
*Attachment DR140-1A
Preliminary Draft Plan*

Drainage, Erosion, and Sediment Control Plan

Ivanpah Solar Electric Generating System

Ivanpah, California

(07-AFC-5)

Submitted to the
California Energy Commission

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1.0 Introduction

This Preliminary Draft Drainage, Erosion, and Sediment Control Plan (DESCP) has been prepared in anticipation of the California Energy Commission's (CEC) approval of the proposed Ivanpah Solar Electric Generating System (Ivanpah SEGS or project) (07-AFC-5). Ivanpah SEGS is a solar energy complex composed of three separate facilities owned by Solar Partners I, LLC; Solar Partners II, LLC; and Solar Partners VIII, LLC; and related shared facilities owned by Solar Partners IV, LLC (hereafter "Applicant"), located in southern California's Mojave Desert, near the Nevada border, to the west of Ivanpah Dry Lake. The project will be located in San Bernardino County, California, on federal land managed by the Bureau of Land Management (BLM). This DESCP was prepared in response to CEC Staff Data Requests #139-140 in the CEC's data request letter dated May 8, 2008.

This DESCP is preliminary in nature because it has been prepared in advance of the final phase of construction planning and engineering design, during which the details of the construction schedule and certain aspects of erosion control design will be finalized. Per the request of the CEC and BLM, the final site layout, site drainage, and erosion control design will be prepared in advance of the final phase of construction planning and engineering design. This DESCP will be updated once the final site layout, site drainage, and erosion control design has been completed. Therefore, this document contains placeholders for information (detailed schedule, final BMP map) that will become available once the final site layout, site drainage, and erosion control design has been completed.

Once this DESCP is finalized, it will demonstrate that the project will not cause an increase in offsite flooding potential or sedimentation during the construction phase by using standard Best Management Practices (BMPs), and that the project will meet all local, state, and federal regulatory requirements associated with the protection of water quality and soil resources. In addition, the final DESCP will ensure compliance with the requirements of the Lahontan Regional Water Quality Control Board (RWQCB) as they relate to construction and post-construction BMPs.

1.1 Drainage, Erosion, and Sediment Control Plan Elements

This DESCP includes the following elements:

- **Vicinity Map** - This map indicates the locations of all project elements and depicts significant geographic features, including watercourses, swales, storm drains, and sensitive areas (Figure 1 - all figures are included in Appendix A).
- **Site Delineation** - The Ivanpah SEGS site and all project elements are delineated on a map showing all areas subject to soil disturbance and the location of all existing and proposed structures, pipelines, roads, and drainage facilities (Figure 2 and the Project Conceptual Plans).

- **Watercourses and Critical Areas** – The DESCPC shows the locations of watercourses and critical areas such as swales, creeks, rivers, wetlands and other environmentally sensitive areas (Figure 3).
- **Drainage** – The DESCPC provides a topographic site map (see the Project Conceptual Plans) showing existing, interim and proposed drainage systems; drainage area boundaries; watershed size in acres; and the hydraulic analysis (Appendix B) to support the selection of BMPs to divert offsite drainage around and through the plant and laydown areas. A narrative also is provided to support the map.
- **Clearing and Grading** – The DESCPC provides clearing and grading plans to show elevations, slope, location, and extent of proposed grading. The locations of any disposal areas, fills, or other special features are also shown (see the Project Conceptual Plans). A narrative also is included with a table showing the quantities of material excavated or filled for the site.
- **Best Management Practices** – The DESCPC describes the location, timing, and maintenance schedule of BMPs to be used (see the Project Conceptual Plans). Final design and placement of the BMPs will take place during the final phase of construction planning after licensing.

1.2 Federal Clean Water Act

The federal Clean Water Act (CWA) and subsequent amendments were established “to restore and maintain the chemical, physical, and biological integrity of the Nation’s waters,” under the enforcement authority of the US Environmental Protection Agency (EPA). The CWA established the National Pollutant Discharge Elimination System (NPDES) program to protect water quality of receiving waters. Under the CWA, Section 402, discharge of pollutants to receiving waters is prohibited unless the discharge is in compliance with an NPDES permit. In California, the USEPA has determined that the State Water Resources Control Board (SWRCB) and its nine RWQCBs have sufficient authority under state law to administer and enforce the federal NPDES permitting program. The project site is located within the boundaries of the Lahontan RWQCB. Discharges from the project site during operations will be regulated under a new, individual NPDES permit for industrial activities (operations are addressed in the project’s Industrial Stormwater Pollution Prevention Plan) and under a statewide NPDES permit during construction activities discussed in this document.

1.3 Project Overview

The Ivanpah SEGS will be located in southern California’s Mojave Desert, near the Nevada border, to the west of Ivanpah Dry Lake, in San Bernardino County, California, on federal land managed by BLM. The three solar concentrating thermal power plants are based on distributed power tower and heliostat mirror technology, in which heliostat (mirror) fields focus solar energy on power tower receivers near the center of the heliostat array. The Ivanpah SEGS will be constructed in three phases: two 100-megawatt (MW) phases (known as Ivanpah 1 and 2) and a 200-MW phase (Ivanpah 3). The phasing is planned so that Ivanpah

1 (the southern-most site owned by Solar Partners II, LLC) will be constructed first, followed by Ivanpah 2 (the middle site, owned by Solar Partners I, LLC), then Ivanpah 3 (the 200 MW plant on the north owned by Solar Partners VIII, LLC), though the order of construction may change. Each 100-MW site requires about 914 acres (or 1.4 square miles); the 200-MW site is about 1,785 acres (or about 2.8 square miles). The total area required for all three phases, including the Administration/Operations and Maintenance building and substation, is approximately 3,700 acres. The Applicant has applied for right-of-way grants for the land from BLM. Although this is a phased project, it is being analyzed as if all phases are operational.

