000'

GRAPHIC SCALE

Louis Berger
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PROPOSED ACTION LAYOUT PLAN

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

REVISIONS

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET

C207

MATCHLINE - FOR CONTINUATION
SEE DWG C206

AREA B

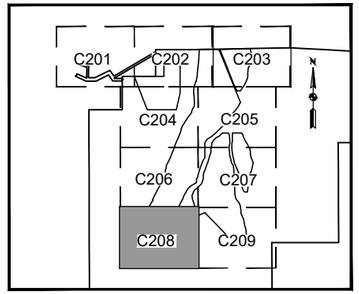
SECTION 2

SECTION 1

SECTION 6

MATCHLINE - FOR CONTINUATION
SEE DWG C209

5167.84' +/-



KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)
4. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL WITH BERM (SEE DETAIL 7/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

0 250' 500' 1000'

GRAPHIC SCALE

Louis Berger
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PROPOSED ACTION LAYOUT PLAN

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET

C208

MATCHLINE - FOR CONTINUATION SEE DWG C207

MATCHLINE - FOR CONTINUATION SEE DWG C208

AREA D

SECTION 5

SECTION 4

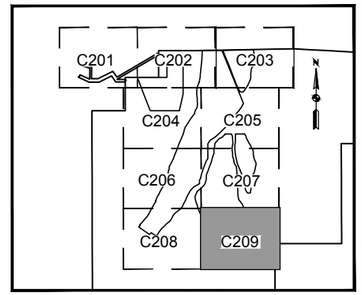
SECTION 8

5231.71' +/-

5278.40' +/-

5274.94' +/-

5279.82' +/-



KEY MAP

CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE — TRANSMISSION LINE
- x — SECURITY FENCE
- FEMA ZONE A SFHA

0 250' 500' 1000'

GRAPHIC SCALE

Louis Berger
444 East Warm Springs Road, Suite 118, Las Vegas, Nevada 89119
Phone: 702.736.6632 Fax: 702.407.1305

GEMINI SOLAR PROJECT
LAS VEGAS, NV, USA

ENGINEER'S STAMP

GEMINI SOLAR PROJECT, LLC

LAS VEGAS, NV, USA

PROPOSED ACTION LAYOUT PLAN

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB CB

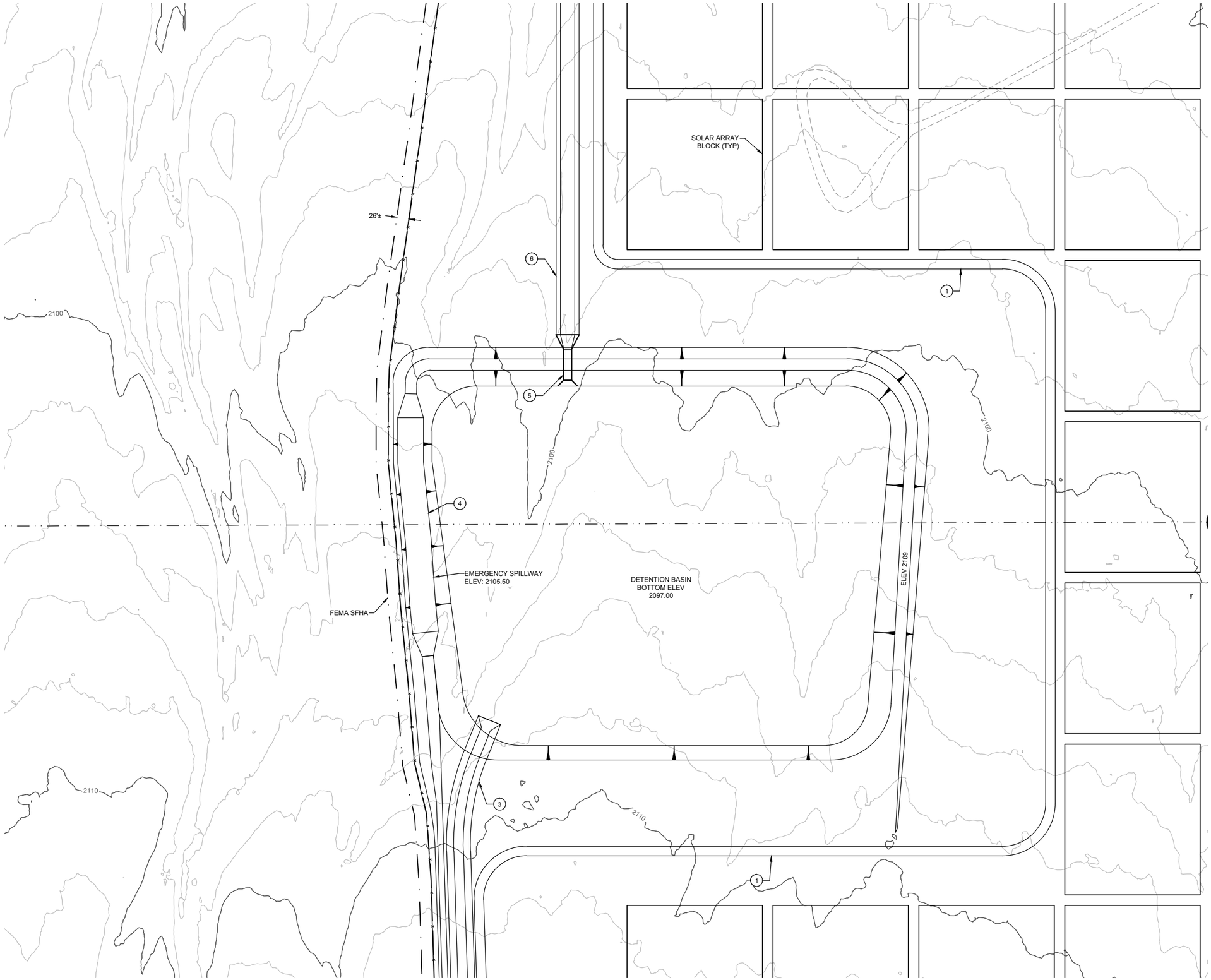
OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET

C209



CONSTRUCTION ITEMS

1. CONSTRUCT 20' ACCESS ROAD (SEE DETAIL 1/C250)
2. INSTALL 72" CHAIN LINK FENCE WITH 3 STRANDS OF BARBWIRE
3. CONSTRUCT SOIL CEMENT TRAPEZOIDAL CHANNEL (SEE DETAIL 2/C250)
4. CONSTRUCT SOIL CEMENT EMERGENCY SPILLWAY (SEE DETAIL 5/C250)
5. INSTALL RCB OUTLET
6. CONSTRUCT SOIL CEMENT OUTFALL CHANNEL (SEE DETAIL 3/C250)

LEGEND

- SECTION LINE
- 1/4 SECTION LINE
- AREA BOUNDARY
- OHE TRANSMISSION LINE
- x SECURITY FENCE
- FEMA ZONE A SFHA

N

0 50' 100' 200'

GRAPHIC SCALE

Louis Berger
444 East Warm Springs Road, Suite 118, Las Vegas, Nevada 89119
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GEMINI SOLAR PROJECT
LAS VEGAS, NV, USA

ENGINEER'S STAMP

GEMINI SOLAR PROJECT, LLC
LAS VEGAS, NV, USA

DETENTION BASIN DETAIL

REVISIONS

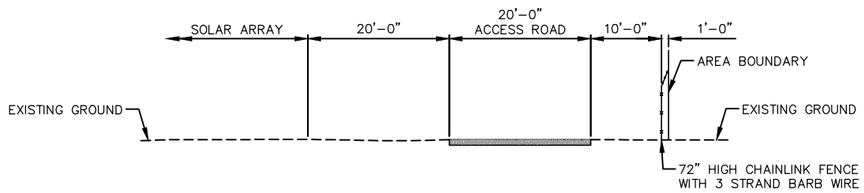
REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

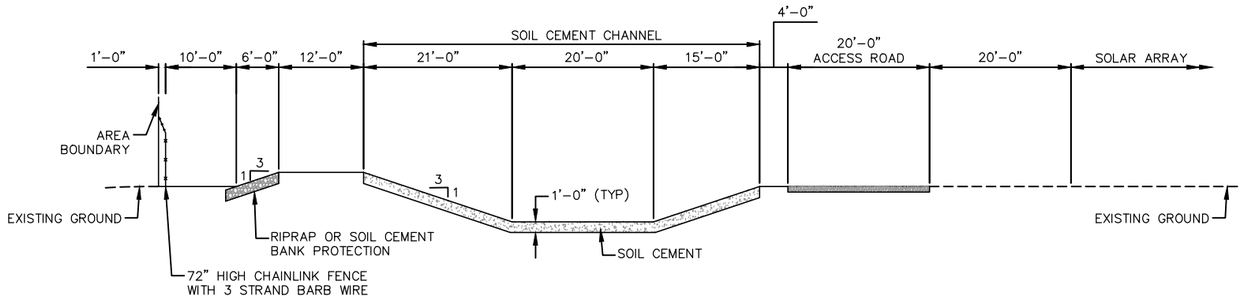
0 ½" 1"

IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

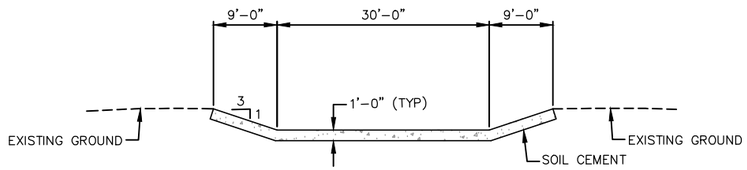
SHEET
C220



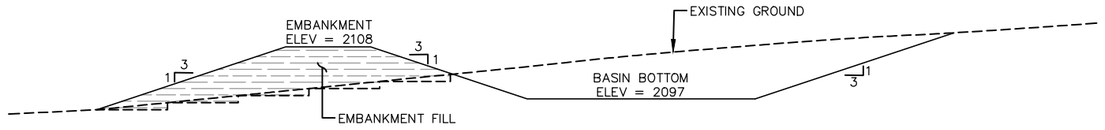
1 C250 ACCESS ROAD
NTS



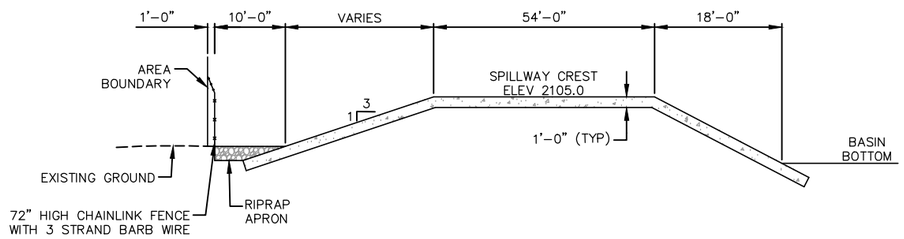
2 C250 SOIL CEMENT TRAPEZOIDAL CHANNEL
NTS



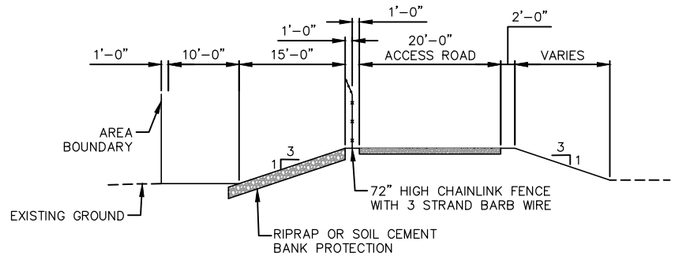
3 C250 SOIL CEMENT OUTFALL CHANNEL
NTS



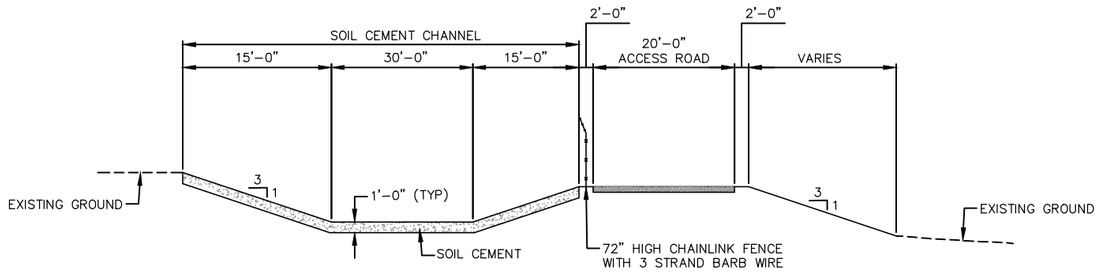
4 C250 DETENTION BASIN
NTS



5 C250 SOIL CEMENT EMERGENCY SPILLWAY
NTS



6 C250 BERM
NTS



7 C250 SOIL CEMENT TRAPEZOIDAL CHANNEL WITH BERM
NTS

GEMINI SOLAR PROJECT
LAS VEGAS, NV, USA

ENGINEER'S STAMP

GEMINI SOLAR PROJECT, LLC
LAS VEGAS, NV, USA

TYPICAL SECTIONS

REVISIONS

REV	DESIGN #	DESCRIPTION	DATE	DB	CB

OPPORTUNITY	XXXX
PROJECT	XXX
DATE DRAWN	10/01/18
DRAWN BY	FME

0 ½" 1"
IF BAR IS NOT ONE INCH, DRAWING IS NOT TO SCALE

SHEET
C250

Louis Berger
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Phone: 702.736.6632 Fax: 702.407.1305

ATTACHMENT C
Preliminary Drainage Plan

GEMINI SOLAR PROJECT

MOAPA PAIUTE TRAVEL PLAZA

CRYSTAL SUBSTATION

DEVELOPMENT AREA C

DEVELOPMENT AREA A

DEVELOPMENT AREA B

DEVELOPMENT AREA D

DEVELOPMENT AREA E

417 CFS

3922 CFS

1951 CFS

15

Valley of Fire Rd

SUBBASIN A

SUBBASIN B

SUBBASIN C1

SUBBASIN C2

SUBBASIN D

SUBBASIN E

SUBBASIN F

SUBBASIN G

SUBBASIN H

SUBBASIN I

SUBBASIN J

SUBBASIN K

791 CFS

286 CFS

2117 CFS

3513 CFS

2571 CFS

1978 CFS

3360 CFS

354 CFS

2559 CFS

255 CFS

1688 CFS

2956 CFS

LEGEND

- INFLOW NODES
- STREETS
- CROSS SECTION
- FEMA FLOOD ZONE A
- DEVELOPMENT AREAS

HYDRAULIC STRUCTURE

- BERM
- CHANNEL

DEPTH (FT)

- 0.00 - 0.25
- 0.26 - 0.50
- 0.51 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 3.00
- 3.01 - 4.00
- 4.01 - 5.00
- 5.01 - 8.62

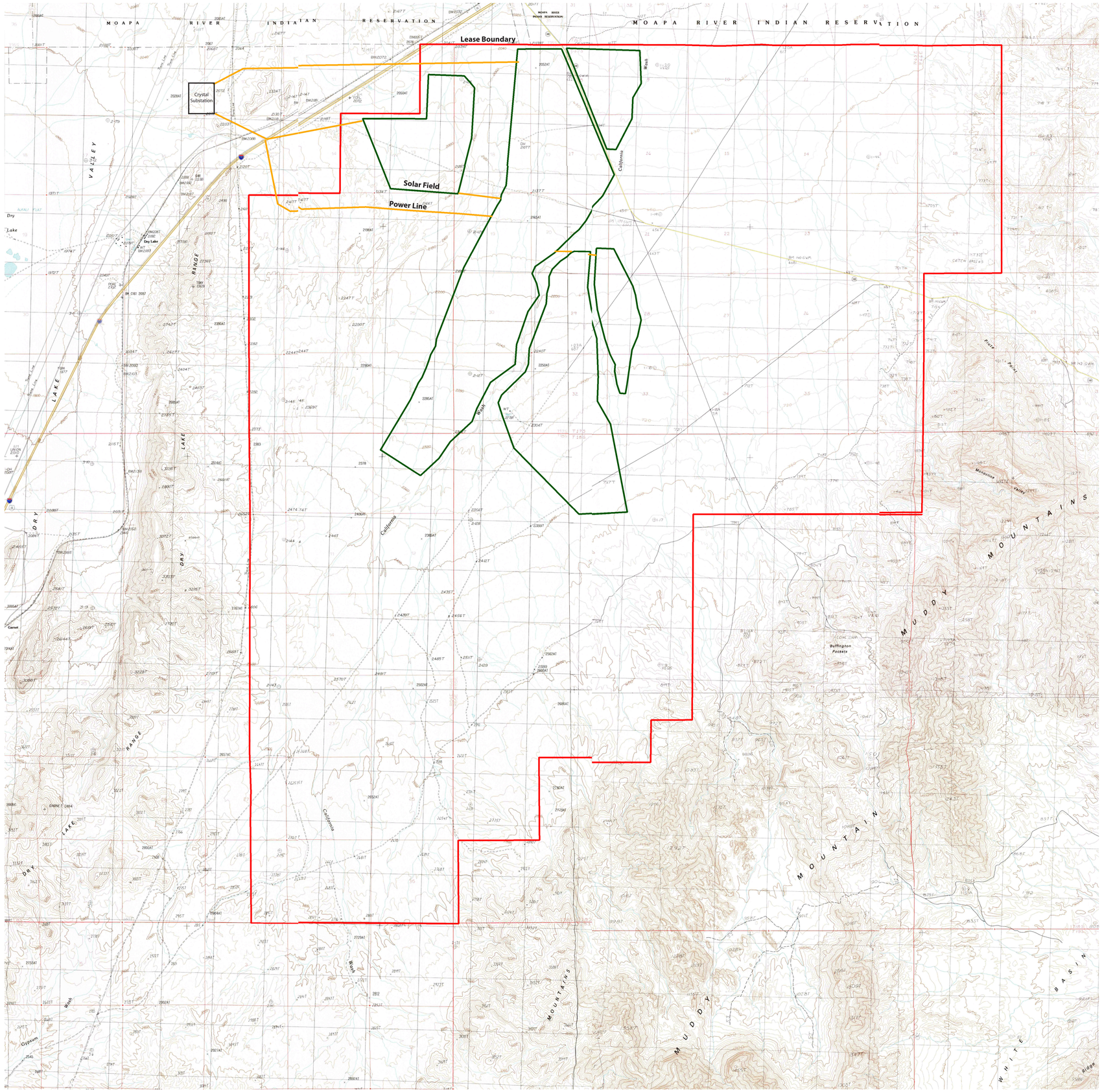
N

0 2,500 5,000 FT

Louis Berger

100-YR MAXIMUM FLOW DEPTH
PROPOSED ACTION

ATTACHMENT D
USGS Topographic Map



Gemini Solar
USGS Topographic Map

Dry Lake, Dry Lake SE, Muddy Peak, and Piute Point Quadrangles

October 25, 2017

ATTACHMENT E
Alternatives Report

ATTACHMENT F
BLM-Approved Herbicide Formulations

TABLE G-1 HERBICIDES FORMULATIONS APPROVED FOR USE ON LANDS – *THE BLM ADMINISTERS IN THE 17 WESTERN STATES*

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Aminopyralid	Milestone	Dow AgroSciences	62719-519
Aminopyralid + 2,4-D	ForeFront HL	Dow AgroSciences	62719-630
	GrazonNext HL	Dow AgroSciences	62719-628
Aminopyralid + Clopyralid	Sendero	Dow AgroSciences	62719-645
Aminopyralid + Metsulfuron Methyl	Chaparral	Dow AgroSciences	62719-597
	Opensight	Dow AgroSciences	62719-597
Aminopyralid + Triclopyr	Capstone	Dow AgroSciences	62719-572
Bromacil	Bromacil 80DF	Alligare, LLC	81927-4
	Bromacil 80WG	Alligare, LLC	81927-4
	Ceannard Bromacil 80DF	Ceannard, Inc.	58035-19
	Hyvar X	Bayer Environmental Science	432-1546
	Hyvar X	DuPont Crop Protection	352-287
	Hyvar X-L	Bayer Environmental Science	432-1548
	Hyvar X-L	DuPont Crop Protection	352-346
Bromacil + Diuron	Bromacil/Diuron 40/40	Alligare, LLC	81927-3
	Ceannard Diuron/Bromacil 80DF	Ceannard, Inc.	58035-18
	DiBro 2+2	Nufarm Americas Inc.	228-227
	DiBro 4+2	Nufarm Americas Inc.	228-386
	DiBro 4+4	Nufarm Americas Inc.	228-235
	Krovar I DF	Bayer Environmental Science	432-1551
	Krovar I DF	DuPont Crop Protection	352-505
	Weed Blast 4G	SSI Maxim Co., Inc.	34913-19
	Weed Blast Res. Weed Cont.	Loveland Products, Inc.	34704-576
Chlorsulfuron	Alligare Chlorsulfuron	Alligare, LLC	81927-43
	Chlorsulfuron 75	Alligare, LLC	81927-43
	Chlorsulfuron E-Pro 75 WDG	Nufarm Americas Inc.	79676-72
	Nufarm Chlorsulf SPC 75 WDG Herbicide	Nufarm Americas Inc.	228-672
	Telar DF	DuPont Crop Protection	352-522
	Telar XP	Bayer Environmental Science	432-1561
	Telar XP	DuPont Crop Protection	352-654
Clopyralid	CleanSlate	Nufarm Americas Inc.	228-491
	Clopyralid 3	Alligare, LLC	42750-94-81927
	Clopyralid 3	Alligare, LLC	81927-14
	Pyramid R&P	Albaugh, Inc.	42750-94

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Clopyralid – cont.	Reclaim	Dow AgroSciences	62719-83
	Spur	Albaugh, Inc.	42750-89
	Stinger	Dow AgroSciences	62719-73
	Transline	Dow AgroSciences	62719-259
Clopyralid + 2,4-D	Cody Herbicide	Alligare, LLC	81927-28
	Commando	Albaugh, Inc.	42750-92
	Curtail	Dow AgroSciences	62719-48
	Cutback	Nufarm Americas Inc.	71368-72
2,4-D	2,4-D 4# Amine Weed Killer	UAP-Platte Chem. Co.	34704-120
	2,4-D Amine	Helena Chemical Company	5905-72
	2,4-D Amine	Setre (Helena)	5905-72
	2,4-D Amine 4	Albaugh, Inc./Agri Star	42750-19
	2,4-D Amine 4	Helena Chemical Company	42750-19-5905
	2,4-D LV 4	Albaugh, Inc./Agri Star	42750-15
	2,4-D LV4	Setre (Helena)	5905-90
	2,4-D LV 6	Albaugh, Inc./Agri Star	42750-20
	2,4-D LV6	Helena Chemical Company	4275-20-5905
	2,4-D LV6	Setre (Helena)	5905-93
	2,4-D LV 6 Ester	Nufarm Americas Inc.	228-95
	Agrisolution 2,4-D Amine 4	Agriliance, LLC	1381-103
	Agrisolution 2,4-D Amine 4	Winflied Solutions, LLC	1381-103
	Agrisolution 2,4-D LV4	Agriliance, LLC	1381-102
	Agrisolution 2,4-D LV4	Winflied Solutions, LLC	1381-102
	Agrisolution 2,4-D LV6	Agriliance, LLC	1381-101
	Agrisolution 2,4-D LV6	Winflied Solutions, LLC	1381-101
	Alligare 2,4-D Amine	Alligare, LLC	81927-38
	Alligare 2,4-D LV 6	Alligare, LLC	81927-39
	Amine 4	Wilbur-Ellis Co.	2935-512
	Aqua-Kleen	Nufarm Americas Inc.	228-378
	Aqua-Kleen	Nufarm Americas Inc.	71368-4
	Barrage HF	Helena Chemical Company	5905-529
	Barrage LV Ester	Setre (Helena)	5905-504
	Base Camp Amine 4	Wilbur-Ellis Co.	71368-1-2935
	Base Camp LV6	Wilbur-Ellis Co.	2935-553
	Broadrange 55	Wilbur-Ellis Co.	2217-813-2935
	Clean Amine	Loveland Products, Inc.	34704-120
	Clean Crop Amine 4	UAP-Platte Chem. Co.	34704-5 CA
	Clean Crop Low Vol 6 Ester	UAP-Platte Chem. Co.	34704-125
	Clean Crop LV-4 ES	UAP-Platte Chem. Co.	34704-124

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
2,4-D – cont.	Cornbelt 4 lb. Amine	Van Diest Supply Co.	11773-2
	Cornbelt 4# LoVol Ester	Van Diest Supply Co.	11773-3
	Cornbelt 6# LoVol Ester	Van Diest Supply Co.	11773-4
	D-638	Albaugh, Inc./Agri Star	42750-36
	De-Amine 4	Drexel Chemical Company	19713-650
	De-Amine 6	Drexel Chemical Company	19713-651
	De-Ester LV4	Drexel Chemical Company	19713-345
	De-Ester LV6	Drexel Chemical Company	19713-655
	Esteron 99C	Nufarm Americas Inc.	62719-9-71368
	Five Star	Albaugh, Inc./Agri Star	42750-49
	Formula 40	Nufarm Americas Inc.	228-357
	HardBall	Helena Chemical Company	5905-549
	Hi-Dep	PBI/Gordon Corporation	2217-703
	Lo Vol-4	Wilbur-Ellis Co.	228-139-2935
	Low Vol 4 Ester Weed Killer	Loveland Products, Inc.	34704-124
	Lo Vol-6 Ester	Wilbur-Ellis Co.	228-95-2935
	Low Vol 6 Ester Weed Killer	Loveland Products, Inc.	34704-125
	Opti-Amine	Helena Chemical Company	5905-501
	Phenoxy 088	Winfield Solutions, LLC	42750-36-9779
	Platoon	Nufarm Americas Inc.	228-145
	Rugged	Winfield Solutions, LLC	1381-247
	Saber	Loveland Products, Inc.	34704-803
	Salvo	Loveland Products, Inc.	34704-609
	Salvo LV Ester	UAP-Platte Chem. Co.	34704-609
	Savage DS	Loveland Products, Inc.	34704-606
	Savage DS	UAP-Platte Chem. Co.	34704-606
	Shredder 2,4-D LV4	Winfield Solutions, LLC	1381-102
	Shredder Amine 4	Winfield Solutions, LLC	1381-103
	Shredder E-99	Winfield Solutions, LLC	1381-195
	Solution Water Soluble	Nufarm Americas Inc.	228-260
	Solve 2,4-D	Albaugh, Inc./Agri Star	42750-22
	Unison	Helena Chemical Company	5905-542
	Weedar 64	Nufarm Americas Inc.	71368-1
	WEEDestroy AM-40	Nufarm Americas Inc.	228-145
	Weedone LV-4	Nufarm Americas Inc.	228-139-71368
	Weedone LV-4 Solventless	Nufarm Americas Inc.	71368-14
	Weedone LV-6	Nufarm Americas Inc.	71368-11
	Whiteout 2,4-D	Loveland Products, Inc.	34704-1032
Dicamba	Banvel	Arysta LifeScience N.A. Corp.	66330-276

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Dicamba – cont.	Banvel	Micro Flo Company	51036-289
	Clarity	BASF Corporation	7969-137
	Cruise Control	Alligare, LLC	42750-40-81927
	Diablo	Nufarm Americas Inc.	228-379
	Dicamba DMA	Albaugh, Inc./Agri Star	42750-40
	Kam-Ba	Drexel Chemical Company	19713-624
	Rifle	Loveland Products, Inc.	34704-861
	Sterling Blue	Winfield Solutions, LLC	7969-137-1381
	Vanquish	Syngenta Professional Products	100-884
	Vanquish Herbicide	Nufarm Americas Inc.	228-397
	Vision	Albaugh, Inc.	42750-98
	Vision	Helena Chemical Company	5905-576
Dicamba + 2,4-D	Brash	Winfield Solutions, LLC	1381-202
	Brush-Rhap	Helena Chemical Company	5905-568
	Dicamba + 2,4-D DMA	Alligare, LLC	81927-42
	KambaMaster	Nufarm Americas Inc.	71368-34
	Latigo	Helena Chemical Company	5905-564
	Outlaw	Helena Chemical Company	5905-574
	Range Star	Albaugh, Inc./Agri Star	42750-55
	Rifle-D	Loveland Products, Inc.	34704-869
	Weedmaster	BASF Ag. Products	7969-133
	Weedmaster	Nufarm Americas Inc.	71368-34
	Veteran 720	Nufarm Americas Inc.	228-295
Dicamba + Diflufenzopyr*	Distinct	BASF Corporation	7969-150
	Overdrive	BASF Corporation	7969-150
Diquat	Alligare Diquat	Alligare, LLC	81927-35
	Diquat E-Ag 2L	Nufarm Americas Inc.	79676-75
	Diquat E-Pro 2L	Nufarm Americas Inc.	79676-75
	Diquat SPC 2 L Herbicide	Nufarm Americas Inc.	79676-75
	NuFarm Diquat SPC 2 L Herbicide	Nufarm Americas Inc.	228-675
	Reward	Syngena Professional Products	100-1091
Diuron	Ceannard Diuron 80DF	Ceannard, Inc.	58035-16
	Direx 4L	DuPont Crop Protection	352-678
	Direx 4L	Griffin Company	1812-257
	Direx 4L	Makhteshim Agan of N. A.	66222-54
	Direx 80DF	Griffin Company	1812-362
	Diuron 4L	Alligare, LLC	81927-44
	Diuron 4L	Drexel Chemical Company	19713-36