The heliostat (or mirror) fields focus solar energy on the power tower receivers near the center of each of the heliostat arrays (the 100-MW plants has one array and the 200-MW plant has four arrays). Within each array, heliostats are located on rows arranged in arcs with progressively larger radii. A power block of approximately 500 by 510 feet is located at each plant. The power block contains the power generation equipment including a steam turbine, natural gas-fired start-up boiler and auxiliary equipment. The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the solar fields will discourage water from concentrating to maintain sheet flow. In addition, each power block will have two concrete holding basins, each approximately 240 square feet in size that can serve for boiler commissioning and emergency outfalls from any of the processes. The basins will also be used for discharge of uncontaminated water used to pressure test and clean the pipelines.

In each plant, one Rankine-cycle reheat steam turbine receives live steam from the solar boilers, and reheat steam from one solar reheater-located in the power block at the top of its own tower. The solar field and power generation equipment are started each morning after sunrise and insolation build-up, and shut down in the evening when insolation drops below the level required to keep the turbine online. Each plant will have a 200 KW diesel fire pump and an emergency diesel generator, sized to provide emergency power to the feedwater pump, boiler circulation pumps, and firewater pump.

In addition, two onsite wells, fitted with a pump and motor, and associated underground HDPE or PVC pipe will be drilled adjacent to Ivanpah 1's northwest corner. Contemplated raw water tank capacity in each project is 250,000 gallons, but the final size will depend on fire marshal requirements. The site will include a water filtration and deionization system and associated storage tanks.

Each phase of the project includes a small package natural gas-fired start-up boiler to provide heat for plant start-up and during temporary cloud cover. The project's natural gas system will be connected to the Kern River Gas Transmission Line, which passes less than half a mile to the north of the project site. Raw water will be drawn daily from one of two onsite wells, located near Ivanpah 1's northwest corner. Each well will have sufficient capacity to supply water for all three phases. Groundwater will go through a treatment system for use as boiler make-up water and to wash the heliostats. To save water in the site's desert environment, each plant will use a dry-cooling condenser. Water consumption is therefore minimal (estimated at no more than 100 acre-feet/year for all three phases). Each phase includes a small onsite wastewater package treatment plant located in the power

block that treats wastewater from domestic waste streams such as showers and toilets. A larger sewage package treatment plant will also be located at the Administration Building/Operations and Maintenance area, located between Ivanpah 1 and 2. Sewage sludge will be removed from the site by a sanitary service provider. No wastewater will be generated by the system, except for a small stream that will be treated and used for landscape irrigation. If necessary, a small filter/purification system will be used to provide potable water at the Administration Building.

Fabrication buildings that will be used to assemble heliostats and for other work during all three construction phases will be located in a 120-acre area (the “construction logistics area”) located between Ivanpah 1 and 2. Once construction of Ivanpah 3 is completed, the buildings will be removed and the area restored. In addition to the 120-acre construction logistics area, 257 acres will be reserved for temporary use making the total temporary construction area of about 377 acres.

Ivanpah 1, 2 and 3 will be interconnected to the Southern California Edison (SCE) grid through upgrades to SCE’s 115-kilovolt (kV) line passing through the site on a northeast-southwest right-of-way. These updates will include the construction by SCE of a new 230/115kV breaker-and-a-half substation between the Ivanpah 1 and 2 project sites. This new substation and the 230 kV upgrades will be for the benefit of Ivanpah and other Interconnection Customers in the region. The existing 115-kV transmission line from the El Dorado substation will be replaced with a double-circuit 230-kV overhead line that will be looped into the new substation. Power from Ivanpah 1, 2 and 3 will be transmitted at 115 kV to the new substation. SCE plans to add three new 115-kV lines to increase capacity to the existing El Dorado-Baker-Cool Water-Dunn Siding-Mountain Pass 115-kV line heading southwest. SCE is evaluating two alternate substation locations, both to the north of the three electrical lines running southwest to northwest between Ivanpah 1 and Ivanpah 2. The substation area is 835 feet x 850 feet, with an additional 400 feet x 835 feet at both the southwest and northeast ends to accommodate the turning of the lines into the substation. This area outside the station but within the ROW will also be used by SCE for a temporary laydown area during construction. The timing of this upgrade depends upon the development of wind projects ahead in the queue, and is not affected by the Ivanpah SEGS project.

As part of a Special Protection Scheme required for the solar plant operation, SCE is evaluating a telecommunications route between the AT&T radio facility in Mountain Pass and the Ivanpah substation. The fiber optic cable would be added to the existing Nipton 33 kV wood pole line that parallels the 115 kV line from the Ivanpah substation approximately 7 miles southwest to the Mountain Pass substation and from there using the Earth 12 kV pole line that travels south approximately 1.5 miles to the radio facility.