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Diuron – cont.	Diuron 4L	Loveland Products, Inc.	34704-854
	Diuron 4L	Makteshim Agan of N.A.	66222-54
	Diuron 80	Drexel Chemical Company	19713-274
	Diuron 80DF	Agriliance, LLC	9779-318
	Diuron 80DF	Alligare, LLC	81927-12
	Diuron 80DF	Winfield Solutions, LLC	9779-318
	Diuron 80 WDG	Loveland Products, Inc.	34704-648
	Diuron 80WDG	UAP-Platte Chem. Co.	34704-648
	Diuron-DF	Wilbur-Ellis Co.	00352-00-508-02935
	Karmex DF	DuPont Crop Protection	352-692
	Karmex DF	Makhteshim Agan of N. A.	66222-51
	Karmex IWC	DuPont Crop Protection	352-692
	Karmex XP	DuPont Crop Protection	352-692
	Parrot DF	Makhteshim Agan of N. A.	66222-51
	Parrot 4L	Makhteshim Agan of N. A.	66222-54
	Vegetation Man. Diuron 80 DF	Vegetation Man., LLC	66222-51-74477
Fluridone	Alligare Fluridone	Alligare, LLC	81927-45
	Avast!	SePRO Corporation	67690-30
	Fluridone 4L	Albaugh, LLC	42750-280
	Sonar AS	SePRO Corporation	67690-4
	Sonar Precision Release	SePRO Corporation	67690-12
	Sonar Q	SePRO Corporation	67690-3
	Sonar SRP	SePRO Corporation	67690-3
Fluroxypyr	Alligare Fluroxypyr	Alligare, LLC	66330-385-81927
	Comet Selective	Nufarm Americas Inc.	71368-87
	Vista XRT	Dow AgroSciences	62719-586
Fluroxypyr + Clopyralid	Truslate Selective Herbicide	Nufarm Americas Inc.	71368-86
Fluroxypyr + Picloram	Surmount	Dow AgroSciences	62719-480
	Trooper Pro	Nufarm Americas Inc.	228-599
Fluroxypyr + Triclopyr	PastureGard	Dow AgroSciences	62719-637
Fluroxypyr + 2,4-D + Dicamba	E-2 Herbicide	Nufarm Americas Inc.	228-442
Glyphosate	Accord Concentrate	Dow AgroSciences	62719-324
	Accord SP	Dow AgroSciences	62719-322
	Accord XRT	Dow AgroSciences	62719-517
	Accord XRT II	Dow AgroSciences	62719-556
	Agrisolutions Cornerstone	Winfield Solutions, LLC	1381-191
	Agrisolutions Cornerstone 5 Plus	Winfield Solutions, LLC	1381-241

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Glyphosate – cont.	Agrisolutions Cornerstone Plus	Winfield Solutions, LLC	1381-192
	Agrisolutions Rascal	Winfield Solutions, LLC	1381-191
	Agrisolutions Rascal Plus	Winfield Solutions, LLC	1381-192
	Aqua Neat	Nufarm Americas Inc.	228-365
	Aqua Star	Albaugh, Inc./Agri Star	42750-59
	Aquamaster	Monsanto	524-343
	AquaPro Aquatic Herbicide	SePRO Corporation	62719-324-67690
	Buccaneer	Tenkoz	55467-10
	Buccaneer Plus	Tenkoz	55467-9
	ClearOut 41 Plus	Chem. Prod. Tech., LLC	70829-3
	Credit Xtreme	Nufarm Americas Inc.	71368-81
	Foresters	Nufarm Americas Inc.	228-381
	Forest Star	Albaugh, Inc./Agri Star	42570-61
	Four Power Plus	Loveland Products, Inc.	34704-890
	Gly Star Gold	Albaugh, Inc./Agri Star	42750-61
	Gly Star Original	Albaugh, Inc./Agri Star	42750-60
	Gly Star Plus	Albaugh, Inc./Agri Star	42750-61
	Gly Star Pro	Albaugh, Inc./Agri Star	42750-61
	Gly-4	Universal Crop Protection Alliance, LLC	42750-60-72693
	Gly-4 Plus	Universal Crop Protection Alliance, LLC	72693-1
	Gly-4 Plus	Universal Crop Protection Alliance, LLC	42750-61-72693
	Glyfos	Cheminova	4787-31
	Glyfos Aquatic	Cheminova	4787-34
	Glyfos PRO	Cheminova	67760-57
	GlyphoMate 41	PBI/Gordon Corporation	2217-847
	Glyphosate 4	Vegetation Man., LLC	73220-6-74477
	Glyphosate 4 +	Alligare, LLC	81927-9
	Glyphosate 4 PLUS	Alligare, LLC	81927-9
	Glyphosate 5.4	Alligare, LLC	81927-8
	Glypro	Dow AgroSciences	62719-324
	Glypro Plus	Dow AgroSciences	62719-322
	Honcho	Monsanto	524-445
	Honcho Plus	Monsanto	524-454
	Imitator 25% Concentration	Drexel Chemical Company	19713-628
	Imitator Aquatic	Drexel Chemical Company	19713-623
	Imitator DA	Drexel Chemical Company	19713-586
	Imitator Plus	Drexel Chemical Company	19713-526

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Glyphosate – cont.	Imitator RTU	Drexel Chemical Company	19713-607
	KleenUp Pro	Loveland Products, Inc.	34704-890
	Mad Dog Plus	Loveland Products, Inc.	34704-890
	Makaze	Loveland Products, Inc.	34704-890
	Mirage	Loveland Products, Inc.	34704-889
	Mirage Herbicide	UAP-Platte Chem. Co.	524-445-34704
	Mirage Plus	Loveland Products, Inc.	34704-890
	Mirage Plus Herbicide	UAP-Platte Chem. Co.	524-454-34704
	Rattler	Setre (Helena)	524-445-5905
	Razor	Nufarm Americas Inc.	228-366
	Razor Pro	Nufarm Americas Inc.	228-366
	Rodeo	Dow AgroSciences	62719-324
	Roundup Custom	Monsanto	524-343
	Roundup Original	Monsanto	524-445
	Roundup Original II	Monsanto	524-454
	Roundup Original II CA	Monsanto	524-475
	Roundup PRO	Monsanto	524-475
	Roundup PRO Concentrate	Monsanto	524-529
	Roundup PRO Dry	Monsanto	524-505
	Roundup PROMAX	Monsanto	524-579
	Showdown	Helena Chemical Company	71368-25-5905
Glyphosate + 2,4-D	Campaign	Monsanto	524-351
	Imitator Plus D	Drexel Chemical Company	19713-635
	Landmaster BW	Albaugh, Inc./Agri Star	42570-62
	Landmaster BW	Monsanto	524-351
Hexazinone	Pronone 10G	Pro-Serve	33560-21
	Pronone 25G	Pro-Serve	33560-45
	Pronone MG	Pro-Serve	33560-21
	Pronone Power Pellet	Pro-Serve	33560-41
	Velossa	Helena Chemical Company	5905-579
	Velpar DF	DuPont Crop Protection	352-581
	Velpar DF VU	Bayer Environmental Science	432-1576
	Velpar L	DuPont Crop Protection	352-392
	Velpar L VU	Bayer Environmental Science	432-1573
	Velpar ULW	DuPont Crop Protection	352-450
Hexazinone Sulfometuron methyl*	Oustar	Bayer Environmental Science	432-1553
	Oustar	DuPont Crop Protection	352-603
	Westar	Bayer Environmental Science	432-1558
	Westar	DuPont Crop Protection	352-626

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Imazapic	Nufarm Imazapic 2SL	Nufarm Americas Inc.	71368-99
	Panoramic 2SL	Alligare, LLC	66222-141-81927
	Plateau	BASF	241-365
Imazapic + Glyphosate	Journey	BASF	241-417
Imazapyr	Arsenal	BASF	241-346
	Arsenal Applicators Conc.	BASF	241-299
	Arsenal PowerLine	BASF	241-431
	Arsenal Railroad Herbicide	BASF	241-273
	Chopper	BASF	241-296
	Ecomazapyr 2SL	Alligare, LLC	81927-22
	Ecomazapyr 2 SL	Vegetation Man., LLC	74477-6
	Habitat	BASF	241-426
	Habitat Herbicide	SePRO Corporation	241-426-67690
	Imazapyr 2 SL	Vegetation Man., LLC	74477-4
	Imazapyr 2SL	Alligare, LLC	81927-23
	Imazapyr 4 SL	Vegetation Man., LLC	74477-5
	Imazapyr 4SL	Alligare, LLC	81927-24
	Polaris	Nufarm Americas Inc.	228-534
	Polaris AC	Nufarm Americas Inc.	241-299-228
	Polaris AC	Nufarm Americas Inc.	228-480
	Polaris AC Complete	Nufarm Americas Inc.	228-570
	Polaris AQ	Nufarm Americas Inc.	241-426-228
	Polaris Herbicide	Nufarm Americas Inc.	241-346-228
	Polaris RR	Nufarm Americas Inc.	241-273-228
	Polaris SP	Nufarm Americas Inc.	228-536
	Polaris SP	Nufarm Americas Inc.	241-296-228
	Rotary 2 SL	Alligare, LLC	81927-6
	SSI Maxim Arsenal 0.5G	SSI Maxim Co., Inc.	34913-23
	SSI Maxim Arsenal 5.0G	SSI Maxim Co., Inc.	34913-24
	Stalker	BASF	241-398
Imazapyr + Diuron	Imazuron E-Pro	Etigra, LLC	79676-54
	Mojave 70 EG	Alligare, LLC	74477-9-81927
	Mojave 70 EG	Alligare, LLC	81927-25
	Sahara DG	BASF	241-372
	SSI Maxim Topsite 2.5G	SSI Maxim Co., Inc.	34913-22
Imazapyr + Metsulfuron methyl	Lineage Clearstand	Bayer Environmental Science	432-1578
	Lineage Clearstand	DuPont Crop Protection	352-766

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Imazapyr + Sulfometuron methyl + Metsulfuron methyl*	Lineage HWC	Bayer Environmental Science	432-1577
	Lineage HWC	DuPont Crop Protection	352-765
	Lineage Prep	Bayer Environmental Science	432-1579
	Lineage Prep	DuPont Crop Protection	352-767
Metsulfuron methyl	AmTide MSM 60DF Herbicide	AmTide, LLC	83851-3
	Escort DF	DuPont Crop Protection	352-439
	Escort XP	Bayer Environmental Science	432-1549
	Escort XP	DuPont Crop Protection	352-439
	Metsulfuron Methyl DF	Vegetation Man., LLC	74477-2
	MSM 60	Alligare, LLC	81927-7
	MSM E-AG 60 EG Herbicide	Etigra, LLC	81959-14
	MSM E-Pro 60 EG Herbicide	Etigra, LLC	81959-14
	Patriot	Nufarm Americas Inc.	228-391
	PureStand	Nufarm Americas Inc.	71368-38
Metsulfuron methyl + Chlorsulfuron	Cimarron Plus	Bayer Environmental Science	432-1572
Metsulfuron methyl + Chlorsulfuron – cont.	Cimarron Plus	DuPont Crop Protection	352-670
	Cimarron X-tra	DuPont Crop Protection	352-669
Metsulfuron methyl + Dicamba + 2,4-D	Cimarron MAX	Bayer Environmental Science	432-1555
	Cimarron MAX	DuPont Crop Protection	352-615
Picloram	Grazon PC	Dow AgroSciences	62719-181
	OutPost 22K	Dow AgroSciences	62719-6
	Picloram 22K	Alligare, LLC	81927-18
	Picloram K	Alligare, LLC	81927-17
	Tordon 22K	Dow AgroSciences	62719-6
	Tordon K	Dow AgroSciences	62719-17
	Triumph 22K	Albaugh, Inc.	42750-79
	Triumph K	Albaugh, Inc.	42750-81
	Trooper 22K	Nufarm Americas Inc.	228-535
Picloram + 2,4-D	Graslan L	Dow AgroSciences	62719-655
	Grazon P+D	Dow AgroSciences	62719-182
	GunSlinger	Albaugh, Inc.	42750-80
	HiredHand P+D	Dow AgroSciences	62719-182
	Pathway	Dow AgroSciences	62719-31
	Picloram + D	Alligare, LLC	81927-16
	Tordon 101 R Forestry	Dow AgroSciences	62719-31

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Picloram + 2,4-D – cont.	Tordon 101 Mixture	Dow AgroSciences	62719-5
	Tordon RTU	Dow AgroSciences	62719-31
	Trooper 101	Nufarm Americas Inc.	228-561
	Trooper P + D	Nufarm Americas Inc.	228-530
Picloram + 2,4-D + Dicamba	Trooper Extra	Nufarm Americas Inc.	228-586
Rimsulfuron	Laramie 25DF	Alligare, LLC	81927-57
	Matrix SG	Dupont Crop Protection	352-768
Sulfometuron methyl*	Oust DF	DuPont Crop Protection	352-401
	Oust XP	Bayer Environmenatl Science	432-1552
	Oust XP	DuPont Crop Protection	352-601
	SFM 75	Alligare, LLC	81927-26
	SFM 75	Vegetation Man., LLC	72167-11-74477
	SFM E-Pro 75EG	Etigra, LLC	79676-16
	Spyder	Nufarm Americas Inc.	228-408
Sulfometuron methyl + Chlorsulfuron*	Landmark XP	Bayer Environmental Science	432-1560
	Landmark XP	DuPont Crop Protection	352-645
Sulfometuron methyl + Metsulfuron methyl*	Oust Extra	Bayer Environmental Science	432-1557
	Oust Extra	DuPont Crop Protection	352-622
	SFM Extra	Alligare, LLC	81927-5
	Spyder Extra Selective	Nefarm Americas Inc.	228-690
Tebuthiuron	Alligare Tebuthiuron 80 WG	Alligare, LLC	81927-37
	Alligare Tebuthiuron 20 P	Alligare, LLC	81927-41
	Spike 20P	Dow AgroSciences	62719-121
	Spike 80DF	Dow AgroSciences	62719-107
	SpraKil S-5 Granules	SSI Maxim Co., Inc.	34913-10
Tebuthiuron + Diuron	SpraKil SK-13 Granular	SSI Maxim Co., Inc.	34913-15
	SpraKil SK-26 Granular	SSI Maxim Co., Inc.	34913-16
Triclopyr	Boulder 6.3	Alligare, LLC	81927-54
	Ecotriclopyr 3 SL	Vegetation Man., LLC	72167-49-74477
	Element 3A	Dow AgroSciences	62719-37
	Element 4	Dow AgroSciences	62719-40
	Forestry Garlon XRT	Dow AgroSciences	62719-553
	Garlon 3A	Dow AgroSciences	62719-37
	Garlon 4	Dow AgroSciences	62719-40
	Garlon 4 Ultra	Dow AgroSciences	62719-527
	Pathfinder II	Dow AgroSciences	62719-176
	Relegate	Nufarm Americas Inc.	228-521

Active Ingredient	Trade Name	Manufacturer	EPA Reg. Number
Triclopyr – cont.	Relegate RTU	Nufarm Americas Inc.	228-522
	Remedy	Dow AgroSciences	62719-70
	Remedy Ultra	Dow AgroSciences	62719-552
	Renovate 3	SePRO Corporation	62719-37-67690
	Renovate OTF	SePRO Corporation	67690-42
	Tahoe 3A	Nufarm Americas Inc.	228-384
	Tahoe 3A	Nufarm Americas Inc.	228-518
	Tahoe 3A	Nufarm Americas Inc.	228-520
	Tahoe 4E	Nufarm Americas Inc.	228-385
	Tahoe 4E Herbicide	Nufarm Americas Inc.	228-517
	Triclopry 4	Alligare, LLC	81927-11
	Triclopyr 3	Alligare, LLC	81927-13
	Triclopyr 3 SL	Vegetation Man., LLC	72167-53-74477
	Triclopyr RTU	Albaugh, LLC	42750-173
	Triclopyr RTU	Alligare, LLC	81927-33
	Trycera	Helena Chemical Company	5905-580
	Vastlan	Dow AgroSciences	62719-687
Triclopyr + 2,4-D	Aquasweep	Nufarm Americas Inc.	228-316
	Candor	Nufarm Americas Inc.	228-565
	Crossbow	Dow AgroSciences	62719-260
	Everett	Alligare, LLC	81927-29
Triclopyr + Clopyralid	Brazen	Nufarm Americas Inc.	228-564
	Prescott Herbicide	Alligare, LLC	81927-30
	Redeem R&P	Dow AgroSciences	62719-337

NOTE: * In accordance with the Record of Decision for the *Vegetation Treatments Using Herbicides on Bureau of Land Management*, lands in 17 Western *States Programmatic Environmental Impact Statement* (PEIS), *the aerial application of this herbicide* is prohibited.