The following public trails will be rerouted to allow continued use and access to the Ivanpah Valley and environs:

- Trial 699226, which passes through the northern third of Ivanpah 3, would be rerouted along the northern border of Ivanpah 3;
- Trail 699198 which passes between Ivanpah 2 and 3, would be rerouted between those two proposed plants;

- Unnumbered trail on the east side of Ivanpah 3, (north of the limestone outcrop), would be relocated outside the project site.

Figure 1 shows the regional location of the project. Figure 2 shows the project location and location of all existing and proposed pipelines and roads. Locations of watercourses and critical areas such as ephemeral washes are shown in Figure 3. A site plan which includes drainage characteristics and proposed BMP locations is provided in the Project Conceptual Plans. All figures are provided in Appendix A.

The project will comply with all local, state, and federal regulatory requirements associated with the protection of water quality and soil resources, as indicated in the Application for Certification for the Ivanpah SEGS.

1.4 Watercourses and Critical Areas

1.4.1 Watercourses

The project area is located in the Ivanpah hydrologic unit of the South Lahontan Watershed, which includes approximately 278,486 acres in the Ivanpah and Pahrump Valleys of California and Nevada. In this area, all drainage is internal with the rapid runoff from mountains and alluvial fans collecting in closed basins in the Ivanpah Valley. Major surface water features within the Ivanpah Valley include Ivanpah Lake, Roach Lake, and numerous springs and ephemeral washes. The Ivanpah Valley is a topographically closed basin and surface water drainage evaporates on Ivanpah Lake or Roach Lake. The Ivanpah Valley is part of a larger hydrologic system that includes both Ivanpah Valley and Jean Lake Valley. The portion of the valley in California is generally referred to as Ivanpah South, while the portion of the basin in Nevada is generally referred to as Ivanpah North.

The project site is located within the Ivanpah South portion of the valley. Ivanpah South includes the 35-square-mile Ivanpah Lake, several ephemeral waterways, and scattered springs along the mountain front. Overall surface drainage in Ivanpah South is towards Ivanpah Lake (DWR, 2004). Ivanpah Lake is located approximately 2 miles east and down slope of the project area. Waterways in or near the project site include unnamed ephemeral washes. These ephemeral washes typically flow only in response to storm events. There are two mapped springs, Whisky Spring and Ivanpah Spring, located approximately 1.6 miles west of the proposed project site in the foothills of the Clark Mountains. There are no springs located on the project site.

1.4.2 Other Critical Areas

The project area is dissected by numerous ephemeral washes ranging in size from small (1 to 4 feet wide), weakly expressed erosional features to broad (over 10 feet wide) drainages. The active flow channels are devoid of vegetation and typically have a sandy-gravel substrate, although some washes also contain cobble and scattered larger rocks. Throughout the project area the majority of the washes are associated with Mojave Creosote Bush Scrub habitat. Species such as cheesebush, are common in some medium to large sized washes; especially in braided channels that contain slightly elevated areas intermixed with the active flow channels. Mojave Wash Scrub is limited to the larger washes (typically over 15 feet) with sandy gravel substrate and well defined banks.

A total of 1,689 ephemeral washes were identified and mapped in the project study area. Small to medium sized washes are common and widespread throughout the entire project area, while the larger washes are most abundant in the northern section of Ivanpah 3 as well as the eastern side of Ivanpah 2. No other wetlands or waters were identified in the project area (Figure 3).

2.0 Drainage

2.1 Precipitation

The project site is located in southern California's Mojave Desert in the Ivanpah Valley. Ivanpah Valley is a semi-arid, topographically closed basin. Average annual precipitation at the project site from 1971 to 2000 was 8.31 inches. Most of the precipitation in the project area falls during January through March and July through September. The rainfall for a 10-year 24-hour event is 1.9 inches and 1.6 inches for a 6-hour event¹ (Appendix B).

2.2 Drainage

Stormwater runoff at the site is predominantly sheet flow from west to east, eventually discharging into Ivanpah Dry Lake.

With exception of the power block areas, solar field development will maintain sheet flow where possible, with water exiting the site in existing natural contours and flows.

Existing small to moderate ephemeral washes will remain intact at locations capable of being traversed by installation equipment; large ephemeral washes that are subject to damaging heliostats or power block equipment will be routed through detention ponds and/or diversion channels either through or along the outer perimeter of each solar field. The large washes will then be graded to the extent necessary to provide equipment access. At locations where stormwater crosses roads (all surface types) as sheet flow, existing grade will be maintained. In situations where concentrated stormwater crosses paved roads, culverts will be constructed to pass the 100 year, 24 hour storm event. At locations where concentrated stormwater crosses unpaved roads or trails, a slight grading of the channel bank will be performed in order to provide vehicular access across the wash (provide an earthen ramp).

Detention ponds sized for the site's 100 year, 24 hour storm event will be placed upstream in each facility drainage area (on the high side of the site) to detain and release a volume of concentrated offsite stormwater run-on equivalent to the volume required for conventional on-site stormwater detention and runoff. Stormwater received in excess of the volume required for detention will be permitted to surcharge the ponds and will be directed to long broad crested weirs armored with native stone to convey the excess stormwater across the site as sheet flow. At pond locations with exceptionally large concentrated offsite stormwater run-on, a portion of the excessive flow will be directed to bypass channels for redirection and velocity control prior to release within the site as sheet flow. Stormwater falling directly onto each facility will be conveyed through each site combined with the excess stormwater from the ponds and will not require additional detention.

¹ The general accepted design standard for a BMP is to a precipitation intensity of a 10-year, 6-hour event. The majority of the operational BMPs at the site, however, have been designed to a precipitation intensity of 100-year, 24-hour event.

Stormwater will be channeled around the power blocks on their north and south sides (using a small berm, between 3 to 6.5 feet high, on the west side of each power block with a north-south intercept channel at its base with stabilized slopes) to channel storm runoff around each area before discharging as sheet flow. The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the solar fields will discourage water from concentrating to maintain sheet flow and prevent scouring. The diversion ditches and infiltration/evaporation areas will be designed to pass flow from a 100-year storm event to prevent damage to the power block and tower areas. In addition, each power block will have two concrete holding basins, each approximately 240 square feet in size that can serve for boiler commissioning and emergency outfalls from any of the processes. The basins will also be used for discharge of uncontaminated water used to pressure test and clean the pipelines. During periods of heavy rain the concrete holding basins may overflow into the respective infiltration/evaporation area. In Ivanpah 2, the power block area is situated so that the streambed and associated stream flows will not need to be routed around the power block area to protect it against flooding during high flow events. Hence, the original streambed at Ivanpah 2 will not be disturbed (see the Project Conceptual Plans).

As described previously, this DESCOP will be updated once the final site layout, site drainage, and erosion control design has been completed. Design drawings would be incorporated into the DESCOP once this information is available.

Stormwater management practices will follow the California Storm Water Quality Association (CASQA) California Storm Water BMP Handbook. The Project Conceptual Plans in Appendix A depicts the site grading and stormwater drainage plan that shows drainage after construction.

2.3 Hydraulic Analysis

Preliminary stormwater calculations are located in Appendix B. The watershed of the project area is 14,856 acres in size.

3.0 Clearing and Grading

3.1 Areas to be Cleared and Graded

The existing site has about a 5 percent relatively uniform natural slope up from east to west, located on a relatively small alluvial runoff drainage basin, which can be accommodated by the heliostat fields. The erection and operation of the heliostat fields therefore requires only topsoil stripping and local leveling of significant projections and depressions. Heliostats are relatively small (2.25 meters high) and light (100 kilograms) structures, contain no hazardous materials, and are not essential structures. Extensive grading of the site will be limited to the power block areas, receiving towers and the major access roads (asphalt roads between power blocks and gravel roads servicing the receiving towers from the power blocks). Heavy equipment will be stored on dunnage to protect it from ground moisture.

Within the heliostat array fields, all vegetation between every other row will be cleared with a blade to reduce the risk of fire. Scalping vegetation with a grader blade will likely go a couple inches into the soil and leave some of the existing root systems intact to anchor the soil at locations where the vegetation was cleared, reducing the potential for erosion. In areas of substantial grading (power block areas, receiving towers, major access roads and in heliostat field areas requiring significant improvements to grade for access), topsoil will be stripped to a depth of about one foot, in order to remove plants and roots to accommodate heliostat erection in the solar field, and as pre-excitation activity in the power block and solar tower areas. As much as possible, stripped topsoil will be incorporated in and compacted into final site work shapes. Native vegetation may be harvested for possible reuse to obtain long term soil stabilization.

Finish grade in the solar field areas will maintain natural drainage features where practical and grading is to be designed to promote sheet flow where possible.

All underground piping and wiring will be installed, followed by installation of the foundation for the new power blocks, solar towers and associated structures.

Parking areas for construction workers and laydown areas for construction materials will be prepared. Detailed information regarding the location within the solar field of the laydown and parking areas will be developed after a Contractor is hired, and incorporated into the Final DESCP.

Primary access to the site is via the Yates Well Road interchange on Interstate 15, and Colosseum Road to the west of the Primm Valley Golf Club. Colosseum Road will be re-routed between Ivanpah 1 and Ivanpah 2 and paved from its intersection with Yates Well Road to the project site. In addition, the access roads to individual plants will be paved from their point of connection to Colosseum Road. Access road beds will typically be 30 feet of asphalt with 5-foot-wide crushed rock shoulders. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

After final site design and prior to any soil disturbance, the Applicant will prepare the Final DESC. During construction, the Applicant will be required to follow the DESC to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the Final DESC; the DESC will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP (reference the Project Conceptual Plans for proposed BMP locations in this DESC).

3.1.1 Gas Pipeline

Trenching-width to construct the natural gas pipeline depends on the type of soils encountered and requirements of the governing agencies. The optimal trench will be approximately 36 inches wide and 5 to 10 feet deep. With loose soil, a trench up to 8 feet wide at the top and 3 feet wide at the bottom may be required. The pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil will be piled on one side of the trench and used for backfilling after the pipe is installed. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.

Stainless steel piping will be tested with demineralized water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the concrete holding basins, unless the analysis shows that the water is contaminated, in which case the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction Contractor, as required.