TABLE B-2 SUMMARY OF ADJUVANTS APPROVED FOR USE ON BLM ADMINISTRATED LANDS

Adjuvant Type	Trade Name	Manufacturer	Comments
Surfactant			
Non-ionic Surfactant	90-10 Surfactant	Brewer International	
	A-90	Alligare, LLC	
	Activate Plus	Winfield Solutions, LLC	CA Reg. No. 9779-50004-AA
			WA Reg. No. 1381-09001
	Activator 90	Loveland Products, Inc.	CA Reg. No. 34704-50034-AA
	Ad Spray 90	Helena Chemical Company	WA Reg. No. 5905-70020
	Alligare Surface	Alligare, LLC	

Adjuvant Type	Trade Name	Manufacturer	Comments
	Alligare Surface West	Alligare, LLC	CA Reg. No. 81927-50007-AA
			WA Reg. No. 81927-15004
	Alligare Trace	Alligare, LLC	
	Aquafact	Crop Production Services	
	Aqufact	Aqumix, Inc.	
	Audible 80	Exacto, Inc.	
	Audible 90	Exacto, Inc.	
	Brewer 90-10	Brewer International	
	Chempro S-820	Chemorse Ltd.	WA Reg. No. 46059-15001
	Chempro S-910	Chemorse Ltd.	WA Reg. No. 46059-14001
	Chemsurf 80	Chemorse Ltd.	CA Reg. No. 1050984-50004-AA
			WA Reg. No. 46059-10002
	Chemsurf 90	Chemorse Ltd.	CA Reg. No. 1050984-50005-AA
			WA Reg. No. 46059-10003
	Cornbelt Premier 90	Van Diest Supply Co.	
	Cornbelt Trophy Gold	Van Diest Supply Co.	
	Denali-EA	Wilbur-Ellis Co.	CA Reg. No. 2935-50204
			WA Reg. No. 2935-15006
	Elite Platinum	Red River Specialties, Inc.	
	EP-90	Eco-Pak, LLC	
	Haf-Pynt	Drexel Chemical Company	CA Reg. No. 19713-50007-AA
			WA Reg. No. 19713-14001
	Hum-AC 820	Drexel Chemical Company	WA Reg. No. 19713-09001
	Induce	Setre (Helena)	CA Reg. No. 5905-50066-AA
		Helena Chemical Company	CA Reg. No. 5905-50091-AA
	Induce pH	Helena Chemical Company	
	Inlet	Helena Chemical Company	CA Reg. No. 5905-50099-AA
	LI-700	Loveland Products, Inc.	CA Reg. No. 34704-50035
	Magnify	Monterey AgResources	CA Reg. No. 17545-50018
Non-ionic Surfactant – cont.	NIS 90:10	Precision Laboratories, LLC	CA Reg. No. 9349-50002-AA
			WA Reg. No. 9349-13001
	NIS-EA	Wilbur-Ellis Co.	
	No Foam A	Creative Marketing & Research, Inc.	CA Reg. No. 1050775-50015
	Optima	Helena Chemical Company	CA Reg. No. 5905-50075-AA
	PAS-800	Drexel Chemical Company	
	Preference	Winfield Solutions, LLC	WA Reg. No. 1381-50011
	R-900	Wilbur-Ellis Co.	

Adjuvant Type	Trade Name	Manufacturer	Comments
	Rainer-EA	Wilbur-Ellis Co.	
	Range Master	ORO Agri Inc.	
	Red River 90	Red River Specialties, Inc.	
	Red River NIS	Red River Specialties, Inc.	
	Scanner	Loveland Products, Inc.	CA Reg. No. 34704-50064
			WA Reg. No. 34704-09003
	Spec 90/10	Helena Chemical Company	
	Spray Activator 85	Van Diest Supply Co.	
	Spreader 90	Loveland Products, Inc.	WA Reg. No. 34704-05002-AA
	Spret	Helena Chemical Company	CA Reg. No. 5905-50098-AA
	Super Spread 90	Wilbur-Ellis Co.	WA Reg. No. AW-2935-70016
	Super Spread 7000	Wilbur-Ellis Co.	CA Reg. No. 2935-50170
			WA Reg. No. AW-2935-0002
	Surf-Ac 910	Drexel Chemical Company	WA Reg. No. 19713-70003
	Surf-Ac 820	Drexel Chemical Company	WA Reg. No. 19713-70002
	UAP Surfactant 80/20	Loveland Products, Inc.	
	Wetcit	ORO Agri Inc.	
	X-77	Loveland Products, Inc.	CA Reg. No. 34704-50044
Spreader/Sticker	Agri-Trend Spreader	Agri-Trend	
	Attach	Loveland Products, Inc.	CA Reg. No. 34704-50026
	Aqua-King Plus	Winfield Solutions, LLC	
	Bond	Loveland Products, Inc.	CA Reg. No. 36208-50005
	Bond Max	Loveland Products, Inc.	CA Reg. No. 34704-50060
			WA Reg. No. 34704-08003
	Chempro S-196	Chemorse Ltd.	CA Reg. No. 1050984-50006-AA
			WA Reg. No. 46059-11001
	Cohere	Helena Chemical Company	CA Reg. No. 5905-50083-A
	CWC 90	CWC Chemical, Inc.	
	Gulfstream	Winfield Solutions, LLC	
	Insist 90	Wilbur-Ellis Co.	
	Lastick	Setre (Helena)	
Spreader/Sticker – cont.	Nu-Film-IR	Miller Chem. & Fert. Corp.	
	Nu Film 17	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50021-AA
	Nu Film P	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50022-AA
	Onside Kick	Exacto, Inc.	
	Pinene II	Drexel Chemical Company	CA Reg. No. 19713-50003-AA
			WA Reg. No. 19713-00001
	Protyx	Precision Laboratories, LLC	WA Reg. No. 9349-13002

Adjuvant Type	Trade Name	Manufacturer	Comments
	R-56	Wilbur-Ellis Co.	CA Reg. No. 2935-50144
	Rocket DL	Monterey AgResources	CA Reg. No. 17545-50019
	Tactic	Loveland Products, Inc.	CA Reg. No. 34704-50041-AA
	TopFilm	Biosorb, Inc.	
	Widespread Max	Loveland Products, Inc.	CA Reg. No. 34704-50061
			WA Reg. No. 34704-09001
Silicone-based	Aero Dyne-Amic	Helena Chemical Company	CA Reg. No. 5905-50080-AA
	Aircover	Winfield Solutions, LLC	
	Alligare OSS/NIS	Alligare, LLC	
	Chempro S-172	Chemorse Ltd.	CA Reg. No. 1050984-50008-AA
			WA Reg. No. 46059-15002
	Dyne-Amic	Helena Chemical Company	CA Reg. No. 5095-50071-AA
	Elite Marvel	Red River Specialties, Inc.	
	Freeway	Loveland Products, Inc.	CA Reg. No. 34704-50031
			WA Reg. No. 34704-04005
	Kinetic	Setre (Helena)	CA Reg. No. 5905-50087-AA
	Phase	Loveland Products, Inc.	CA Reg. No. 34704-50037-AA
	Phase II	Loveland Products, Inc.	
	Scrimmage	Exacto, Inc.	
	SilEnergy	Brewer International	
	Sil-Fact	Drexel Chemical Company	CA Reg. No. 19713-50004-AA
	Sil-MES 100	Drexel Chemical Company	
	Silnet 200	Brewer International	
	Silwet L-77	Loveland Products, Inc.	CA Reg. No. 34704-50043
	Speed	Precision Laboratories, LLC	
	Sun Spreader	Red River Specialties, Inc.	
	Syl-coat	Wilbur-Ellis Co.	CA Reg. No. 2935-50189
			WA Reg. No. 2935-12002
	Sylgard 309	Wilbur-Ellis Co.	CA Reg. No. 2935-50161
	Syl-Tac	Wilbur-Ellis Co.	CA Reg. No. 2935-50167
Oil-based			
Crop Oil Concentrate	60/40 Crop Oil Concentrate	Chemorse Ltd.	WA Reg. No. 46059-15004
	Agri-Dex	Helena Chemical Company	CA Reg. No. 5905-50094-AA
Crop Oil Concentrate – cont.	Alligare Forestry Oil	Alligare, LLC	
	Brewer 83-17	Brewer International	
	Cornbelt Crop Oil Concentrate	Van Diest Supply Co.	
	Cornbelt Premium Crop Oil Concentrate	Van Diest Supply Co.	

Adjuvant Type	Trade Name	Manufacturer	Comments
	Crop Oil Concentrate	Helena Chemical Company	CA Reg. No. 5905-50085-AA
	Crop Oil Concentrate	Loveland Products, Inc.	
	CWR Herbicide Activator	Creative Marketing & Research, Inc.	CA Reg. No. 1050775-50020-AA
	Exchange	Precision Laboratories, LLC	WA Reg. No. 9349-13008
	Herbimax	Loveland Products, Inc.	CA Reg. No. 34704-50032-AA
			WA Reg. No. 34704-04006
	Maximizer Crop Oil Conc.	Loveland Products, Inc.	CA Reg. No. 34704-50059
			WA Reg. No. 34704-08002
	Monterey M.S.O.	Monterey AgResources	CA Reg. No. 17545-50025
	Mor-Act	Wilbur-Ellis Co.	CA Reg. No. 2935-50098
	Peptoil	Drexel Chemical Company	WA Reg. No. 19713-70001
	Power-Line Crop Oil	Land View Inc.	
	Primary	Drexel Chemical Company	
	Prime Oil	Winfield Solutions, LLC	CA Reg. No. 979-50002-AA
			WA Reg. No. 1381-13004
	R.O.C. Rigo Oil Conc.	Wilbur-Ellis Co.	
	Red River Forestry Oil	Red River Specialties, Inc.	
	Red River Pacer Crop Oil	Red River Specialties, Inc.	
	Superb HC	Winfield Solutions, LLC	WA Reg. No. 1381-06003
Methylated Seed Oil	60/40 MSO	Chemorse Ltd.	WA Reg. No. 46059-15003
	Alligare MSO	Alligare, LLC	
	Alligare MSO West	Alligare, LLC	WA Reg. No. 81927-15002
	Atmos	Winfield Solutions, LLC	
	Conquer	Chemorse Ltd.	CA Reg. No. 1050984-50002-AA
			WA Reg. No. 46059-10001
	Cornbelt Base	Van Diest Supply Co.	
	Cornbelt Methylates Soy-Stik	Van Diest Supply Co.	
	Destiny HC	Winfield Solutions, LLC	WA Reg. No. 1381-09002
	Elite Supreme	Red River Specialties, Inc.	
	Hasten	Wilbur-Ellis Co.	CA Reg. No. 2935-50160
			WA Reg. No. 2935-02004
	Hasten-EA	Wilbur-Ellis Co.	CA Reg. No. 2935-50202
			WA Reg. No. 2935-15003
	Hot MES	Drexel Chemical Company	
Methylated Seed Oil – cont.	Kixyt	Precision Laboratories, LLC.	WA Reg. No. 9349-12001
	MES-100	Drexel Chemical Company	CA Reg. No. 19713-50002-AA
			WA Reg. No. 19713-50002

Adjuvant Type	Trade Name	Manufacturer	Comments
	Methylated Spray Oil Conc.	Helena Chemical Company	
	Monterey M.S.O.	Monterey AgResources	CA Reg. No. 17545-50025
	MSO Concentrate	Alligare, LLC	
	MSO Concentrate	Loveland Products, Inc.	CA Reg. No. 34704-50029-AA
	Premium MSO	Helena Chemical Company	
	Persist Ultra	Precision Laboratories, LLC.	CA Reg. No. 9349-50005
			WA Reg. No. 9349-13003
	Red River Supreme	Red River Specialties, Inc.	
	Renegade 2.0	Wilbur-Ellis Co.	CA Reg. No. 2935-50194
			WA Reg. No. 2935-13001
	Renegade-EA	Wilbur-Ellis Co.	CA Reg. No. 2935-50201
			WA Reg. No. 2935-15002
	Sunburn	Red River Specialties, Inc.	
	SunEnergy	Brewer International	
	Sunset	Red River Specialties, Inc.	
	Sun Wet	Brewer International	
	Super Kix	Wilbur-Ellis Co.	
	Super Spread MSO	Wilbur-Ellis Co.	
Methylated Seed Oil + Organosilicon	Alligare MVO Plus	Alligare, LLC	
	Syl-Tac-EA	Wilbur-Ellis Co.	CA Reg. No. 2935-50203
			WA Reg. No. 2935-15004
	Turbulence	Winfield Solutions, LLC	
Vegetable Oil	Amigo	Loveland Products, Inc.	CA Reg. No. 34704-50028-AA
			WA Reg. No. 34704-04002
	BeanOil	Drexel Chemical Company	
	Competitor	Wilbur-Ellis Co.	CA Reg. No. 2935-50173
			WA Reg. No. AW-2935-04001
	Elite Natural	Red River Specialties, Inc.	
	Motion	Exacto, Inc.	
	Noble	Winfield Solutions, LLC	
	Vegetoil	Drexel Chemical Company	
Fertilizer-based			
Nitrogen-based .	Actamaster Soluble Spray Adjuvant	Loveland Products, Inc.	WA Reg. No. 34704-50001
	Actamaster Spray Adjuvant	Loveland Products, Inc.	WA Reg. No. 34704-50006
	Alliance	Winfield Solutions, LLC	CA Reg. No. 1381-50002-AA
			WA Reg. No.1381-05005
Nitrogen-based – cont.	AMS-All	Drexel Chemical Company	
	AMS-Supreme	Drexel Chemical Company	

Adjuvant Type	Trade Name	Manufacturer	Comments
	AMS-Xtra	Drexel Chemical Company	
	Bronc	Wilbur-Ellis Co.	
	Bronc Max	Wilbur-Ellis Co.	
	Bronc Max EDT	Wilbur-Ellis Co.	
	Bronc Plus Dry	Wilbur-Ellis Co.	
	Bronc Plus Dry EDT	Wilbur-Ellis Co.	WA Reg. No.2935-03002
	Bronc Total	Wilbur-Ellis Co.	
	Cayuse Plus	Wilbur-Ellis Co.	CA Reg. No. 2935-50171
	Class Act NG	Winfield Solutions, LLC	WA Reg. No. 1381-01004
	Cornbelt Gardian	Van Diest Supply Co.	
	Cornbelt Gardian Plus	Van Diest Supply Co.	
	Corral AMS Liquid	Winfield Solutions, LLC	WA Reg. No. 1381-01006
	Dispatch	Loveland Products, Inc.	
	Dispatch 111	Loveland Products, Inc.	
	Dispatch 2N	Loveland Products, Inc.	
	Dispatch AMS	Loveland Products, Inc.	
	Flame	Loveland Products, Inc.	
	Holzit	Drexel Chemical Company	
	Nitro-Surf	Drexel Chemical Company	
	Quest	Helena Chemical Company	CA Reg. No. 5905-50076-AA
	TransActive HC	Helena Chemical Company	
Special Function			
	Brimstone	Wilbur-Ellis Co.	
	BS-500	Drexel Chemical Company	
	Buffers P.S.	Helena Chemical Company	CA Reg. No. 5905-50062-ZA
Buffering Agent	Oblique	Red River Specialties, Inc.	
	Spray-Aide	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50006-AA
	Tri-Fol	Wilbur-Ellis Co.	CA Reg. No. 2935-50152
	Yardage	Exacto, Inc.	
	Alligare Super Marking Dye	Alligare, LLC	
	BullsEye	Milliken Chemical	
	Elite Ruby	Red River Specialties, Inc.	
	Elite Sapphire	Red River Specialties, Inc.	
Colorants/Dyes	Elite Sapphire WSB	Red River Specialties, Inc.	
	Elite Splendor	Red River Specialties, Inc.	
	Hash Mark Blue Liquid	Exacto, Inc.	
	Hash Mark Blue Liquid HC	Exacto, Inc.	
	Hash Mark Blue Powder	Exacto, Inc.	

Adjuvant Type	Trade Name	Manufacturer	Comments
Colorants/Dyes – cont.	Hash Mark Green Liquid	Exacto, Inc.	
	Hash Mark Green Powder	Exacto, Inc.	
	Hi-Light	Becker-Underwood	
	Hi-Light WSP	Becker-Underwood	
	Marker Dye	Loveland Products, Inc.	
	Mark-It Blue	Monterey AgResources	
	Mark-It Red	Monterey AgResources	
	Mystic HC	Winfield Solutions, LLC	
	Signal	Precision Laboratories, LLC	
	SPI-Max Blue Spray Marker	PROKoZ	
	Spray Indicator XL	Helena Chemical Company	
	TurfTrax	Loveland Products, Inc.	
	TurfTrax Blue Spray Indicator	Loveland Products, Inc.	
Compatibility/suspension Agent	Blendex VHC	Setre (Helena)	
	Convert	Precision Laboratories, LLC	WA Reg. No. 9349-13007
	E Z MIX	Loveland Products, Inc.	CA Reg. No. 36208-50006
	Mix	Drexel Chemical Company	
	Support	Loveland Products, Inc.	WA Reg. No. 34704-04011
Defoaming Agent	Alligare Anti-Foamer	Alligare, LLC	
	Alligare Defoamer	Alligare, LLC	
	Cornbelt Defoamer	Van Diest Supply Co.	
	Defoamer	Brewer International	
	Fast Break	Winfield Solutions, LLC	
	Fighter-F 10	Loveland Products, Inc.	
	Fighter-F Dry	Loveland Products, Inc.	
	Foam Buster	Setre (Helena)	CA Reg. No. 5905-50072-AA
	Foambuster Max	Helena Chemical Company	
	Foam Fighter	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50005-AA
	Fome-Kil	Drexel Chemical Company	
	FTF Defoamer	Wilbur-Ellis Co.	WA Reg. No. 2935-13002
	Gundown Max	Precision Laboratories, LLC	WA Reg. No. 9349-13013
	No Foam	Wilbur-Ellis Co.	CA Reg. No. 2935-50136
	Red River Defoamer	Red River Specialties, Inc.	
	Reverse	Exacto, Inc.	
	Suppression	Chemorse, Ltd	CA Reg. No. 1050984-50007
			WA Reg. No. 46059-12001
	Tripleline	Creative Marketing & Research, Inc.	CA Reg. No. 1050775-50023-AA

Adjuvant Type	Trade Name	Manufacturer	Comments
	Unfoamer	Loveland Products, Inc.	CA Reg. No. 34704-50062
Defoaming Agent – cont.			WA Reg. No. 34704-09002
Deposition Aid	Agripharm Drift Control	Walco International	
	Alligare Downforce	Alligare, LLC	
	Alligare Pattern	Alligare, LLC	CA Reg. No. 81927-50008-AA
			WA Reg. No. 81927-15003
	Bivert	Wilbur-Ellis Co.	CA Reg. No. 2935-50163
	Border AQ	Precision Laboratories, LLC	WA Reg. No. 9349-13009
	Chem-Trol	Chemorse, Ltd	CA Reg. No. 1050984-50001-AA
			WA Reg. No. 1050984-50001
	Clasp	Helena Chemical Company	WA Reg. No. 5905-13002
	Compadre	Loveland Products, Inc.	CA Reg. No. 34704-50050
			WA Reg. No. 34704-06004
	Coverage G-20	Wilbur-Ellis Co.	
	Crosshair	Wilbur-Ellis Co.	
	CWC Sharpshooter	CWC Chemical, Inc.	
	Cygnet Plus	Brewer International	CA Reg. No. 1051114-50001
	Direct	Precision Laboratories, LLC	
	Droplex	Winfield Solutions, LLC	
	EDT Concentrate	Wilbur-Ellis Co.	
	Elite Secure Ultra	Red River Specialties, Inc.	
	Exit	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50014-AA
	Grounded	Helena Chemical Company	
	Grounded - CA	Helena Chemical Company	CA Reg. No. 5905-50096-AA
	Infuse	Loveland Products, Inc.	
	Intac Plus	Loveland Products, Inc.	
	Interlock	Winfield Solutions, LLC	
	Liberate	Loveland Products, Inc.	CA Reg. No. 34704-50030-AA
			WA Reg. No. 34704-04008
	LOX	Drexel Chemical Company	
	LOX PLUS	Drexel Chemical Company	
	Mist-Control	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50011-AA
	Offside	Exacto, Inc.	
	Pointblank	Helena Chemical Company	CA Reg. No. 52467-50008-AA-5905
	Poly Control 2	Brewer International	
	ProMate Impel	Helena Chemical Company	
	Reign	Loveland Products, Inc.	CA Reg. No. 34704-50045
			WA Reg. No. 34704-05010

Adjuvant Type	Trade Name	Manufacturer	Comments
	Reign LC	Loveland Products, Inc.	CA Reg. No. 34704-50048
	Secure Ultra	Red River Specialties, Inc.	
	Sta Put	Setre (Helena)	CA Reg. No. 5905-50068-AA
Deposition Aid – cont.	Strike Zone DF	Helena Chemical Company	CA Reg. No. 5905-50084-AA
	Sustain	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50015-AA
	Syndetic	Chemorse, Ltd	CA Reg. No. 1050984-50003-ZA
	Volare DC	Precision Laboratories, LLC	CA Reg. No. 9349-50004-AA
			WA Reg. No. 9349-13006
	Weather Gard	Loveland Products, Inc.	CA Reg. No. 34704-50042-AA
	Poly Control 2	Brewer International	
	ProMate Impel	Helena Chemical Company	
	Reign	Loveland Products, Inc.	CA Reg. No. 34704-50045
			WA Reg. No. 34704-05010
	Reign LC	Loveland Products, Inc.	CA Reg. No. 34704-50048
	Secure Ultra	Red River Specialties, Inc.	
	Sta Put	Setre (Helena)	CA Reg. No. 5905-50068-AA
	Strike Zone DF	Helena Chemical Company	CA Reg. No. 5905-50084-AA
	Sustain	Miller Chem. & Fert. Corp.	CA Reg. No. 72-50015-AA
	Syndetic	Chemorse, Ltd	CA Reg. No. 1050984-50003-ZA
	Volare DC	Precision Laboratories, LLC	CA Reg. No. 9349-50004-AA
			WA Reg. No. 9349-13006
	Weather Gard	Loveland Products, Inc.	CA Reg. No. 34704-50042-AA
Diluent/Deposition Agent	Bark Oil	Crop Production Services	
	Bark Oil EC	Crop Production Services	
	Elite Premier	Red River Specialties, Inc.	
	Elite Premier Blue	Red River Specialties, Inc.	
	Hy-Grade EC	CWC Chemical, Inc.	
	Hy-Grade I	CWC Chemical, Inc.	
	Improved JLB Oil Plus	Brewer International	
	In-Place	Wilbur-Ellis Co.	CA Reg. No. 2935-50169
	JLB Oil Plus	Brewer International	
	Red River Basal Oil	Red River Specialties, Inc.	
	Thinvert TRU	Waldrum Specialties, Inc.	
	Thinvert Concentrate	Waldrum Specialties, Inc.	
	W.E.B. Oil	Wilbur-Ellis Co.	CA Reg. No. 2935-50166
			WA Reg. No. AW 2935-70023
Foam Marker	Align	Helena Chemical Company	
	F.M.-160	Drexel Chemical Company	

Adjuvant Type	Trade Name	Manufacturer	Comments
	R-160	Wilbur-Ellis Co.	
	Red River Foam Marker	Red River Specialties, Inc.	
	Trekker Trax	Loveland Products, Inc.	
	Tuff Trax Foam Concentrate	Loveland Products, Inc.	
Invert Emulsion Agent	Redi-vert II	Wilbur-Ellis Co.	CA Reg. No. 2935-50168
Tank Cleaner	All Clear	Loveland Products, Inc.	
	Back Field	Exacto, Inc.	
	Cornbelt Tank-Aid	Van Diest Supply Co.	
	Elite Vigor	Red River Specialties, Inc.	
	Kutter	Wilbur-Ellis Co.	
	Neutral-Clean	Wilbur-Ellis Co.	
	Pro Tank	Winfield Solutions, LLC	
	Red River Tank Cleaner	Red River Specialties, Inc.	
	SSC-11	Wilbur-Ellis Co.	
	Tank and Equipment Cleaner	Loveland Products, Inc.	
	Wipe Out	Helena Chemical Company	
Water Conditioning .	AccuQuest WM	Helena Chemical Company	
	Alligare Water Conditioner	Alligare, LLC	
	Blendmaster	Loveland Products, Inc.	
	Breeze	Winfield Solutions, LLC	WA Reg. No. 1381-13007
	Choice	Loveland Products, Inc.	CA Reg. No. 34704-50027-AA
			WA Reg. No. 34704-04004
	Choice Weather Master	Loveland Products, Inc.	CA Reg. No. 34704-50038-AA
			WA Reg. No. 34704-05005
	Choice Xtra	Loveland Products, Inc.	
	Climb	Wilbur-Ellis Co.	CA Reg. No. 2935-50181
			WA Reg. No. 2935-09001
	Completion	Exacto, Inc.	
	Cornbelt N-Tense	Van Diest Supply Co.	
	Cut-Rate	Wilbur-Ellis Co.	
	Elite Imperial	Red River Specialties, Inc.	
	Hel-Fire	Helena Chemical Company	
	Import	Precision Laboratories, LLC	WA Reg. No. 9349-14001
	Sequestra	Drexel Chemical Company	
	Smoke	Helena Chemical Company	CA Reg. No. 5905-50104-AA
	Transport LpH	Precision Laboratories, LLC	
	Transport Plus	Precision Laboratories, LLC	WA Reg. No. 9349-13014

ATTACHMENT G
Herbicide Treatment Standard Operating Procedures and Mitigation Measures

HERBICIDE TREATMENT STANDARD OPERATING PROCEDURES AND MITIGATION MEASURES

This appendix identifies standard operating procedures (SOPs) that will be followed by the U.S. Department of the Interior (USDOI) Bureau of Land Management (BLM) to ensure that risks to human health and the environment from herbicide treatment actions will be kept to a minimum. SOPs are the management controls and performance standards required for vegetation management treatments. These practices are intended to protect and enhance natural resources that could be affected by future vegetation treatments. The information in this appendix has been carried over from the Record of Decision (ROD) for the 2007 *Vegetation Treatments Using Herbicides on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (2007 PEIS), with changes made, as appropriate, to clarify procedures or update information. New SOPs have also been included, as appropriate.

All mitigation measures that were included in the ROD for the 2007 PEIS would also be followed, as applicable. Many of these mitigation measures are specific to the 18 herbicides covered in the 2007 PEIS, and therefore would not apply to treatments with the three new herbicides unless other herbicides were also involved (e.g., in a tank mixture). Mitigation measures presented in Table 3 include subsequent clarifications to the original wording.

Prevention of Weeds and Early Detection and Rapid Response

Once weed populations become established, infestations can increase and expand in size. Weeds colonize highly disturbed ground and invade plant communities that have been degraded, but are also capable of invading intact communities. Therefore, prevention, early detection, and rapid response are the most cost-effective methods of weed control. Prevention, early detection, and rapid response strategies that reduce the need for vegetative treatments for noxious weeds should lead to a reduction in the number of acres treated using herbicides in the future by reducing or preventing weed establishment.

As stated in the BLM's *Partners Against Weeds: An Action Plan for the BLM*, prevention and public education are the highest priority weed management activities. Priorities are as follows:

- Priority 1: Take actions to prevent or minimize the need for vegetation control when and where feasible, considering the management objectives of the site.
- Priority 2: Use effective nonchemical methods of vegetation control when and where feasible.
- Priority 3: Use herbicides after considering the effectiveness of all potential methods or in combination with other methods or controls.

Prevention is best accomplished by ensuring the seeds and vegetatively reproductive plant parts of new weed species are not introduced into new areas.

The BLM is required to develop a noxious weed risk assessment when it is determined that an action may introduce or spread noxious weeds or when known habitat exists. If the risk is moderate or high, the BLM may modify the project to reduce the likelihood of weeds infesting the site, and to identify control measures to be implemented if weeds do infest the site.

To prevent the spread of weeds, the BLM takes actions to minimize the amount of existing non-target vegetation that is disturbed or destroyed during project or vegetation treatment actions (Table 1). During project planning, the following steps are taken:

- Incorporate measures to prevent introduction or spread of weeds into project layout, design, alternative evaluation, and project decisions.
- During environmental analysis for projects and maintenance programs, assess weed risks,

analyze potential treatment of high-risk sites for weed establishment and spread, and identify prevention practices.