3.2 Location of Disposal Areas, Fills or Other Special Areas

All excavated soil will be used onsite for grading and leveling purposes and no soils will be disposed of offsite.

3.3 Existing and Proposed Topography

The existing site has about a 5 percent relatively uniform natural slope up from east to west, which can be accommodated by the heliostat fields. The sites topography varies across each heliostat field requiring different levels of disturbance to obtain the final topography suitable for the erection and operation of the heliostats. Grade and topography are to be modified (if required) to ensure the minimum disturbance needed for the access of installation equipment and materials. In areas where the existing terrain will permit access, grading will be restricted and only vegetation is to be removed. In areas where the existing topography requires modification, access will be improved by leveling (cut and filling) or conventional grading (where required).

At completion of the project, onsite drainage will be accomplished through gravity flow. Stormwater will flow through the heliostat fields and diverted around the power blocks on their north and south sides to channel storm runoff around each area before discharging as sheet flow. The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before

overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the solar fields will discourage water from concentrating to maintain sheet flow.

Appendix A contains drawings that show topography before and after construction.

3.4 Volumes of Cut and Fill

The grading of the site to design elevations will require cut and fill. Preliminary cut and fill volumes for each project element will be available as part of the 90 percent design package. Trenches excavated for the underground utilities will be entirely refilled. No surplus soil is expected. The updated information will be incorporated into the Final DESCP.

4.0 Project Schedule

Construction would take place over approximately 48 months, from the third quarter of 2009 to the fourth quarter 2013. Commercial operations are expected to commence in 2011 at Ivanpah 1, in 2012 at Ivanpah 2, and in 2013 at Ivanpah 3. Major milestones are listed in Table 4.0-1. A more detailed project schedule will be provided in a future draft of this DESCOP once more detailed information on the project design and construction are known and a Contractor has been selected.

TABLE 4.0-1
Project Schedule Major Milestones

Activity	Date
Begin Construction	Third Quarter 2009
Ivanpah 1 Commercial Operation	Second Quarter 2011
Ivanpah 2 Commercial Operation	Second Quarter 2012
Ivanpah 3 Commercial Operation	Fourth Quarter 2013

4.1 Mobilization

The selected Contractor will mobilize and develop temporary construction facilities and laydown areas adjacent to the power block. Clearing and grubbing will start in the power block area and last 4 months. Areas cleared and grubbed will be smoothed by 1 grader and compacted by 2 vibrating rollers over a period of 5 months.

4.2 Heliostat Erection

Solar field erection works will require at least two pre-assembly sheds for assembling heliostat structures. Approximately 55,000 heliostats will need to be erected in Ivanpah 1 and 2 with Ivanpah 3 requiring about 104,000 heliostats. Fabrication buildings will be used to assemble heliostats and for other work during all three construction phases. These buildings will be located in the construction logistics area, which is situated between Ivanpah 1 and 2. Once construction of Ivanpah 3 is completed, the buildings will be removed and the area restored.

4.3 Power Block and Towers

Concrete, mechanical and electrical works will be performed over a period of 15 months.

The construction logistics area, located between Ivanpah 1 and 2, will be used for the fabrication sheds and construction parking. It can be used for construction laydown if necessary. However, temporary laydown of materials at each site will generally occur in the vicinity of active construction work.

5.0 Best Management Practices

The project has been designed to impact as small an area as possible at any given time, thereby limiting the amount of exposed soil. Construction is expected to proceed as expediently and efficiently as possible, thereby ensuring that as little soil is exposed for as short a time as possible. The following sections present standard construction BMPs, most of which are described in the *California Storm Water Best Management Practice Handbook* (2003) and the *Caltrans Storm Water Quality Handbook* (2003). These resource handbooks provide comprehensive details on BMP implementation and will be obtained and reviewed by managers for all construction contractors that may have an impact on implementation of the DESC. Appendix C contains the CASQA Handbook BMP factsheets with detailed descriptions of the BMPs discussed in the following sections. The fact sheets also include the maintenance practices for each BMP. The Project Conceptual Plans show the location of all BMPs to be used and will be further developed during the final project design phase. The Final DESC will include locations and details of all BMPs to be used during the construction of linear features, such as roads and pipelines.

The following sections present the recommended construction BMPs for stormwater pollution prevention at the Ivanpah SEGS construction laydown areas, plant site, and linear facilities. Each section provides information on BMP implementation as it relates to the activity being performed. BMPs that may have an impact on implementation of the DESC will be reviewed by managers and construction contractors. While performing the work, the contractors may implement additional control measures if necessary.

5.1 General Erosion and Sediment Control Measures

The project has been designed to impact as small an area as possible at any given time, thereby limiting the amount of exposed soil. BMPs will be used to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation. Temporary erosion control measures would be implemented before construction begins and they would be evaluated and maintained during construction. These measures typically include mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These measures would be removed from the site after the completion of construction.