- Determine prevention and maintenance needs, to include the use of herbicides if needed, at the onset of project planning.
- Avoid or remove sources of weed seed and propagules to prevent new weed infestations and the spread of existing weeds.

During project development, weed infestations are prioritized for treatment in project operating areas and along access routes. Weeds present on or near the site are identified, a risk assessment is completed, and weeds are controlled as necessary. Project staging areas are weed free, and travel through weed infested areas is avoided or minimized. Examples of prevention actions to be followed during project activities include cleaning all equipment and clothing before entering the project site; avoiding soil disturbance and the creation of other soil conditions that promote weed germination and establishment; and using weed-free seed, hay, mulch, gravel, soil, and mineral materials on public lands where there is a state or county program in place.

Conditions that enhance invasive species abundance should be addressed when developing mitigation and prevention plans for activities on public lands. These conditions include excessive disturbance associated with road maintenance, poor grazing management, and high levels of recreational use. If livestock grazing is managed to maintain the vigor of native perennial plants, particularly grasses, the chance of weeds invading rangeland is much less. By carefully managing recreational use and educating the public on the potential impacts of recreational activities on vegetation, the amount of damage to native vegetation and soil can be minimized at high use areas, such as campgrounds and off-highway vehicle (OHV) trails. Early detection in recreation areas is focused on roads and trails, where much of the weed spread occurs.

The BLM participates in the National Early Warning and Rapid Response System for Invasive Plants (Figure 1). The goal of this System is to minimize the establishment and spread of new invasive species through a coordinated framework of public and private processes by:

- Early detection and reporting of suspected new plant species to appropriate officials;
- Identification and vouchering of submitted specimens by designated specialists;
- Verification of suspected new state, regional, and national plant records;
- Archival of new records in designated regional and plant databases;
- Rapid assessment of confirmed new records; and
- Rapid response to verified new infestations that are determined to be invasive.

Herbicide Treatment Planning

BLM Manual 9011 (*Chemical Pest Control*) outlines the policies, and BLM Handbook H-9011-1 (*Chemical Pest Control*) outlines the procedures, for use of herbicides on public lands. As part of policy, the BLM is required to thoroughly evaluate the need for chemical treatments and their potential for impact on the environment. The BLM is required to use only U.S. Environmental Protection Agency (USEPA)-registered herbicides that have been properly evaluated under the National Environmental Policy Act (NEPA), and to carefully follow label directions and additional BLM requirements.

An operational plan is developed and updated for each herbicide project. The plan includes information on project specifications, key personnel responsibilities, and communication, safety, spill response, and emergency procedures. For application of herbicides not approved for aquatic use, the plan should also specify minimum buffer widths between treatment areas and water bodies. Recommended widths are provided in BLM Handbook H-9011-1, but actual buffers are site and herbicide active ingredient specific, and are determined based on a scientific analysis of environmental factors, such as climate, topography, vegetation, and weather; timing and method of application; and herbicide risks to humans and non-target species. Table 2 summarizes important SOPs that should be used when applying herbicides to help protect resources of concern on public lands.

TABLE 1
Prevention Measures

BLM Activity	Prevention Measure
Project Planning	• Incorporate prevention measures into project layout and design, alternative evaluation, and project decisions to prevent the introduction or spread of weeds. • Determine prevention and maintenance needs, including the use of herbicides, at the onset of project planning. • Before ground-disturbing activities begin, inventory weed infestations and prioritize areas for treatment in project operating areas and along access routes. • Remove sources of weed seed and propagules to prevent the spread of existing weeds and new weed infestations. • Pre-treat high-risk sites for weed establishment and spread before implementing projects. • Post weed awareness messages and prevention practices at strategic locations such as trailheads, roads, boat launches, and public land kiosks. • Coordinate project activities with nearby herbicide applications to maximize the cost-effectiveness of weed treatments.
Project Development	• Minimize soil disturbance to the extent practical, consistent with project objectives. • Avoid creating soil conditions that promote weed germination and establishment. • To prevent weed germination and establishment, retain native vegetation in and around project activity areas and keep soil disturbance to a minimum, consistent with project objectives. • Locate and use weed-free project staging areas. Avoid or minimize all types of travel through weed-infested areas, or restrict travel to periods when the spread of seeds or propagules is least likely. • Prevent the introduction and spread of weeds caused by moving weed-infested sand, gravel, borrow, and fill material. • Inspect material sources on site, and ensure that they are weed-free before use and transport. Treat weed-infested sources to eradicate weed seed and plant parts, and strip and stockpile contaminated material before any use of pit material. • Survey the area where material from treated weed-infested sources is used for at least 3 years after project completion to ensure that any weeds transported to the site are promptly detected and controlled. • Prevent weed establishment by not driving through weed-infested areas. • Inspect and document weed establishment at access roads, cleaning sites, and all disturbed areas; control infestations to prevent weed spread within the project area. • Avoid acquiring water for dust abatement where access to the water is through weed-infested sites. • Identify sites where equipment can be cleaned. Clean equipment before entering public lands. • Clean all equipment before leaving the project site if operating in areas infested with weeds. • Inspect and treat weeds that establish at equipment cleaning sites. • Ensure that rental equipment is free of weed seed. • Inspect, remove, and properly dispose of weed seed and plant parts found on workers' clothing and equipment. Proper disposal entails bagging the seeds and plant parts and incinerating them.
Revegetation	• Include weed prevention measures, including project inspection and documentation, in operation and reclamation plans. • Retain bonds until reclamation requirements, including weed treatments, are completed, based on inspection and documentation. • To prevent conditions favoring weed establishment, reestablish vegetation on bare ground caused by project disturbance as soon as possible using either natural recovery or artificial techniques. • Maintain stockpiled, uninfested material in a weed-free condition.

TABLE 1 (Cont.)
Prevention Measures

BLM Activity	Prevention Measure
Revegetation (Cont.)	• Revegetate disturbed soil (except travel ways on surfaced projects) in a manner that optimizes plant establishment for each specific project site. For each project, define what constitutes disturbed soil and objectives for plant cover revegetation. Revegetation may include topsoil replacement, planting, seeding, fertilization, liming, and weed-free mulching, as necessary. • Where practical, stockpile weed-seed-free topsoil and replace it on disturbed areas (e.g., road embankments or landings). • Inspect seed and straw mulch to be used for site rehabilitation (for wattles, straw bales, dams, etc.) and certify that they are free of weed seed and propagules. • Inspect and document all limited term ground-disturbing operations in noxious weed infested areas for at least 3 growing seasons following completion of the project. • Use native material where appropriate and feasible. Use certified weed-free or weed-seed-free hay or straw where certified materials are required and/or are reasonably available. • Provide briefings that identify operational practices to reduce weed spread (for example, avoiding known weed infestation areas when locating fire lines). • Evaluate options, including closure, to regulate the flow of traffic on sites where desired vegetation needs to be established. Sites could include road and trail rights-of-way (ROWs), and other areas of disturbed soils.

Revegetation

Disturbed areas may be reseeded or planted with desirable vegetation when the native plant community cannot recover and occupy the site sufficiently.

Determining the need for revegetation is an integral part of developing a vegetation treatment. The most important component of the process is determining whether active (seeding/planting) or passive (natural recovery) revegetation is appropriate.

USDOI policy states, "Natural recovery by native plant species is preferable to planting or seeding, either of natives or non-natives. However, planting or seeding should be used only if necessary to prevent unacceptable erosion or resist competition from non-native invasive species" (620 Departmental Memorandum Chapter 3, *Emergency Stabilization and Rehabilitation*). This policy is reiterated in the USDOI *Interagency Burned Area Emergency Stabilization and Rehabilitation* Manual 620, the BLM *Burned Area Emergency Stabilization and Rehabilitation* Manual (BLM H-1742-1), and the USDOI and U.S. Department of Agriculture *Interagency Burned Area Rehabilitation Guidebook*.

In addition to these handbooks and policy, use of native and non-native seed in revegetation and restoration is guided by BLM Manual 1745 (*Introduction, Transplant, Augmentation and Reestablishment of Fish, Wildlife and Plants)*. This manual states that native species shall be used, unless it is determined through the NEPA process that: 1) suitable native species are not available; 2) the natural biological diversity of the proposed management area will not be diminished; 3) exotic and naturalized species can be confined within the proposed management area; 4) analysis of ecological site inventory information indicates that a site will not support reestablishment of a species that historically was part of the natural environment; or 5) resource management objectives cannot be met with native species.

When natural recovery is not feasible, revegetation can be used to stabilize and restore vegetation on disturbed sites and to eliminate or reduce the conditions that favor invasive species. Reseeding or replanting may be required when there is insufficient vegetation or seed stores to naturally revegetate the site.

To ensure revegetation success, there must be adequate soil for root development and moisture storage, which provides moisture to support the new plants. Chances for revegetation success are improved by selecting seed with high purity and percentage germination; selecting native species or cultivars adapted to the area; planting at proper depth, seeding rate, and time of the year for the region; choosing the appropriate planting method; and, where feasible, removing competing vegetation. Planting mixtures are adapted for the treatment area and

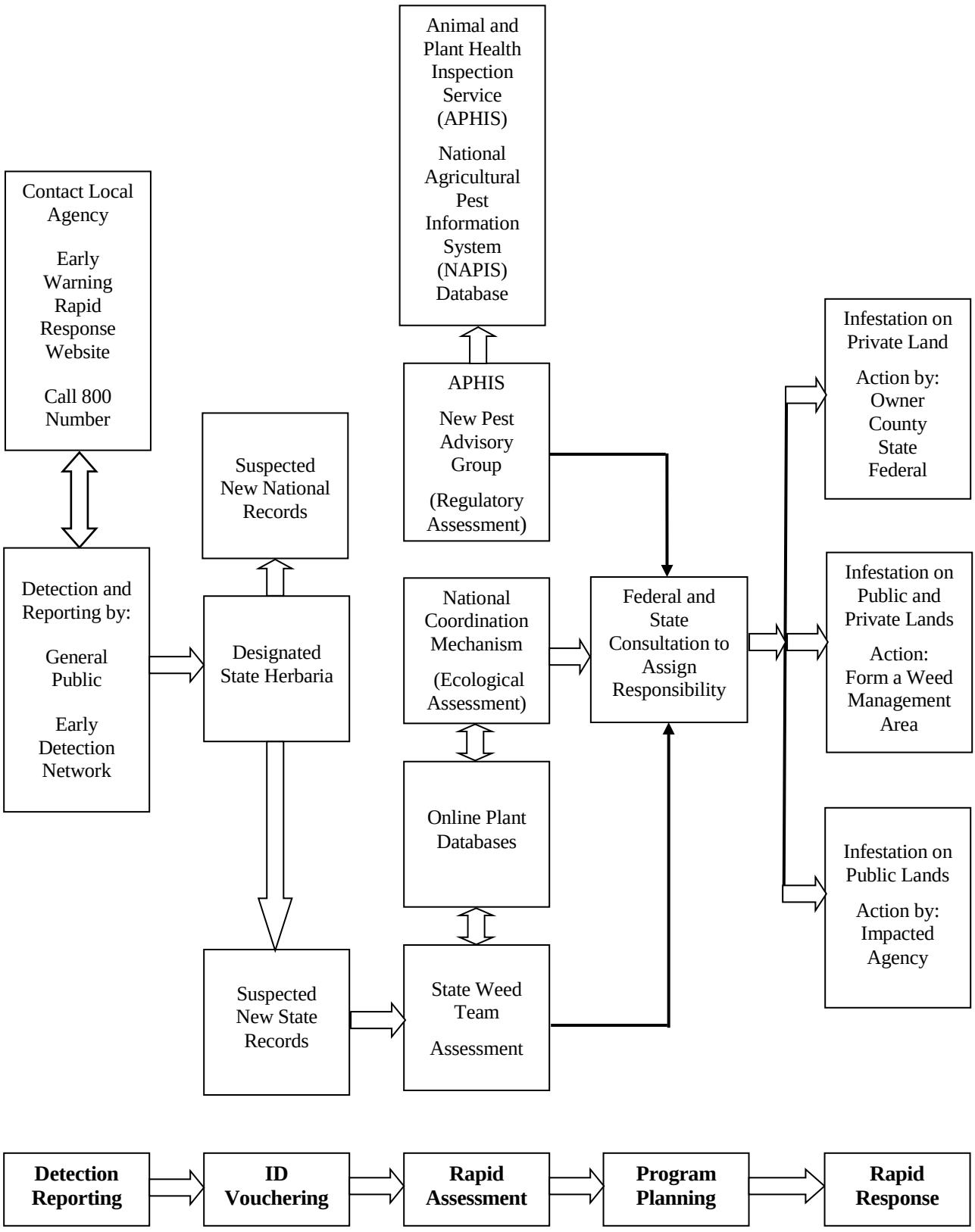


Figure 1. National Early Warning and Rapid Response System for Invasive Plants.

site uses. A combination of forbs, perennial grasses, and shrubs is typically used on rangeland sites, while shrubs and trees might be favored for riparian and forestland sites. A mixture of several native plant species and types or functional groups enhances the value of the site for fish and wildlife and improves the health and aesthetic character of the site. Mixtures can better take advantage of variable soil, terrain, and climatic conditions, and thus are more likely to withstand insect infestations and survive adverse climatic conditions.

The USDOI BLM Native Seed program was developed in response to Congressional direction to supply native plant material for emergency stabilization and longer-term rehabilitation and restoration efforts. The focus of the program is to increase the number of native plant species for which seed is available and the total amount of native seed available for these efforts. To date, the program has focused on native plant material needs of emergency stabilization and burned area rehabilitation in the Great Basin, but is expanding to focus on areas such as western Oregon, the Colorado Plateau, and most recently the Mojave Desert. The Wildland Fire Management Program funds and manages the effort.

The National Seed Warehouse is a storage facility for the native seed supply. Through a Memorandum of Understanding with the BLM Idaho State Director, each state (Idaho, Oregon, Nevada, Utah, and Colorado) can reserve an annual seed supply for purchase based on a reasonable projection of annual acreage to be stabilized or rehabilitated over a 5-year period.

The Great Basin Restoration Initiative (GBRI) grew out of concern for the health of the Great Basin after the wildfires of 1999. The goal of GBRI is to implement treatments and strategies to maintain functioning ecosystems and to proactively restore degraded ones at strategic locations. Native plants are emphasized in restoration projects where their use is practical and the potential for success is satisfactory. Monitoring is recommended to measure treatment success. To increase the availability of native plants, especially native forbs, the GBRI has established a collaborative native plant project, the Great Basin Native Plant Selection and Increase Project, to increase native plant availability and the technology to successfully establish these plants. This project is supported by funding from the BLM's Native Plant Initiative.

The BLM will follow the following SOPs when revegetating sites:

- Cultivate previously disturbed sites to reduce the amount of weed seeds in the soil seedbank.
- Revegetate sites once work is completed or soon after a disturbance.
- When available, use native seed of known origin as labeled by state seed certification programs.
- Use seed of non-native cultivars and species only when locally adapted native seed is not available or when it is unlikely to establish quickly enough to prevent soil erosion or weed establishment.
- Use seed that is free of noxious and invasive weeds, as determined and documented by a seed inspection test by a certified seed laboratory.
- Limit nitrogen fertilizer applications that favor annual grass growth over forb growth in newly seeded areas, especially where downy brome (cheatgrass; *Bromus tectorum*) and other invasive annuals are establishing.
- Use clean equipment, free of plants and plant parts, on revegetation projects to prevent the inadvertent introduction of weeds into the site.
- Where important pollinator resources exist, include native nectar and pollen producing plants in the seed mixes used in restoration and reclamation projects. Include non-forage plant species in seed mixes for their pollinator/host relationships as foraging, nesting, or shelter species. Choose native plant species over manipulated cultivars, especially of forbs and shrubs, since natives tend to have more valuable pollen and nectar resources than cultivars. Ensure that bloom times for the flowers of the species chosen match the activity times for the pollinators. Maintain sufficient litter on the soil surfaces of native plant communities for ground-nesting bees.
- Where feasible, avoid grazing by domestic and wild animals on treatment sites until vegetation is well established. Where total rest from grazing is not feasible, efforts should be made to modify the amount and/or season of grazing to promote vegetation recovery within the treatment area. Reductions in grazing animal numbers, permanent or temporary fencing, changes in grazing rotation, and identification of alternative forage sources are examples of

methods that could be used to remove, reduce, or modify grazing impacts during vegetation recovery.

Special Precautions

Special Status Species

Federal policies and procedures for protecting federally listed threatened and endangered plant and animal species, and species proposed for listing, were established by the Endangered Species Act of 1973 (Act) and regulations issued pursuant to the Act. The purposes of the Act are to provide mechanisms for the conservation of threatened and endangered species and their habitats. Under the Act, the Secretary of the Interior is required to determine which species are threatened or endangered and to issue recovery plans for those species.

Section 7 of the Act specifically requires all federal agencies to use their authorities in furtherance of the Act to carry out programs for the conservation of listed species, and to ensure that no agency action is likely to jeopardize the continued existence of a listed species or adversely modify critical habitat. Policy and guidance (BLM Manual 6840; *Special Status Species*) also stipulates that species proposed for listing must be managed at the same level of protection as listed species.

The BLM state directors may designate special status species in cooperation with their respective state. These special status species must receive, at a minimum, the same level of protection as federal candidate species. The BLM will also carry out management for the conservation of state-listed species, and state laws protecting these species will apply to all BLM programs and actions to the extent that they are consistent with Federal Land Policy and Management Act and other federal laws.

The BLM consulted with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) during development of the *Final Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States Programmatic Environmental Impact Statement* (PEIS) as required under Section 7 of the Endangered Species Act. As part of this process, the BLM prepared a formal consultation package that included a description of the program; species listed as threatened or endangered, species proposed for listing, and critical habitats that could be affected by the program; and a *Vegetation Treatments Using Aminopyralid, Fluroxypyr, and Rimsulfuron on Bureau of Land Management Lands in 17 Western States Biological Assessment* (BA) that evaluated the likely impacts to listed species, species proposed for listing, and critical habitats from the proposed vegetation treatment program. Over 300 species were evaluated in the BA. The BA also provides broad guidance at a programmatic level for actions that will be taken by the BLM to avoid adversely impacting species or critical habitat.

Before any vegetation treatment or ground disturbance occurs, BLM policy requires a survey of the project site for species listed or proposed for listing, or special status species. This is done by a qualified biologist and/or botanist who consults the state and local databases and visits the site at the appropriate season. If a proposed project may affect a proposed or listed species or its critical habitat, the BLM consults with the USFWS and/or NMFS. A project with a "may affect, likely to adversely affect" determination requires formal consultation and receives a Biological Opinion from the USFWS and/or NMFS. A project with a "may affect, not likely to adversely affect" determination requires informal consultation and receives a concurrence letter from the USFWS and/or NMFS, unless that action is implemented under the authorities of the alternative consultation agreement pursuant to counterpart regulations established for *National Fire Plan* projects.

Wilderness Areas

Wilderness areas, which are designated by Congress, are defined by the Wilderness Act of 1964 as places "where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain." The BLM manages 223 Wilderness Areas encompassing over 8.7 million acres.

Activities allowed in wilderness areas are identified in wilderness management plans prepared by the BLM. The BLM does not ordinarily treat vegetation in wilderness areas, but will control invasive and noxious weeds when they threaten lands outside the wilderness area or are spreading within the wilderness area and can be controlled without serious adverse impacts to wilderness values.

Management of vegetation in a wilderness area is directed toward retaining the natural character of the environment. Tree and shrub removal is usually not

allowed, except for fire, insect, or disease control. Reforestation is generally prohibited except to repair damage caused by humans in areas where natural reforestation is unlikely. Only native species and primitive methods, such as hand planting, are allowed for reforestation.

Tools and equipment may be used for vegetation management when they are the minimum amount necessary for the protection of the wilderness resource. Motorized tools may only be used in special or emergency cases involving the health and safety of wilderness visitors, or the protection of wilderness values.

Habitat manipulation using mechanical or chemical means may be allowed to protect threatened and endangered species and to correct unnatural conditions, such as weed infestations, resulting from human influence.

The BLM also manages a total of 545 Wilderness Study Areas (WSAs) encompassing nearly 12.8 million acres. These are areas that have been determined to have wilderness characteristics worthy of consideration for wilderness designation. The BLM's primary goals in WSAs are to manage them so as to not impair their wilderness values and to maintain their suitability for preservation as wilderness until Congress makes a determination on their future.

In WSAs, the BLM must foster a natural distribution of native species of plants and animals by ensuring that ecosystems and processes continue to function naturally.

Cultural Resources

The effects of BLM actions on cultural resources are addressed through compliance with the National Historic Preservation Act, as implemented through a national Programmatic Agreement (*Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*) and state-specific protocol agreements with State Historic Preservation Officers (SHPOs). The BLM's responsibilities under these authorities are addressed as early in the vegetation management project planning process as possible.

The BLM meets its responsibilities for consultation and government-to-government relationships with Native American tribes by consulting with appropriate tribal representatives prior to taking actions that affect tribal interests. The BLM's tribal consultation policies are detailed in BLM Manual 8120 (*Tribal Consultation Under Cultural Resource Authorities)* and Handbook H-8120-1 (*Guidelines for Conducting Tribal Consultation).* The BLM consulted with Native American tribes, Alaska Native groups, and Alaska Native Corporations during development of the PEIS. Information gathered on important tribal resources and potential impacts to these resources from herbicide treatments is presented in the analysis of impacts.

When conducting vegetation treatments, field office personnel consult with relevant parties (including tribes, native groups, and SHPOs), assess the potential of the proposed treatment to affect cultural and subsistence resources, and devise inventory and protection strategies suitable to the types of resources present and the potential impacts to them.

Herbicide treatments, for example, are unlikely to affect buried cultural resources, but might have a negative effect on traditional cultural properties comprised of plant foods or materials significant to local tribes and native groups. These treatments require inventory and protection strategies that reflect the potential of each treatment to affect various types of cultural resources.

Impacts to significant cultural resources are avoided through project redesign or are mitigated through data recovery, recordation, monitoring, or other appropriate measures. When cultural resources are discovered during vegetation treatment, appropriate actions are taken to protect these resources.

TABLE 2
Standard Operating Procedures for Applying Herbicides

Resource Element	Standard Operating Procedure
Guidance Documents	BLM Handbook H-9011-1 (*Chemical Pest Control*); and manuals 1112 (*Safety*), 9011 (*Chemical Pest Control*), 9012 (*Expenditure of Rangeland Insect Pest Control Funds*), 9015 (*Integrated Weed Management)*, and 9220 (*Integrated Pest Management*)
General	• Prepare operational and spill contingency plan in advance of treatment. • Conduct a pretreatment survey before applying herbicides. • Select herbicide that is least damaging to the environment while providing the desired results. • Select herbicide products carefully to minimize additional impacts from degradates, adjuvants, inert ingredients, and tank mixtures. • Apply the least amount of herbicide needed to achieve the desired result. • Follow herbicide label guidance for use and storage. • Have licensed applicators apply herbicides. • Use only USEPA-approved herbicides and follow product label directions and "advisory" statements. • Review, understand, and conform to the "Environmental Hazards" section on the herbicide product label. This section warns of known pesticide risks to the environment and provides practical ways to avoid harm to organisms or the environment. • In addition to the information presented in the Environmental Hazards section, follow all additional precautions and restrictions identified on the label, paying particular attention to herbicides that require some form of soil incorporation, either mechanically or through a moisture event, to activate them. Applications to powdery, dry soil or light, sandy soil when there is little likelihood of an incorporation event may result in off-site movement when the treated soil particles area moved by wind. • Consider surrounding land use before assigning aerial spraying as a treatment method and avoid aerial spraying near agricultural or densely populated areas. • Consider site characteristics, current and immediate future environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Minimize the size of application area, when feasible. • Comply with herbicide-free buffer zones to ensure that drift will not affect crops or nearby residents/landowners. • Post treated areas and specify reentry or rest times, if appropriate. • Notify adjacent landowners prior to treatment. • Keep a copy of Safety Data Sheets (SDSs)/Material Safety Data Sheets (MSDSs) at work sites. SDSs/MSDSs are available for review at http://www.cdms.net/. • Keep records of each application, including the active ingredient, formulation, application rate, date, time, and location. • Avoid accidental direct spray and spill conditions to minimize risks to resources. • Turn off applied treatments at the completion of spray runs and during turns to start another spray run. • Avoid aerial spraying during periods of adverse weather conditions (snow or rain imminent, fog, or air turbulence). • Make helicopter applications at a target airspeed of 40 to 50 miles per hour (mph), and at about 30 to 45 feet above ground. • Take precautions to minimize drift by not applying herbicides when winds exceed 10 mph (6 mph for aerial applications), or a heavy rainfall event is imminent. • Conduct pre-treatment surveys for sensitive habitat and special status species within or adjacent to proposed treatment areas. • Use drift reduction agents, as directed by the label, and low volatile formulations to reduce the drift hazard to non-target species.

TABLE 2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
General (cont.)	• Refer to the herbicide product label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide. • Do not use adjuvants that are not approved for use with the selected active ingredients. Review labels of herbicides and adjuvants proposed for use to ensure that the proposed adjuvant(s) are approved for use with the selected active ingredients and in application settings where the selected herbicides are approved for use. • Clean OHVs to remove seeds.
Air Quality See Manual 7000 (*Soil, Water, and Air Management*)	• Consider the effects of wind, humidity, temperature inversions, and heavy rainfall on herbicide effectiveness and risks. • Apply herbicides in favorable weather conditions to minimize drift. For example, do not treat when winds exceed 10 mph (6 mph for aerial applications) or rainfall is imminent. • Use drift reduction agents, as appropriate, to reduce the drift hazard. • Select proper application equipment (e.g., spray equipment that produces 200- to 800-micron diameter droplets [spray droplets of 100 microns and less are most prone to drift]). • Select proper application methods (e.g., set maximum spray heights, use appropriate buffer distances between spray sites and non-target resources).
Soil See Manual 7000 (*Soil, Water, and Air Management*)	• Minimize treatments in areas where herbicide runoff is likely, such as steep slopes under conditions when heavy rainfall is expected. • Minimize use of herbicides that have high soil mobility, particularly in areas where soil properties increase the potential for mobility. • Do not apply granular herbicides on slopes of more than 15 percent where there is the possibility of runoff carrying the granules into non-target areas.
Water Resources See Manual 7000 (*Soil, Water, and Air Management*)	• Consider climate, soil type, slope, and vegetation type when developing herbicide treatment programs. • Select herbicide products to minimize impacts to water. This is especially important for application scenarios that involve risk from active ingredients in a particular herbicide, as predicted by risk assessments. • Use local historical weather data to choose the month of treatment. Considering the phenology of the target species, schedule treatments based on the condition of the water body and existing water quality conditions. • Plan to treat between weather fronts (calms) and at the appropriate time of day to avoid high winds that increase water movements, and to avoid potential stormwater runoff and water turbidity. • Review hydrogeologic maps of proposed treatment areas. Note depths to groundwater and areas of shallow groundwater and areas of surface water and groundwater interaction. Minimize treating areas with high risk for groundwater contamination. • Conduct mixing and loading operations in an area where an accidental spill would not contaminate an aquatic body. • Do not rinse spray tanks in or near water bodies. Do not broadcast pellets where there is danger of contaminating water supplies. • As needed, maintain buffers between treatment areas and water bodies. Buffer widths should be developed based on herbicide- and site-specific criteria to minimize impacts to water bodies. • Minimize the potential effects to surface water quality and quantity by stabilizing terrestrial areas as quickly as possible following treatment.
Wetlands and Riparian Areas	• Use a selective herbicide and a wick or backpack sprayer. • Use appropriate herbicide-free buffer zones for herbicides not labeled for aquatic use based on risk assessment guidance, with minimum widths of 100 feet for aerial, 25 feet for vehicle, and 10 feet for hand spray applications.
Vegetation	• Refer to the herbicide label when planning revegetation to ensure that subsequent vegetation would not be injured following application of the herbicide.

TABLE 2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Vegetation (cont.) See Manuals 5000 (*Forest Management*) and 9015 (*Integrated Weed Management*)	• Consider site characteristics, environmental conditions, and application equipment in order to minimize damage to non-target vegetation. • Review, understand, and incorporate application information identified in the environmental hazards section of the herbicide label, along with all additional precautions and restrictions identified on the label. • Use weed seed-free feed for horses and pack animals. Use weed seed-free straw and mulch for revegetation and other activities. • Identify and implement any temporary domestic livestock grazing and/or supplemental feeding restrictions needed to enhance desirable vegetation recovery following treatment. Consider adjustments in the existing grazing permit to maintain desirable vegetation on the treatment site.
Pollinators	• Ensure proper identification of pollinator plants, as some native species that attract and support many pollinators may be easily misidentified as invasive/noxious weed species. • Complete vegetation treatments seasonally before pollinator foraging plants bloom. • Time vegetation treatments to take place when foraging pollinators are least active both seasonally and daily. • Apply herbicides at the stage of growth when the weed is most vulnerable, when application will be most successful. • Design vegetation treatment projects so that nectar and pollen sources for important pollinators and resources are treated in patches rather than in one single treatment, or conduct spot treatments on individual invasive/noxious weed species, using the appropriate application equipment. • Minimize herbicide application rates. Use typical rather than maximum rates where there are important pollinator resources. • Maintain herbicide free buffer zones around patches of important pollinator nectar and pollen sources. • Maintain herbicide free buffer zones around patches of important pollinator nesting habitat and hibernacula. • Make special note of pollinators that have single host plant species, and minimize herbicide spraying on those plants (if invasive species) and in their habitats.
Fish and Other Aquatic Organisms See Manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use appropriate buffer zones based on label and risk assessment guidance. • Minimize treatments near fish-bearing water bodies during periods when fish are in life stages most sensitive to the herbicide(s) used, and use spot rather than broadcast or aerial treatments. • Use appropriate application equipment/method near water bodies if the potential for off-site drift exists. • For treatment of aquatic vegetation, 1) treat only that portion of the aquatic system necessary to achieve acceptable vegetation management, 2) use the appropriate application method to minimize the potential for injury to desirable vegetation and aquatic organisms, and 3) follow water use restrictions presented on the herbicide label.
Wildlife See Manuals 6500 (*Wildlife and Fisheries Management*) and 6780 (*Habitat Management Plans*)	• Use herbicides of low toxicity to wildlife, where feasible. • Use spot applications or low-boom broadcast operations where possible to limit the probability of contaminating non-target food and water sources, especially non-target vegetation over areas larger than the treatment area. • Use timing restrictions (e.g., do not treat during critical wildlife breeding or staging periods) to minimize impacts to wildlife.
Threatened, Endangered, and Sensitive Species See Manual 6840 (*Special Status Species*)	• Survey for special status species before treating an area, at a time when the species can be found. Consider effects to special status species when designing herbicide treatment programs. • Where feasible, use a selective herbicide and a wick or backpack sprayer to minimize risks to special status plants. • Avoid treating vegetation during time-sensitive periods (e.g., nesting and migration, sensitive life stages) for special status species in area to be treated.