To reduce erosion, project construction will minimize land disturbance by limiting construction activities only to areas that are essential to the installation and operation of the project. Grading is not intended to level the site, but rather to prepare the site for installation and future maintenance of the heliostats. Within the heliostat array fields, all vegetation between every other row will be cleared with a blade to reduce the risk of fire. Scalping vegetation with a grader blade will likely go a couple inches into the soil and leave some of the existing root systems intact to anchor the soil at locations where the vegetation was cleared, reducing the potential for erosion. Extensive site grading consisting of cuts and fills will be limited to the power block areas, receiving towers, major access roads (asphalt roads between power blocks and gravel roads servicing the receiving towers) and in heliostat field

areas requiring significant improvements to grade for access. At this time it is unknown whether vegetation removed by blading will be burned, or mulched into the soil, and/or stockpiled for transport offsite. The matter is being discussed with the regulatory agencies and the information will be incorporated into the Final DESCP. BLM may also potentially open up the site prior to site grading to invite the public to come in and salvage the accessible vegetation. Disking and light grading may be used prior to compaction by rolling. Disturbed soils will be compacted to reduce the rainfall absorptive capacity and vegetative productivity of the soils that are permanently covered by project facilities.

Non-active areas will be stabilized as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased.

It will be necessary to segregate and stockpile surface soils and organic matter during construction and excavation. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long term soil stabilization. All excavated soils are to be reused during construction at the site to prevent subsequent erosion and sedimentation issues. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion and sediment control methods.

Potable water (groundwater) will be applied to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed.

The access roads to individual plants will be paved from their point of connection to Colosseum Road. Colosseum Road, from its intersection with Yates Well Road to the project site, will also be paved. All public roadways (Yeats Well Road and Colosseum Road) will be maintained free from dust, dirt and debris caused by construction activities. These streets will be swept at the end of the day if visible soil materials are carried onto them.

A mitigation monitoring plan also will be developed in conjunction with BLM and CEC Staff to set performance standards and monitor the effectiveness of BMPs. This plan will address the timing and methods of such measures, as well as reporting and response requirements. Personnel will receive training to conduct their jobs properly and recognize and report abnormal/adverse situations so that they can be quickly corrected.

The following general erosion and sediment control measures may be used during various phases of the project:

- Proper scheduling and sequencing of activities (EC-1)
- Preservation of existing vegetation (EC-2)
- Hydraulic mulch (EC-3)
- Straw mulch (EC-6)
- Placement of geotextiles, plastic covers, and erosion control blankets/mats (EC-7)
- Earth dikes and drainage swales (EC-9)
- Velocity dissipation devices (EC-10)
- Streambank stabilization (EC-12)
- Silt fences and fiber rolls (SE-1 and SE-5)
- Sediment basin (SE-2)
- Sediment trap (SE-3)

- Check dams (SE-4)
- Gravel bag berm (SE-6)
- Stockpile management (WM-3)

5.1.1 Access Road, Entrance and Parking, and Laydown Areas/ Offsite Vehicle Tracking

Controls will be in place to minimize or eliminate soils from being tracked off the project site from vehicles. Primary access to the site is via the Yates Well Road interchange on I-15, and Colosseum Road to the west of the Primm Valley Golf Club. Colosseum Road will be re-routed between Ivanpah 1 and Ivanpah 2 and paved from its intersection with Yates Well Road to the project site. In addition, the access roads to individual plants will be paved from their point of connection to Colosseum Road. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

The parking and laydown areas will be stabilized with coarse gravel. All surfaces will be regularly watered to reduce generation of dust, but will not be excessively watered so as to generate runoff. Silt fencing or fiber rolls may be used at edges of these areas, as necessary to minimize sediment discharging into swales or ditches.

All public roadways (Yeats Well Road and Colosseum Road) will be maintained free from dust, dirt and debris caused by construction activities. These streets will be swept at the end of the day if visible soil materials are carried onto them.

The following control methods will be considered for offsite vehicle tracking, as necessary:

- Stabilized construction entrance/exit (TC-1)
- Stabilized construction roadway (TC-2)
- Tire wash (TC-3)
- Entrance/exit Street sweeping (SE-7)
- Paving and grinding operations (NS-3)

5.1.2 Dust Suppression and Control

During construction of the project and the related linear facilities, dust erosion control measures would be implemented to minimize the wind-blown loss of soil from the site. Potable water (groundwater) will be applied to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed, but will not be excessively watered so as to generate runoff.

The following control method will be considered for dust suppression, as necessary:

- Wind erosion control (WE-1)
- Water conservation practices (NS-1)

5.1.3 Ivanpah SEGS Site and Linear Facilities

The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters

and local diversion berms through the solar fields will discourage water from concentrating to maintain sheet flow.

Overall the project is being designed to maintain, to the extent possible, the existing sheet flow patterns on the site.

Sediment control barriers would be placed in locations where offsite drainage could occur to prevent sediment from leaving the site. If used, sediment barriers would be properly installed, then removed or used as mulch after construction. Any soil stockpiles, including sediment barriers around the base of the stockpiles, would be stabilized and covered.

The excavated soil from trenching activities associated with construction of the natural gas pipeline will be piled on one side of the trench and used for backfilling after the pipe is installed. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.

Primary access to the site is via the Yates Well Road interchange on I-15, and Colosseum Road to the west of the Primm Valley Golf Club. Colosseum Road will be re-routed between Ivanpah 1 and Ivanpah 2 and paved from its intersection with Yates Well Road to the project site. In addition, the access roads to individual plants will be paved from their point of connection to Colosseum Road. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.