TABLE 2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Livestock	• Whenever possible and whenever needed, schedule treatments when livestock are not present in the treatment area. Design treatments to take advantage of normal livestock grazing rest periods, when possible. • As directed by the herbicide product label, remove livestock from treatment sites prior to herbicide application, where applicable. • Use herbicides of low toxicity to livestock, where feasible. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contamination of non-target food and water sources. • Notify permittees of the herbicide treatment project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Notify permittees of livestock grazing, feeding, or slaughter restrictions, if necessary. • Provide alternative forage sites for livestock, if possible.
Wild Horses and Burros	• Minimize use of herbicides in areas grazed by wild horses and burros. • Use herbicides of low toxicity to wild horses and burros, where feasible. • Remove wild horses and burros from identified treatment areas prior to herbicide application, in accordance with herbicide product label directions for livestock. • Take into account the different types of application equipment and methods, where possible, to reduce the probability of contaminating non-target food and water sources.
Cultural Resources and Paleontological Resources See Handbooks H-8120-1 (*Guidelines for Conducting Tribal Consultation*) and H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*), and Manuals 8100 (*The Foundations for Managing Cultural Resources*), 8120 (*Tribal Consultation Under Cultural Resource Authorities*), and 8270 (*Paleontological Resource Management*) See also: *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act*.	• Follow standard procedures for compliance with Section 106 of the National Historic Preservation Act as implemented through the *Programmatic Agreement among the Bureau of Land Management, the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers Regarding the Manner in Which BLM Will Meet Its Responsibilities Under the National Historic Preservation Act* and state protocols or 36 Code of Federal Regulations Part 800, including necessary consultations with State Historic Preservation Officers and interested tribes. • Follow BLM Handbook H-8270-1 (*General Procedural Guidance for Paleontological Resource Management*) to determine known Condition I and Condition 2 paleontological areas, or collect information through inventory to establish Condition 1 and Condition 2 areas, determine resource types at risk from the proposed treatment, and develop appropriate measures to minimize or mitigate adverse impacts. • Consult with tribes to locate any areas of vegetation that are of significance to the tribe and that might be affected by herbicide treatments. • Work with tribes to minimize impacts to these resources. • Follow guidance under Human Health and Safety in the PEIS in areas that may be visited by Native peoples after treatments.
Visual Resources See Handbooks H-8410-1 (*Visual Resource Inventory*) and H-8431-1 (*Visual Resource Contrast Rating*), and Manual 8400 (*Visual Resource Management*)	• Minimize the use of broadcast foliar applications in sensitive watersheds to avoid creating large areas of browned vegetation. • Consider the surrounding land use before assigning aerial spraying as an application method.

TABLE 2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Visual Resources (cont.)	• Minimize off-site drift and mobility of herbicides (e.g., do not treat when winds exceed 10 mph; minimize treatment in areas where herbicide runoff is likely; establish appropriate buffer widths between treatment areas and residences) to contain visual changes to the intended treatment area. • If the area is a Class I or II visual resource, ensure that the change to the characteristic landscape is low and does not attract attention (Class I), or if seen, does not attract the attention of the casual viewer (Class II). • Lessen visual impacts by: 1) designing projects to blend in with topographic forms; 2) leaving some low-growing trees or planting some low-growing tree seedlings adjacent to the treatment area to screen short-term effects; and 3) revegetating the site following treatment. • When restoring treated areas, design activities to repeat the form, line, color, and texture of the natural landscape character conditions to meet established Visual Resource Management objectives.
Wilderness and Other Special Areas See Handbooks H-8550-1 (*Management of Wilderness Study Areas (WSAs)*), and H-8560-1 (*Management of Designated Wilderness Study Areas*), and Manual 8351 (*Wild and Scenic Rivers*)	• Encourage backcountry pack and saddle stock users to feed their livestock only weed seed-free feed for several days before entering a wilderness area. • Encourage stock users to tie and/or hold stock in such a way as to minimize soil disturbance and loss of native vegetation. • Revegetate disturbed sites with native species if there is no reasonable expectation of natural regeneration. • Provide educational materials at trailheads and other wilderness entry points to educate the public on the need to prevent the spread of weeds. • Use the "minimum tool" to treat noxious and invasive vegetation, relying primarily on the use of ground-based tools, including backpack pumps, hand sprayers, and pumps mounted on pack and saddle stock. • Use chemicals only when they are the minimum method necessary to control weeds that are spreading within the wilderness or threaten lands outside the wilderness. • Give preference to herbicides that have the least impact on non-target species and the wilderness environment. • Implement herbicide treatments during periods of low human use, where feasible. • Address wilderness and special areas in management plans. • Maintain adequate buffers for Wild and Scenic Rivers (¼ mile on either side of river, ½ mile in Alaska).
Recreation See Handbook H-1601-1 (*Land Use Planning Handbook, Appendix C*)	• Schedule treatments to avoid peak recreational use times, while taking into account the optimum management period for the targeted species. • Notify the public of treatment methods, hazards, times, and nearby alternative recreation areas. • Adhere to entry restrictions identified on the herbicide product label for public and worker access. • Post signs noting exclusion areas and the duration of exclusion, if necessary. • Use herbicides during periods of low human use, where feasible.
Social and Economic Values	• Consider surrounding land use before selecting aerial spraying as a method, and avoid aerial spraying near agricultural or densely-populated areas. • Post treated areas and specify reentry or rest times, if appropriate. • Notify grazing permittees of livestock feeding restrictions in treated areas, if necessary, as per herbicide product label instructions. • Notify the public of the project to improve coordination and avoid potential conflicts and safety concerns during implementation of the treatment. • Control public access until potential treatment hazards no longer exist, per herbicide product label instructions. • Observe restricted entry intervals specified by the herbicide product label.

TABLE 2 (Cont.)
Standard Operating Procedures for Applying Pesticides

Resource Element	Standard Operating Procedure
Social and Economic Values (cont.)	• Notify local emergency personnel of proposed treatments. • Use spot applications or low-boom broadcast applications where possible to limit the probability of contaminating non-target food and water sources, especially vegetation over areas larger than the treatment area. • Consult with Native American tribes, Alaska Native groups, and Alaska Native Corporations to locate any areas of vegetation that are of significance to tribes, Native groups, or Alaska Native Corporations and that might be affected by herbicide treatments. • To the degree possible within the law, hire local contractors and workers to assist with herbicide application projects and purchase materials and supplies, including chemicals, for herbicide treatment projects through local suppliers. • To minimize fears based on lack of information, provide public educational information on the need for vegetation treatments and the use of herbicides in an integrated pest management program for projects proposing local use of herbicides.
Rights-of-way	• Coordinate vegetation management activities where joint or multiple use of a ROW exists. • Notify other public land users within or adjacent to the ROW proposed for treatment. • Use only herbicides that are approved for use in ROW areas.
Human Health and Safety	• Establish a buffer between treatment areas and human residences based on guidance given in the human health risk assessment, with a minimum buffer of ¼ mile for aerial applications and 100 feet for ground applications, unless a written waiver is granted. • Use protective equipment as directed by the herbicide product label. • Post treated areas with appropriate signs at common public access areas. • Observe restricted entry intervals specified by the herbicide product label. • Provide public notification in newspapers or other media where the potential exists for public exposure. • Have a copy of MSDSs/SDSs at work site. • Notify local emergency personnel of proposed treatments. • Contain and clean up spills and request help as needed. • Secure containers during transport. • Follow label directions for use and storage. • Dispose of unwanted herbicides promptly and correctly.

TABLE 3
Mitigation Measures From the 2007 PEIS

Resource	Mitigation Measures
Air Quality	None proposed.
Soil Resources	None proposed.
Water Resources and Quality	• Establish appropriate (herbicide specific) buffer zones to downstream water bodies, habitats, and species/populations of interest.
Wetland and Riparian Areas	• See mitigation for Water Resources and Quality and Vegetation.
Vegetation	• Minimize the use of terrestrial herbicides (especially bromacil, diuron, and sulfometuron methyl) in watersheds with downgradient ponds and streams if potential impacts to aquatic plants are of concern. • Establish appropriate (herbicide specific) buffer zones around downstream water bodies, habitats, and species/populations of interest. Consult the ecological risk assessments for more specific information on appropriate buffer distances under different soil, moisture, vegetation, and application scenarios. • To protect special status plant species, implement all conservation measures for plants presented in the Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment.
Fish and Other Aquatic Organisms	• Limit the use of diquat in water bodies that have native fish and aquatic resources. • Limit the use of terrestrial herbicides in watersheds with characteristics suitable for potential surface runoff, that have fish-bearing streams, during periods when fish are in life stages most sensitive to the herbicide(s) used. • To protect special status fish and other aquatic organisms, implement all conservation measures for aquatic animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*. • Establish appropriate herbicide-specific buffer zones for water bodies, habitats, or fish or other aquatic species of interest (see recommendations in individual ecological risk assessments). • Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing polyoxyethyleneamine (POEA), or seek to use formulations with the least amount of POEA, to reduce risks to aquatic organisms.
Wildlife	• To minimize risks to terrestrial wildlife, do not exceed the typical application rate for applications of dicamba, diuron, glyphosate, hexazinone, tebuthiuron, or triclopyr, where feasible. • Minimize the size of application areas, where practical, when applying 2,4-D, bromacil, diuron, and Overdrive® to limit impacts to wildlife, particularly through contamination of food items. • Where practical, limit glyphosate and hexazinone to spot applications in rangeland and wildlife habitat areas to avoid contamination of wildlife food items. • Avoid using the adjuvant R-11® in aquatic environments, and either avoid using glyphosate formulations containing POEA, or seek to use formulations with the least amount of POEA, to reduce risks to amphibians. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Vegetation section in Chapter 4) to limit contamination of off-site vegetation, which may serve as forage for wildlife. • Do not aerially apply diquat directly to wetlands or riparian areas. • To protect special status wildlife species, implement all conservation measures for terrestrial animals presented in the *Vegetation Treatments on Bureau of Land Management Lands in 17 Western States Programmatic Biological Assessment*. Apply these measures to special status species (refer to conservation measures for a similar size and type of species, of the same trophic guild).

TABLE 3 (Cont.)
Mitigation Measures From the 2007 PEIS

Resource	Mitigation Measures
Livestock	• Minimize potential risks to livestock by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible. • Do not apply 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, or triclopyr across large application areas, where feasible, to limit impacts to livestock, particularly through the contamination of food items. • Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. • Do not aerially apply diquat directly to wetlands or riparian areas used by livestock. • Do not apply bromacil or diuron in rangelands, and use appropriate buffer zones (see Vegetation section in Chapter 4) to limit contamination of off-site rangeland vegetation.
Wild Horses and Burros	• Minimize potential risks to wild horses and burros by applying diuron, glyphosate, hexazinone, tebuthiuron, and triclopyr at the typical application rate, where feasible. • Consider the size of the application area when making applications of 2,4-D, bromacil, dicamba, diuron, Overdrive®, picloram, and triclopyr in order to reduce potential impacts to livestock. • Apply herbicide label grazing restrictions for livestock to herbicide treatment areas that support populations of wild horses and burros. • Where feasible, limit glyphosate and hexazinone to spot applications in rangeland. • Do not apply bromacil or diuron in grazing lands within herd management areas, and use appropriate buffer zones (see Vegetation section in Chapter 4) to limit contamination of vegetation in off-site foraging areas. • Do not apply 2,4-D, bromacil, or diuron in herd management areas during the peak foaling season (March through June, and especially in May and June), and do not exceed the typical application rate of Overdrive® or hexazinone in herd management areas during the peak foaling season.
Paleontological and Cultural Resources	• Do not exceed the typical application rate when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr in known traditional use areas. • Avoid applying bromacil or tebuthiuron aerially in known traditional use areas. • Limit diquat applications to areas away from high residential and traditional use areas to reduce risks to Native Americans and Alaska Natives.
Visual Resources	None proposed.
Wilderness and Other Special Areas	Mitigation measures that may apply to wilderness and other special area resources are associated with human and ecological health and recreation. Please refer to the Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, Recreation, and Human Health and Safety sections of Chapter 4.
Recreation	Mitigation measures that may apply to recreational resources are associated with human and ecological health. Please refer to the Vegetation, Fish and Other Aquatic Resources, Wildlife Resources, and Human Health and Safety sections of Chapter 4.
Social and Economic Values	None proposed.
Human Health and Safety	• Use the typical application rate, where feasible, when applying 2,4-D, bromacil, diquat, diuron, fluridone, hexazinone, tebuthiuron, and triclopyr to reduce risk to occupational and public receptors. • Avoid applying bromacil or diuron aerially. • Limit application of chlorsulfuron via ground broadcast applications at the maximum application rate. • Limit diquat application to all-terrain vehicle, truck spraying, and boat applications to reduce risks to occupational receptors; limit diquat applications to areas away from high residential and subsistence use to reduce risks to public receptors. • Evaluate diuron applications on a site-by-site basis to avoid risks to humans. There appear to be few scenarios where diuron can be applied without risk to occupational receptors. • Do not apply hexazinone with an over-the-shoulder broadcast applicator.

ATTACHMENT H
Health and Safety Plan

ATTACHMENT I
Cultural and Human Remains Discovery Plan

ATTACHMENT J
Paleontological Discovery and Mitigation Monitoring Plan

ATTACHMENT K
Traffic and Transportation Plan

ATTACHMENT L
Dust Control and Air Quality Plan

ATTACHMENT M
Site Restoration Plan

ATTACHMENT N
Bird and Bat Conservation Plan

ATTACHMENT O
Environmental Construction Compliance Monitoring Program

ATTACHMENT P
Decommissioning Plan