5.1.4 Site Stabilization and Demobilization

As construction nears completion, areas used for parking, storage and laydown will be cleared and stabilized. Areas that will continue to be used for parking or storage will have permanent stormwater collection and conveyance structures provided.

Within the heliostat array fields, vegetation between every other row will be cleared with a blade to reduce the risk of fire. Scalping vegetation with a grader blade will likely go a couple inches into the soil and leave some of the existing root systems intact to anchor the soil at locations where the vegetation was cleared, reducing the potential for erosion.

Overall the project is being designed to maintain, to the extent possible, the existing sheet flow patterns on the site. Large ephemeral washes carrying offsite stormwater run-on are to be intercepted by detention ponds to control the direction and velocity of stormwater before release through native rip-rap as sheet flow. Stormwater will be channeled around the power blocks on their north and south sides (using a small berm, between 3 to 6.5 feet high, on the west side of each power block with a north-south intercept channel at its base with stabilized slopes) to channel storm runoff around each area before discharging as sheet flow. The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the solar fields will discourage water from concentrating to maintain sheet flow and prevent scouring. The diversions ditches and infiltration/evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage to the power block and tower areas.

In addition, each power block will have two concrete holding basins, each approximately 240 square feet in size that can serve for boiler commissioning and emergency outfalls from any of the processes. The basins will also be used for discharge of uncontaminated water used to pressure test and clean the pipelines. During periods of heavy rain the concrete holding basins may overflow into the respective infiltration/evaporation area. In Ivanpah 2, the power block is situated so that the streambed and associated stream flows will not need to be routed around the power block area to protect it against flooding during high flow events. Hence, the original streambed at Ivanpah 2 will not be disturbed (see the Project Conceptual Plans). No reject streams from water treatment are planned to be generated onsite.

Berms will capture stormwater from equipment at the power block areas that contain oils and direct the stormwater to pass through an oil/water separator prior to discharge (see the Project Conceptual Plans).

Heliostats are relatively small (about 13 feet high), contain no hazardous materials, and are not essential structures. Their potential structural failure in flood conditions also does not pose a risk to personnel, and the heliostat fields therefore require no special flood protection measures. Onsite water consumption will be minimal – mainly to replace boiler feedwater blowdown and provide deionized water for washing heliostats. The latter is required in a washing cycle of 2 weeks, during which all heliostats are washed, to maintain them at full performance. Because of dust created during site grading, the washing cycle potentially may be more frequent (but not likely more than double) when one plant is operating and another is being graded. This situation would be limited to a 5-month period when Ivanpah 1 is operational as Ivanpah 3 is being graded.

Paved access roads will be protected from floods via ditches, culverts and local fords with reinforced concrete shoulders. Routine vehicle traffic during project operation would be limited to existing roads, most of which will be paved or covered with gravel. Access routes will also be graded between the heliostat arrays to permit bi-weekly washing of the mirrors with a pick-up truck-mounted tanker and the occasional blading of vegetation to reduce the risk of fire due to plant re-growth. Standard operating activities would not involve the disruption of soil. When linear facilities need to be inspected or maintained, vehicle traffic near these areas would be minimized.

Once the project grading plan has been finalized, a figure will be added to that shows the post-construction runoff and drainage patterns. In addition, the Final DESCP will include a schedule for maintenance of post-construction BMPs.

5.2 Other Controls

Ivanpah SEGS will use hazardous materials during construction, such as vehicle fluids, including oil, grease, petroleum, and coolants, paints, solvents and curing compounds. The project will comply with good engineering practices, applicable laws and regulations for the storage of these materials to minimize the potential for a release of hazardous materials, and will conduct emergency response planning to address public health concerns regarding hazardous materials use and storage.

5.2.1 Material Handling and Storage

All construction equipment will be maintained to control leaks and spills, and fueling will only be conducted within contained areas. Any contaminated soils resulting from spills will be dug up as quickly as possible, and then removed from the site for proper disposal. Reference Section 5.2 for additional control measures.

There will be a variety of chemicals stored and used during the construction of Ivanpah SEGS. All hazardous materials will be handled and stored in accordance with applicable codes and regulations. In addition, a Hazardous Materials Business Plan is required by California Code of Regulations Title 19 and the Health and Safety Code (Section 25504). In accordance with these regulations, the Hazardous Materials Business Plan will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. Specific topics to be covered in the plan include:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material above threshold limits)
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The Hazardous Materials Business Plan will be filed with the San Bernardino County Division of Environmental Health (DEH) and updated annually in accordance with applicable regulations. The San Bernardino County DEH will ensure review by and distribution to other potentially affected agencies including the local fire district.

The quantities of hazardous materials that will be onsite during construction will generally be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. There are no feasible alternatives to vehicle fuels and oils for operating construction equipment. The types of paint required are dictated by the types of equipment and structures that must be coated and by the manufacturers' requirements for coating.

The following BMPs will be considered for material handling and storage:

- Vehicle and equipment cleaning (NS-8)
- Vehicle and equipment refueling (NS-9)
- Vehicle and equipment maintenance (NS-10)
- Material delivery and storage (WM-1)
- Material use (WM-2)
- Spill prevention and control (WM-4)

5.2.2 Foundations

During construction of the foundations, a concrete washout area will be required. The concrete washout area's location in the construction logistics area and size will be shown on

the project drawings. Dumping of excess concrete and washing out of delivery vehicles will be prohibited at other locations onsite. Notices will be posted to inform all drivers.

The following BMPs will be considered during the construction of foundations:

- Concrete waste management (WM-8)
- Concrete curing (NS-12)
- Concrete finishing (NS-13)

5.2.3 Solid and Hazardous Waste Management

During construction, the primary waste generated will be solid nonhazardous waste. However, some nonhazardous liquid waste and hazardous waste (solid and liquid) will also be generated. Most of the hazardous wastes will be generated at the plant site. The types of waste are described below.

5.2.3.1 Nonhazardous Solid Waste

Listed below are nonhazardous waste streams that could potentially be generated from construction activities.

Paper, Wood, Glass, and Plastics. Paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers during project construction. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. Onsite, the waste will be placed in dumpsters.

Concrete. Waste concrete will be disposed of in a Class III landfill or at clean fill sites, if available or will be recycled and disposed of at a construction and demolition site.

Metal. Waste metal, including steel from welding/cutting operations, packing materials, and empty nonhazardous chemical containers, and aluminum waste from packing materials and electrical wiring will be recycled where practical and nonrecyclable waste will be deposited in a Class III landfill.

5.2.3.2 Wastewater

Wastewater generated during construction will include stormwater runoff, pressure testing water, and equipment washdown water. Depending on the chemical quality of these wastewaters, they could be classified as hazardous or nonhazardous. The waste waters would be sampled and if they are hazardous would be disposed of in accordance with applicable regulations.

Stainless steel piping will be tested with demineralized water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the concrete holding basins, unless the analysis shows that the water is contaminated, in which case the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction Contractor, as required.

5.2.3.3 Hazardous Waste

Most of the hazardous waste generated during construction will consist of liquid waste, such as water from flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Some hazardous solid waste, such as welding materials, batteries, and dried paint, may also be generated.

Flushing and cleaning waste liquid will be generated as pipes are cleaned and flushed. The volume of flushing and cleaning liquid waste generated is estimated to be one to two times the internal volume of the pipes cleaned. The quantity of welding, solvent, batteries, and paint waste is expected to be minimal. Wastewaters generated during construction could also be considered hazardous, if demonstrated so by sampling.

The construction contractor will be considered the generator of hazardous construction waste and will be responsible for proper handling of hazardous waste in compliance with all applicable federal, state, and local laws and regulations. This responsibility will include licensing, personnel training, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. It will be moved daily to the contractor's 90-day hazardous waste storage area located at the site construction laydown area. The waste will be removed from the site by a certified hazardous waste collection company and delivered to an authorized hazardous waste management facility, before expiration of the 90-day storage limit.

The following BMPs will be considered at the designated storage locations:

- Cover or store hazardous materials indoors, if possible (WM-1)
- Material delivery and storage (WM-1)
- Material use (WM-2)
- Spill prevention and control (WM-4)
- Solid waste management (WM-5)
- Hazardous waste management (WM-6)
- Sanitary/Septic Waste Management (WM-9)

5.2.4 Potential Contaminated Soil

The project area is characterized by a desert scrub community dominated by creosote bush (*Larrea tridentata*) and white bursage (*Ambrosia dumosa*). The ground surface is primarily comprised of coalesced and dissected alluvial fans and desert washes.

It is unlikely that, with exception of light cattle grazing, there has been any other historical use of the site. Soils in the area are not expected to be contaminated. No existing site features have, as a result of past usage, contributed pollutants to stormwater (e.g., toxic materials that have been treated, stored, disposed of, spilled, or leaked onto the construction site).

As such, it is unlikely that contaminated soil will be encountered during construction. However, operators and construction personnel will be asked to report unusual conditions to the appropriate personnel and the area and/or material will be properly contained during investigative actions. If soils require temporary stockpiling, piles will be placed on and covered with plastic sheeting or tarps that are secured safely with sand bags and

bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled and properly disposed of in an authorized waste management facility.

The following BMP will be considered:

- Contaminated Soil Management, WM-7

5.2.5 Groundwater/Dewatering Controls

It is unlikely that groundwater will require removal during the construction phase of Ivanpah SEGS because the groundwater table is believed to be located substantially below the maximum excavation depth.

The infiltration/excavation basins at the power blocks would be constructed prior to initiating any other onsite trenching or excavation activities. Subsequently, stormwater would be conveyed as needed (pumped or gravity flow) from open pit areas to these infiltration/excavation basins, which will be sized to handle the 100-year storm events, and allowed to infiltrate or evaporate.

If any contamination is detected via odors or visible sheens, the collected stormwater will be handled and properly disposed of in a manner consistent with federal, state, and local regulations. The following control methods will be considered for groundwater/dewatering controls, as necessary:

- Dewatering operations (NS-2)

6.0 References

California Department of Water Resources (DWR). 2004. California's Groundwater - Bulletin 118. Basin Descriptions: Ivanpah Valley Groundwater Basin.
http://www.groundwater.water.ca.gov/bulletin118/basin_desc/basins_s.cfm.

APPENDIX A

Figures

APPENDIX B

Stormwater Calculations

APPENDIX C

Best Management Practices
